TEI POST

The Periodical of TUSAS Engine Industires, Inc, (TEI).

ISSUE 130 2016

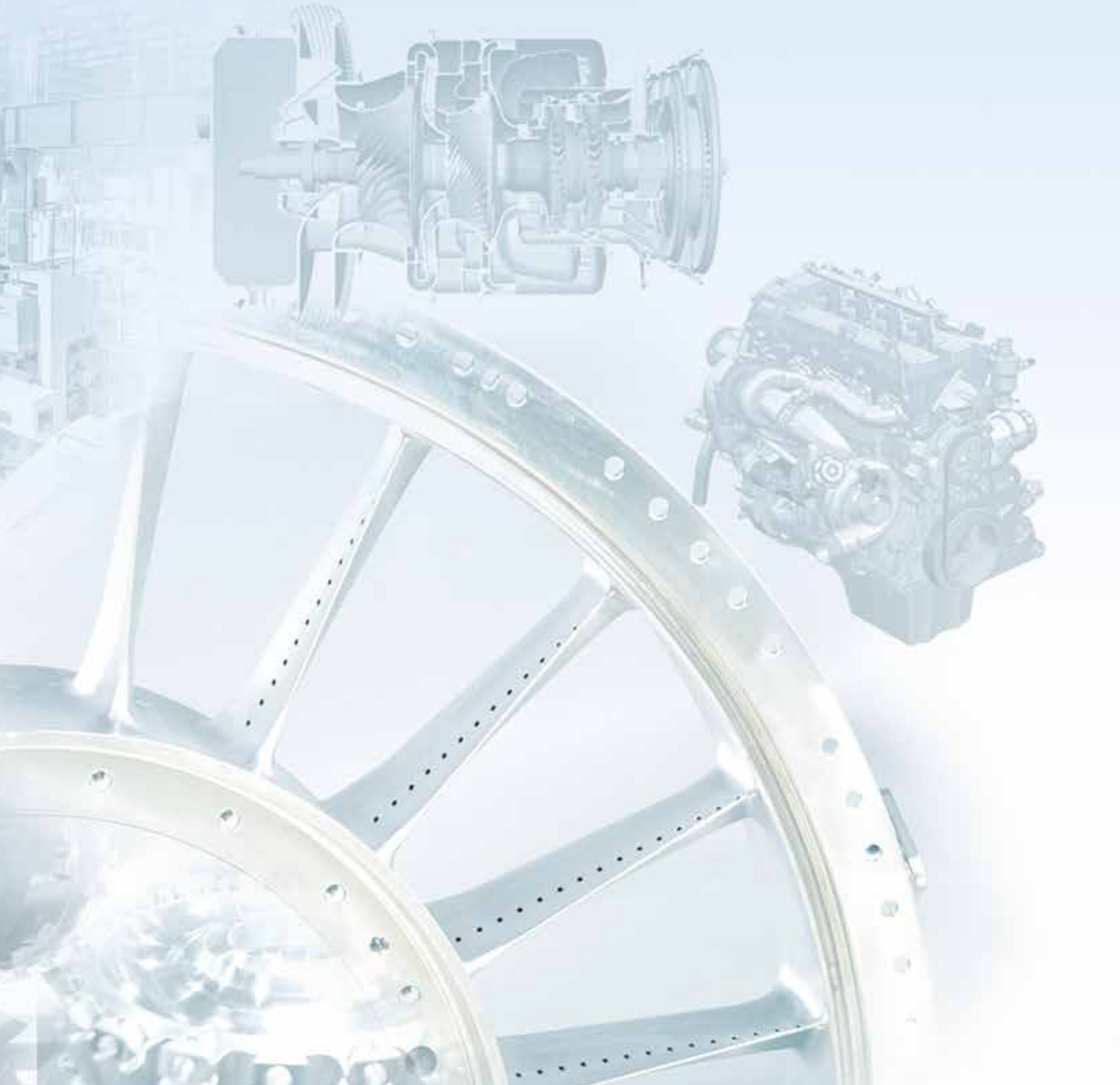
TEI TO POWER
TURKISH UTILITY HELICOPTERS

FIRST **BLISK** PARTS
FOR **LEAP ENGINE DELIVERED**

"INTELLIGENCE WORKSHOPS"
PROJECT BY TEI

T700

TUSAŞ MOTOR SANAYİİ A.Ş.
TUSAŞ ENGINE INDUSTRIES, INC.



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EDITORIAL

Dear TEI Post Readers,

It is our pleasure to present you the 4th issue of TEI Post. In this issue which covers the first half of the year, we present you a well-balanced blend of technical and social topics, as always.

The "**Cover Story**" of our 130th issue presents a featured article on Turkish Utility Helicopter Program.

In the "**Achievement Board**" section, we share with you the awards and recognitions we received as a result of the invaluable efforts of our employees.

The new section we introduced in our previous issue, "**By TEI Employees**" keeps growing with your contributions.

You can also read in "**Travel**" section an article on New York, one of the biggest metropolitan cities in the world, as well as two other articles on Golyazı and Cumalikizik and maybe start planning your next trip to one of them.

See you in our 131st issue...

For and On Behalf of TEI
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STEP BY STEP, WE ARE MOVING **TOWARD OUR VISION**

We have left behind the first half of 2016, which witnessed significant developments for our company. Probably the most remarkable development for us in the first half of the year was execution of the Turkish Utility Helicopter Program, as part of which we will take part as an engine manufacturer, expanding our current position as a part and module supplier for T700 engines. For us, this marks another step towards achieving our vision of "Having globally competitive, original power systems".

Another noteworthy development in the previous period was shipment of the first blisk parts for LEAP engine. We celebrated this shipment, which is a milestone for the LEAP project, with a ceremony held on our anniversary of establishment on January 25, 2016 with the attendance of our Board members.

TEI Material Testing and Research Laboratory, which was formed within the organization of Design Engineering Directorate in 2014, was entitled to obtain NADCAP accreditation, which is recognized by global aviation authorities and managed by PRI (Performance Review Institute), for 18 months to start as of May 2016. Our company was already one of the top 10 companies among 3672 NADCAP-accredited companies with 8 different special process groups, and with the addition of this new accreditation, we are now in the top 5, with our 9 different special process group accreditations.

We have climbed 42 ranks up to the 132nd place among the Top 500 Large Industrial Enterprises of Turkey, selected by Istanbul Chamber of Commerce. Moreover, while our company enjoys the leading position in Turkish aviation engines sector and our global rise among other defense and aeronautics companies continues, on the Top 1000 Exporters List announced by Turkish Exporters' Assembly we remain in 2nd place by export figures in Defense and Aeronautics Industry. We climbed up to 47th place from 52 among all industries by total exports. I would like to thank all my colleagues for your valuable contributions in these achievements.

Recently, we have organized "TEI Intelligence Workshops", a new project among other social responsibility projects we have carried out so far as an Eskisehir-based company. We have introduced "Intelligence Workshops" at two primary schools in Eskisehir with the support of TEI family in order to contribute to the development of children, the future of our country. The project will continue as an annual traditional event with the new Intelligence Workshops to be organized at selected schools every year. Last but now least, TEI was selected as "The Most Productive Organizer Worldwide" by the Institute for Women of Aviation Worldwide for the various events we organized as part of the Women of Aviation Worldwide Week with a view to raising awareness and interest in aviation industry among female students. I would like to thank our employees who volunteered to support these projects.

We closed the first half of the year, which we began with new aspirations and hopes, with remarkable success; I hope the second half of 2016 will bring us even more achievements, happiness and prosperity.

Greetings and best regards,

Prof. Dr. Mahmut F. Aksit,
President & CEO, TEI

TEI TO POWER HELICOPTERS
UNDER THE TURKISH UTILITY HELICOPTER PROGRAM

As part of the Turkish Utility Helicopter Program (TUHP), TEI-TUSAS Engine Industries, Inc. will manufacture a total of 236 “T700-TEI-701D” engines, 218 of which will be used as installed, and 18 of which will be used as spare engines, for 109 "T70 Blackhawk Helicopters" to be manufactured by TAI, the main contractor of the program, for a period of next 10 years in Eskisehir under the General Electric license. This engine will have the same configuration as General Electric Aviation’s T700-GE-701D turboshaft engine.

Engines to be manufactured by TEI will be used in T70 helicopters to be introduced to the inventory of 6 different users; namely Turkish Land Forces Command, Turkish Air Forces Command, Special Forces Command, General Command of Turkish Gendarmerie, Turkish National Police and General Directorate of Forestry.

Manufacturing of modules and parts of the engines, to be delivered to TUSAS as part of the business share of TEI, and assembly of the complete engine, as well as final testing, configuration management and logistic support services thereof will be carried out by TEI.

Hot section parts such as combustion chamber (combuster) with high replacement rated during the lifetime of the engine will be manufactured by TEI in Turkey for the first time. As part of aftersales support, TEI will have the opportunity to carry out the Depot Level Maintenance of T700 engine family available in the inventory of Turkish end users, through the domestically manufactured parts, and will have the right to perform the Depot Level Maintenance operation for a large geographical zone outside Turkey.

In addition, TEI will deliver the first engines 27 months after the commencement of the program calendar (T0), on 15.09.2018, and the activities of TEI under TUHP will continue during the minimum 30-year lifetime of T70 helicopter to be delivered last.

T700-**TEI**-701D ENGINE

T700-TEI-701D turboshaft engine, the last generation member of T700 engine family and the best in its class, is a front-driven turboshaft engine which has integrated air inlet particle separator, and consists of single spool five stage axial, single stage centrifugal compressor, thru-flow annular combustion chamber (combuster), two stage axial flow gas generator turbine, and two stage free axial flow power turbine. In comparison with the previous model, the T700-GE-701C engine, the power of the T700-TEI-701D turboshaft engine is 5% percent higher and it provides two times more robustness in the hot-section components of the engine.

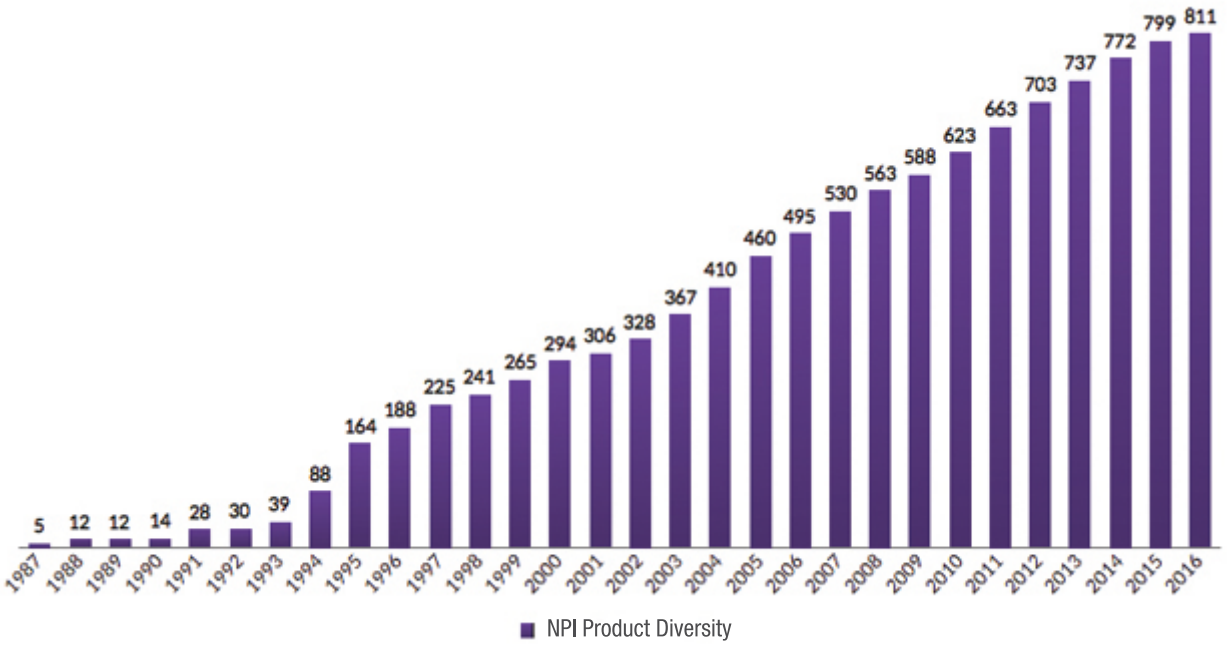
ACTIVITIES IN THE FIRST HALF OF 2016

PART and MODULE MANUFACTURING

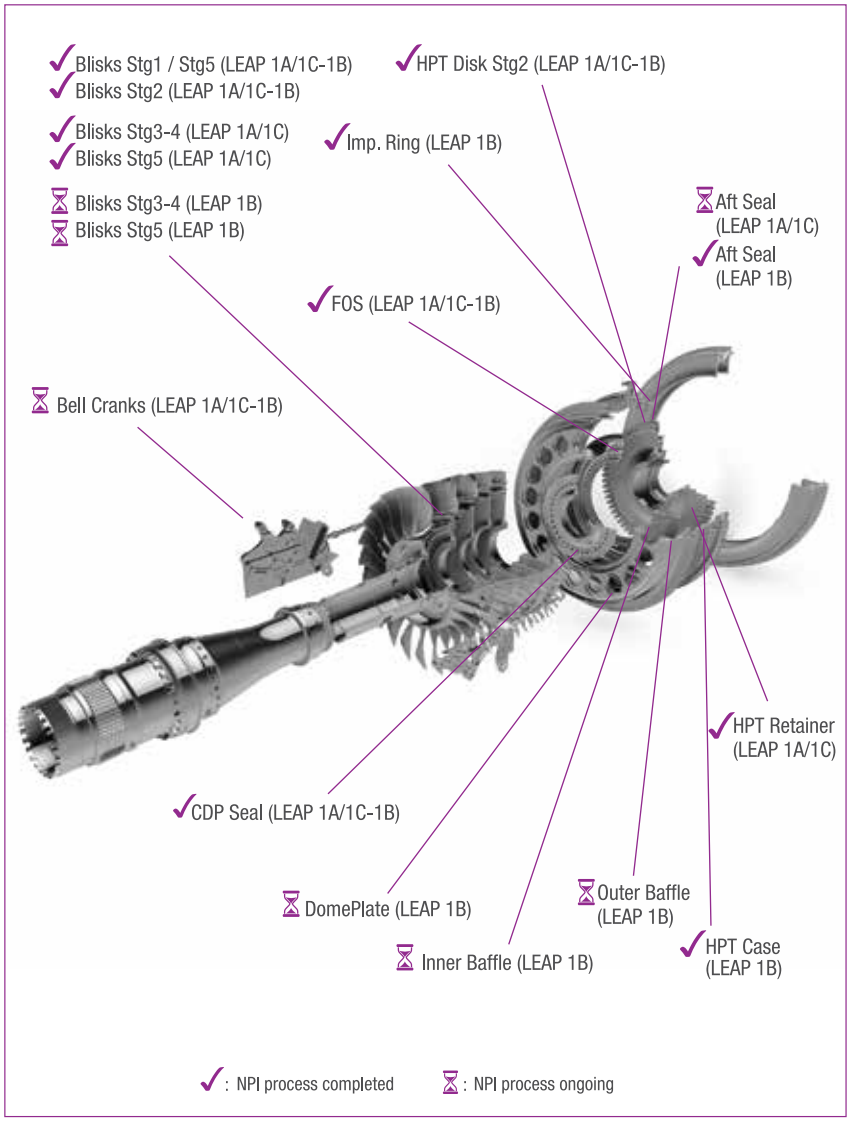
New Part Introduction (NPI)

In the first half of 2016, 12 NPI projects were completed and delivered to our customers on time. Of these projects, 7 were for General Electric (GE), 2 for Snecma, 1 for Tech Space, 1 for Volvo Aero and 1 project was completed as part of Turkish Utility Helicopter Program (TUHP). 8 of the NPI projects completed were for next generation commercial engine programs such as LEAP, GE9X, and Silvercrest. With these new part introduction projects, TEI's product range has reached 811 items for 40 engine assemblies.

In 2016, 67% of the NPI projects were for next generation engine programs and were carried out through concurrent engineering. Achievement rate for delivery deadlines of NPI projects in accordance with the scheduled engine programs was 93% in average. Approximately USD 14.1 million sales revenue is expected in 2016 from the projects completed.



NPI projects for the LEAP engine assembly, which is intended to replace CFM56, currently being the most preferred commercial engine worldwide, were carried out together with Snecma and GE through concurrent engineering studies. So far, 16 different NPIs and 34 different configurations were completed for the LEAP engine program. TEI is the leader part manufacturing supplier of LEAP engines worldwide with 29 different parts. 2 different NPI projects for blisk, forward outer seal, aft seal and HPT casing were successfully completed in 2016. Besides these projects, NPI projects for LEAP inner / outer baffle, blisk, bell crank and aft seal parts are ongoing and is planned to be completed within 2016, as part of the LEAP program. LEAP engine program is expected to generate an annual revenue of USD 180 million by 2020.



TEI launched part and module manufacturing as part of Turkish Utility Helicopter Program with NPI projects comprising complex parts. 7 NPI projects were completed for T700 engines under the Stg1 turbine disk NPI project during the first half of 2016. TEI plans to complete NPI projects for over 60 different parts including subcomponents, which correspond to more than 50% of 236 T700-TEI-701D turboshaft engines as part of the program. With the official roll-out of T700 engine scheduled for the second half of 2016, project planning process has been launched for the NPI projects to be conducted under the program.

Other projects delivered during the first half of 2016 include several projects for GE9X, Silvercrest, LM2500 and LM6000 engines.

Improvement / New Technology Introduction

Besides new part introduction projects, we also focused on new technology introduction in the first half of 2016. To that end, we have developed hobbing process at multi-purpose machining center as an alternative to shaping process.

Also, we introduced multi-axial simultaneous turning process, which resulted in an improvement in machining cycle times and part quality.

Using the software developed at manufacturing engineering as a result of the studies under Industry 4.0, real-time data were collected from 20 machines under a single network, making it possible to monitor productivity and status reports. Also, remote software / data exchange with machines has been provided through DNC, creating a real-time monitoring system with a virtual copy of the plant.

Other improvement projects in progress include micro spot welding with filler material feeding, optimization of broaching process with brazed carbide cutters, machine activated precision hydraulic clamping systems, optimization of precision machining of large parts with steady rest application and pneumatic machine/robotic clamping system which enables multiple part set ups.

TEI Ranks among Top 5 Globally for NADCAP Certification

More than two thirds of the representatives of aviation industry state that they believe that NADCAP accreditations contribute to reliability of the entire industry. With 9 different special processes group accreditations including accreditation of Material Testing Laboratory which we obtained in May 2016, TEI is one of the top 5 companies among 3672 NADCAP-accredited companies worldwide. This proves that TEI has become a benchmark for the industry in application and control of special processes and NDT methods.

Other NADCAP accreditations held by TEI includes Chemical Processes, Nondestructive Testing, Heat Treatment, Surface Enhancement, Nonconventional Machining, Coating, Welding and Conventional Machining as a Special Process. With the addition of the latest Material Testing accreditation, TEI has currently been certified in 9 different special processes group.

Rank	Company Name	Country	Commodity Group Numbers
1	Industria de Turbo Propulsores S.A.	Spain	10
2	**TEI - TUSAŞ Engine Ind.,Inc.**	Turkey	9
3	AEF / AIDC	Taiwan	9
4	AVIC AVIATION - ENGINE Co. PLC - XAE	China	9
5	Sichuan Chengfa Aero Science & Technology Co.,LTD.	China	9

*Table is based on May 2016 data.

Accreditation for Material Testing Laboratory

All parts and components of an engine must steadily and constantly endure the loads and environmental conditions affecting them throughout their lifetime which is determined during design process. Therefore material data used in design process play a highly critical role in determination of the design conditions such as integrity and lifetime of the part. These data are peculiar to each material and they vary depending on manufacturing methods and production conditions, which requires proper determination and utilization of these characteristics. For this reason, the method that should be followed in identification of material data involves procurement of materials meeting international standards and testing of the materials in a manner to include any variations in manufacturing and testing methods.

Material data used in design and analyses are commercially confidential information of aeronautical companies and are highly difficult to obtain from material suppliers. Many tests must be performed and analyzed statistically in order to obtain these accurate and highly reliable material data which prime engine manufacturers consider as critical information and abstain from sharing with any other companies, and are not available at public sources. Driven by the need to build the necessary infrastructure for generation of such data, in 2014 TEI Material Testing and Research Laboratory was been established within the organization of Design Engineering Directorate.

Characteristics of the materials, used in aviation engines, must be known at a high accuracy and reliability level so that they can be used in design analyses. Reliability and precision of the material data used in design are the most important factors in improvement of engine operating limits and determination of its lifetime. Accordingly, it is a must for the laboratories, where materials data are obtained, run in compliance with the international standards and be accredited.

TEI Material Testing and Research Laboratory has been granted NADCAP accreditation for 18 months, with the certification scope including room-temperature tensile testing and sample processing. This accreditation is a highly prestigious and reputable certification in aviation industry, which represents approval of the technical competency of TEI in material testing. Design material data to be generated at an accredited laboratory will allow us to take part in many projects, including original engine projects in particular. We aim to expand the scope of accreditation to include all testing methods that we constantly develop and gain capability, and actions are being taken to that effect.


Nadcap

This certificate is granted and awarded by the authority of the Nadcap Management Council to:

TEI-TUSAS ENGINE IND. INC.

Cevre Yolu Bulvari No 356 Tepebasi
Eskisehir, 26003
Turkey

This certificate demonstrates conformance and recognition of accreditation for specific services, as listed in www.eAuditNet.com on the Qualified Manufacturers List (QML), to the revision in effect at the time of the audit for:

Materials Testing

Joseph G. Pinto
Executive Vice President and Chief Operating Officer

Performance Review Institute (PRI) | 161 Thorn Hill Road | Warrendale, PA 15086-7527

6 Sigma Activities

"6 Sigma Green Belt Projects" have been completed for 41 areas as part of continuous improvement activities in the first half of 2016. 10 of these projects focused on increasing "First Time Yield" (FTY) rate whilst 31 were completed in reduction of MRB rate.

These projects, carried out by 28 green-belt engineers in total, resulted in approximately 50% reduction in MRB rates and nearly 90% increase in FTY rates of the parts under project.

Merve Gokce Unal and Furkan Bilgic have been given “Management Appreciation Award” for their successful projects.

PROJECTS

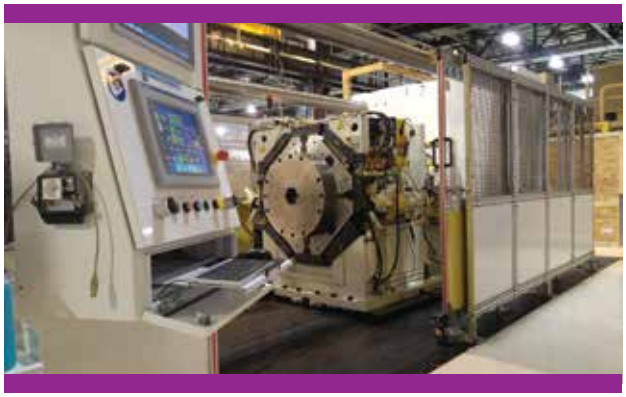
LEAP Engine Blisk Manufacturing

Investments and projects, either completed or in progress, in the first half of 2016 under the LEAP engine blisk manufacturing process are as follows:

• Two 5-axis milling machines were installed and put into service; and total number of Liechti machines used in blisk part manufacturing has risen to 7.

• Of the machine investments we made as part of the project, one CSM (Curved Slot Milling) machine and two vertical turning machines have been delivered to TEI and are currently being installed at B1000 building.

• Also, installation of the inertia welding machine at B700 Building was completed as another investment under the project. The inertia welding machine was put into service after welding process was successfully completed on 1 test part and 1 production part for Stage 1 and 3-4 blisk part groups.



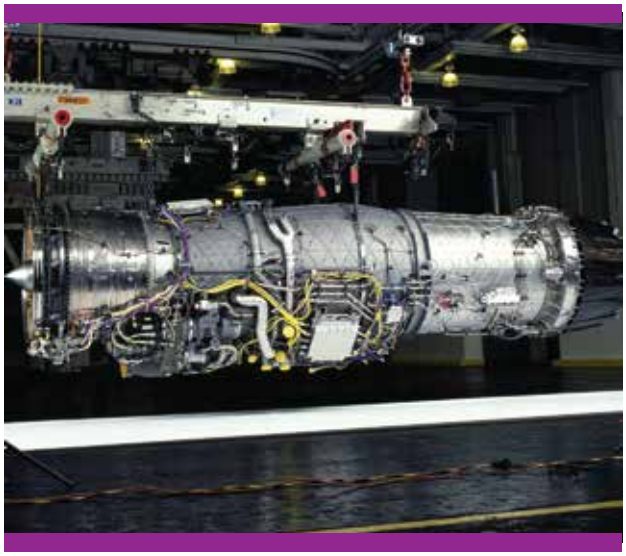
Inertia Welding Machine

JSF Project Turkish National FACO Activation and European Regional F135 MRO&U Center Establishment Planning and Management Phase (Phase 1)

It has been decided that Turkish European Regional F135 Maintenance, Repair, Overhaul & Upgrade (MRO & U) Center will be established at 1st Air Supply Maintenance Center (1st HIBM Hangar 10) under the national main contractor (TEI). Within the scope of JSF F-35 Aircraft F135 Engine Sustainment and ISS (In Service Support) Program, the main contractor agreement with Undersecretariat for Defense Industries (UDI) and the subcontractor agreement with P&W have been signed in July 2015 for the Planning & Management Phase (Phase 1).

TEI will perform the Turkish European Regional F135 Maintenance, Repair, Overhaul, and Upgrade (MRO & U) and Turkish National Final Assembly and Check-Out (FACO) Activation Phase 1, Planning and Management effort. Within this context, TEI's effort includes the planning and management for the establishment of Turkish European Regional F135 Maintenance, Repair, Overhaul & Upgrade and Turkish National Final Assembly and Check-out Activation until 2018 without any problem and by achieving maximum cost efficiency.

While TEI project team, UDI, P & W and TurAF personnel are working as a project group, within this scope, the face-to-face meetings (partnership reviews) for program review and activation studies, the relevant training and events are being carried out. TEI is expected to undertake the main contractor role in Phase 2 (Test Cell Project (New Establishment or Modification)) & Phase 3 (FACO Activation).



Within the scope of the program, TEI has been visited by Hon. Katrina G. McFarland, Assistant Secretary of Defense (Acquisition) and gone through physical & IT security site surveys which were performed by US Gov't, JPO and P & W in November 2015.

Development Project for Nickel - Based Superalloy Material and Production Processes in Aviation (the "Crystal" Project)

The Crystal Project was launched on December 11, 2015 under the sponsorship of Undersecretariat for Defense Industries (UDI) with a view to introducing advanced manufacturing technologies for turbine blade, an engine component that operates under the most severe conditions, to our country and defense industry.

The project aims at manufacturing of turbine blades used in the high-pressure turbine module by using directionally solidified (DS) and single crystal (SX) casting technologies, in particular. In addition to casting processes, it is also intended to gain the capabilities for heat treatment, cooling hole drilling, blade root machining and thermal barrier coating technologies.

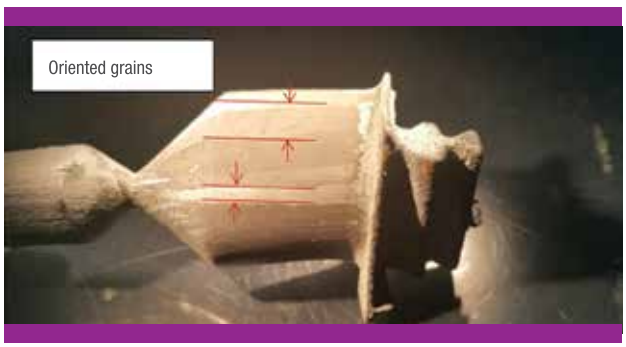
The project is led by TEI as the prime contractor in cooperation with TUBITAK - MAM and Gur Metal Hassas Dokum San. ve Tic. Ltd. Sti.

In recent years, nickel-based superalloys have been widely used in manufacturing of critical engine parts that should have a high temperature capability and a long service life. Nickel-based superalloys are strengthened by solid solution strengthening and precipitation hardening mechanisms to provide a good creep resistance at high temperatures. Specifically, rotating turbine blades exposed to high pressure from hot exhaust gases from the combustion chamber are manufactured through DS and SX casting methods. Today, in turbine blade manufacture, nickel-based superalloys such as CM247LC, MAR M200 etc. are used for DS casting, and CMSX-4, René N-4 etc. for SX casting.

As the turbine blades cast by DS method are solidified directionally in the columnar form in the preferred crystallographic direction, they have a better creep strength and high temperature capability in the direction perpendicular to the grain growth direction compared to that of polycrystalline casting. SX blades, on the other hand, have a higher creep and high temperature capability compared to DS and polycrystalline cast materials as they consist of a single grain without any grain boundary. DS and SX casting methods are of investment casting methods that require the use of ceramic molds in the Vacuum Induction Melting (VIM) furnace. Prior to casting, a wax pattern is initially generated for the geometry intended to be manufactured and the wax pattern is then immersed in different types of slurry tanks to form a ceramic shell on top of the wax pattern. Then, the wax pattern is burnt off in an auto clave at high temperature and lastly the ceramic mold is baked to be ready for the casting. If the production geometry includes any internal elements (e.g. turbine blade with cooling channel), ceramic cores are used in production of wax pattern.

DS and SX casting are carried out in a formerly heated ceramic mold under vacuum and the cooling process takes place in a controlled environment by using a cooling plate inserted to the base of ceramic mold. The microstructure is homogenized by solution heat treatment and aging after casting. Each casting piece is inspected in detail through mechanical and metallurgical tests.

In order to enhance the oxidation and corrosion resistance and temperature capabilities of DS and SX turbine blades, which work under severe operating conditions, Thermal Barrier Coating (TBC), a combination of bond coat and a thermal barrier top coat, is applied. Finally, manufacturing process is completed after blade root machining and any applicable cooling hole drilling processes and turbine blades are made ready for assembly to the engine.



DS Blade

HR PROCESSES

"From Campus to TEI"

The "From Campus to TEI" program for 2016 graduates aims to attract successful college graduates to work at TEI.

The program was posted at relevant engineering faculties and science institutes of 26 universities and on university web sites.

Professional Training and Promotion Days Organized for Vocational High School Teachers in Eskisehir

TEI instructors delivered the second educational program conducted in relation to training of the vocational education teachers, working at vocational and technical schools in Eskisehir, on subject related to their own fields by the instructors who serve at organizations/corporations registered to Eskisehir Chamber of Industry (ESO) and Eskisehir Chamber of Commerce (ETO), under the cooperation between the Governorship of Eskisehir, Ministry of National Education, ESO and ETO.

This project aims to increase the knowledge level of vocational high school teachers who raise the manpower for the market, and enable them to expand their vision, see the current situation of technology on-site, and to raise the manpower so as to meet the market expectations.

On-the-Job Training Program

TEI and Turkish Employment Agency collectively launched an on-the-Job Training Program in January 2016 with 44 trainees across 5 courses. The primary purpose of the program is to help inexperienced individuals gain some professional and business experience and increase their employability. The program was conducted at TEI premises for 6 months, and candidate trainees underwent to assessment process for recruitment at available positions at the end of the program.

Collaboration with Provincial Directorate of National Education

As part of the "Project for Discovery of Qualified Labor Force and Increasing Employment" executed with Office of Governor in Eskisehir in 2015, we organized a plant introduction program, which was attended by Provincial Director of National Education in Eskisehir as well as head masters, deputy heads, teachers from relevant disciplines, and TEI scholarship students, who were included in the program for the first time this year.

MBA Certification Program

In order to enhance knowledge and raise awareness of our executives in various areas other than their own field, in 2016, an MBA Certification Program was held at TEI for the first time, in collaboration with TOBB Economy and Technology University for executive personnel.

TEI's President & CEO Mahmut F. Aksit as well as TEI Directors, Managers and Leaders attended the program which was held on weekends at TEI premises. 10 specialist instructors delivered training courses at TEI during the program which started on April 15, 2016 and ended on June 3, 2016 with a final test.

Courses were delivered on the following subjects during the 3-month program:

- Management Organization
- Human Resources Management
- Labor Law
- Accounting
- Financial Management
- Business Law
- Foreign Trade
- Project Management
- Contracts of International Trade and Contract Law
- Intellectual Property Rights

The trainees will receive their certificates at a certificate ceremony to be organized soon.

The aim is to expand the program, which was held successfully for the first time this year, and reach more trainees in the following years.

FIRST BLISK PARTS FOR LEAP ENGINGE DELIVERED

With the recent orders placed, TEI has become the largest global supplier for the LEAP engines, the most preferred next generation commercial engine to power Airbus A320neo and Boeing 737. 5-stage compressor blisks with a highly complex geometry, which we manufactured for LEAP engines, positioned TEI as one of the few companies that are able to produce these parts worldwide.

Delivery of the first blisk parts for LEAP engine was celebrated on January 25, 2016, anniversary of TEI, with the attendance of TEI Board members. Prof. Dr. Mahmut F. Aksit, CEO and President of TEI, gave a speech at the ceremony and congratulated TEI on its 31st anniversary and thanked all employees involved in the project.

STORY OF TEI STRATEGIES

TEI designated a simple and clear vision, which is called growth. Then, TEI created long-term strategies shaped based on its current capabilities of powerful design, manufacturing and maintenance & repair in favor of all of its stakeholders to grow. Strategies focusing on key areas to achieve the growth of TEI are also the primary factors of the performance to carry TEI forward.

Strategies are the roadmap for TEI. Strategies are the goals and objectives that will allow the right steps to be taken to carry TEI the higher next levels and aim to ensure that everyone within the same direction for TEI.

Corporate strategies are developed by the senior management. Nonetheless; the opinions of employees across all levels of organization are taken into consideration within the process of strategy development. Strategies are enriched with diverse perspectives and feedbacks. Employees develop a common sense of responsibility and provide more support for the strategies sincerely as their opinions are taken into consideration.

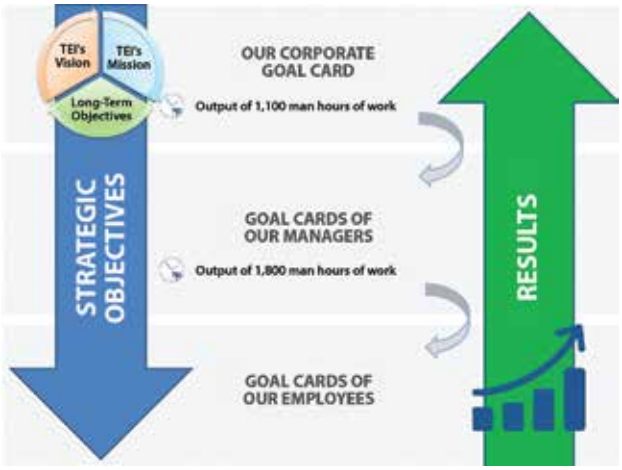
It is necessary that corporate strategies should be negotiated from all the level of the organization in order to ensure that the aims and the objectives of employees to be within same direction. For that, the objectives of employees are not to be assigned by the management directly. Objectives are constituted and reach a compromise in consultation and discussion between managers and employees using two-way process.

If an individual has a purpose, they do their best for the purpose. To do the best is not just about to know what to do, but also understand that why it is important for. TEI ensures the participation of all employees in strategy and goal setting process. This allows the corporate strategies are comprehended identically and each

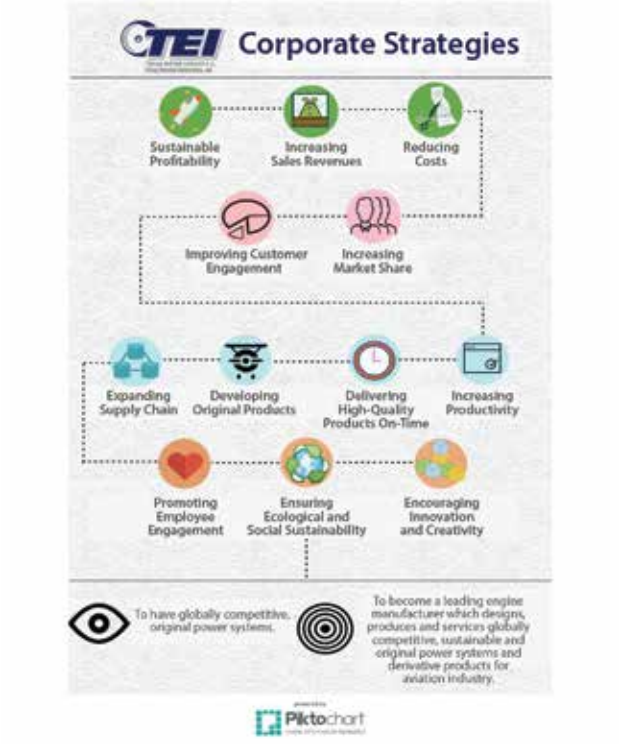
employee knows how they can contribute to the corporate strategies through their own work.

TEI is progressing toward its vision with the efforts of more than 1700 employees as a strong and consistently growing company in aviation industry.

Therefore, TEI believes that it worth all the effort it takes to create vision shared by all the employees, to develop strategy and to set goals.



It is acutely important that the strategies to be pervaded from senior management to each level of organization. Another equally important factor for success is to provide the flow of information about progress from every level to the senior management. This second line forms a closed cycle, control and adjustment of the process is provided.



Story of TEI's Strategies: Simple and easy to remember strategies pave the way to the vision.

TEI REINFORCES COLLABORATION WITH UNIVERSITIES

TEI and several other defense companies executed separate protocols with Anadolu University, Atilim University and Uludag University as part of the Researcher Development Program for Defense Industries (SAYP), a training program launched in 2011 in lead of Undersecretariat for Defense Industries in order to establish a more systematic transfer of knowledge between defense companies and universities, and to ensure that the postgraduate dissertations studies of employees from defense companies are structured so as to support the companies R&D requirements and focus on the priority areas in the industry. These protocols executed under the program have reinforced the collaboration and ongoing projects between TEI and universities. TEI's CEO and President Mahmut F. Aksit underlined the importance of the project and the collaboration between the industry and universities, and said that the memorandum of understanding executed with the aim of raising qualified personnel to meet the needs of the industry would play an important role in accomplishment of goals of the national defense industry

NEW EMPLOYEE UNIFORMS

Employee uniforms have been redesigned to represent TEI's corporate identity, by paying particular attention to suitability for working conditions and fabric quality in line with the feedback from employees. After a three-month design and product development process, TEI debuts the new products in a Corporate Dress Catalog.

In addition to the blue collar collection, the catalog also presents selections of dresses for white collar employees to wear at work. The Catalog also offers a variety of options for daily use for blue and white collar employees. TEI Corporate Dress Catalog was introduced to employees at an iftar dinner organized by the CEO and President Mahmut F. Aksit.

PISTON ENGINES DESIGN MANAGEMENT THROWS DINNER PARTY TO BOOST MOTIVATION

A dinner party was organized by the Piston Engines Design Management in TEI picnic area on June 6, 2016 in order to boost motivation in the department. Human Resources Director K. Levent Tufekci and Design Engineering Director Ali Osman Ayhan were also present at the dinner.

ART EXHIBITON BY ERKAN BALK

Expert Technician and Photographer Erkan Balk, whose works were featured at TEI Post before, opened an exhibition called “Silent Inhabits of Freshwater” at the "'2nd International Symposium on Eurasian Biodiversity" held in Antalya between May 23-27, 2016.

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Dr. Murat S. Ozmusul
Pro Solutions USA LLC

This work is a summary of the paper (GT2016-57944) presented by the authors at "TurboExpo 2016, Seul, South Korea" conference. The paper is prepared within the scope of an ongoing SANTEZ project of "Development of Seals for Gas Turbines" that is being carried out in partnership of Kirikkale University - TEI.

LABYRINTH SEAL LEAKAGE DEGRADATION DUE TO VARIOUS TYPES OF WEAR

INTRODUCTION

Labyrinth seals are used to minimize and control the leakage flow rate between the high and low pressure chambers that exist between rotating and stationary parts in turbine engines. They function by forming constrictions and labyrinth cavities that restrict leakage. A positive clearance, placed between the teeth and the stator at nominal operating conditions, determines the leakage. This positive clearance is not always maintained during engine transients. Thermal growth and centrifugal force during transient conditions are the main reasons that the rotor and stator components move relative to one another in the axial and radial directions.

Thus, radial incursion and axial movement of the rotor-stator pair causes the labyrinth teeth to rub against the unworn stator surface. Wear damage in the form of material loss or deformation permanently increases seal clearance and thus, leakage. Leakage due to wear will ultimately deviate from design values, which threatens the engine's guaranteed overall efficiency, durability, and life [1]. Leakage is also known to be dependent on the shape and geometry of the worn tooth, and the stator rub-groove.

Tooth Wear Shapes:

There are two types of reported tooth tip wear profiles. Those are approximated as: the mushroom shape and the round shape. The mushroomed wear shape occurs when the hardness of the tooth material is less than that of the stator material (See Figure 1 [2-7]). In this case, the tooth wears and deforms by forming a mushroomed shape, while the stator negligibly wears.

The round shaped tooth wear profile occurs mostly when the hardness of the tooth material is greater than that of the stator material, or when an abradable coating is used, as seen on Figure 2 [2-8]. In this case, the stator material also wears, and a rub-groove forms on the stator. Thus, round tooth wear is typically accompanied by the formation of a stator rub-groove.

Figure 1 Mushroomed Tooth Tip Wear - [Ref: 2-6-7-10]

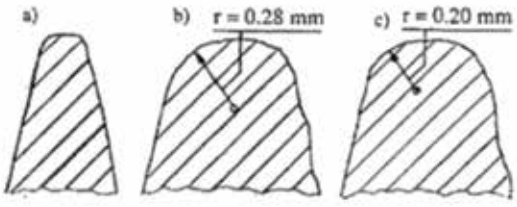
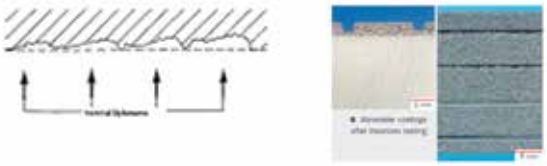


Figure 2 Rounded Tooth Tip Wear - [Ref: 2-8]

Rub-Groove Shapes:

The shapes of rub-grooves are reported in literature as seen on Figure 3 [4-8-11]. When the related photos are examined, the rub-groove shape is not well suited to fit an exact geometric shape. Nevertheless, the stator rub-groove shapes can be approximately simulated in five forms: rectangle, trapezoid (isosceles and acute), triangle, and elliptic.



Stator Surface Measurement [Ref: 8] Rub Test [Ref: 4]

Figure 3 Rub Groove Shapes

When all reported photos are evaluated, the possible wear shapes for the tooth and rub-groove can be listed as follows:

Tooth wear shapes:

T0) Unworn tooth

T1) Mushroom: Symmetric, asymmetric

T2) Round: Symmetric, asymmetric

Rub-groove shapes:

G0) Unworn stator

G1) Rectangle: Sharp/round corner

G2) Trapezoid: Isosceles trapezoid, sharp/round corner

G3) Trapezoid: Acute trapezoid, sharp/round corner

G4) Triangle: Sharp/round corner

G5) Elliptic: Without/with deformation/melt

All these approximated wear shapes are schematically plotted in Figure 4. The scaled plots are representatively produced and used in this paper's CFD (Computational Fluid Dynamics) analyses.

In this study effect of teeth wear and rub groove shapes on labyrinth seal leakage performance is investigated with CFD analysis. In following sections CFD model details and analysis results are given.

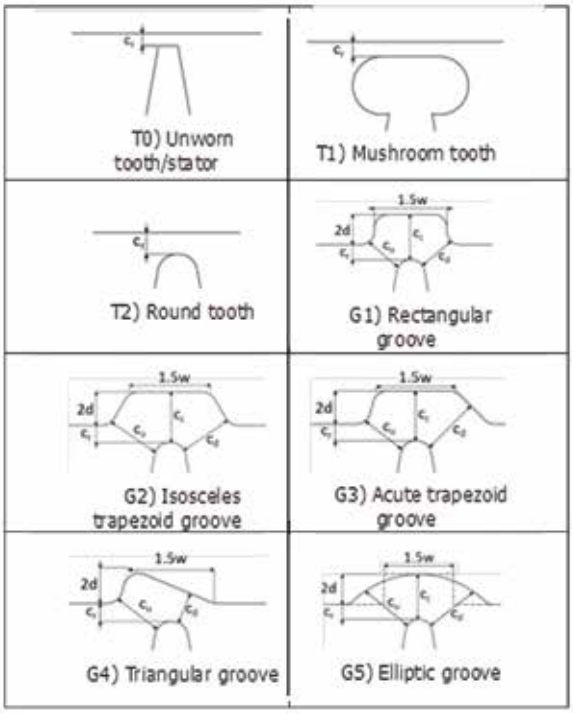


Figure 4 Tooth and Rub-Groove Wear Shapes

CFD MODEL

The CFD model for the labyrinth seal is built in 2-D axisymmetric coordinates. The computational domain and boundary conditions are shown in Figure 5. A commercial CFD code, Ansys-Fluent v.15, is used in the CFD analyses. The airflow is assumed to be Newtonian, steady-state, turbulent, and compressible for the employed Navier-Stokes and energy equations. For turbulent flow, the k-ε turbulence model with realizable and enhanced wall treatment options is employed. Density variation is solved by using the ideal gas equation. Total pressure and room temperature are defined on the inlet boundary. Static pressure is defined as atmospheric pressure on the outlet boundary. Turbulent intensity (5%) and hydraulic diameter (two times of the clearance) are also defined at the up/downstream boundaries. Pressure ratio is varied by changing the upstream pressure for a constant downstream pressure. The rotor and stator boundaries are treated as adiabatic, with no-slip wall conditions. Air properties (viscosity, specific heat, heat conductivity) are defined at the upstream conditions. Quadratic mesh elements are used in the solution domain.

The leakage validation was performed utilizing four different methods: 1-D labyrinth seal leakage correlations in literature, commercial code, test data, and other CFD works.

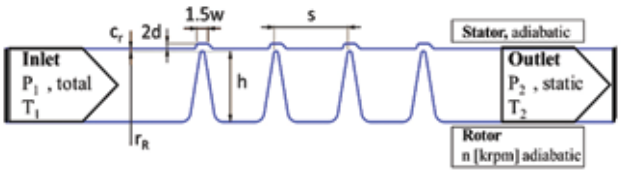


Figure 5 CFD Model Geometry and Boundary Conditions

RESULTS AND DISCUSSION

In this work, results are evaluated for four configurations given in Figure 4 and listed below.

T0 - Unworn tooth and stator

T1 - Mushroom tooth with unworn stator

T2 - Round tooth with unworn stator

G3 - Round tooth with acute trapezoidal groove

As a reference case, first analyses are run for unworn tooth and stator. Then mushroom tooth and round tooth facing unworn stator are analyzed. As the last analyses, round tooth with acute trapezoidal groove are investigated.

For these four configurations, velocity vectors around first teeth are plotted in Figure 6 For the unworn tooth having sharp edges, the flow cross-section at tooth clearance narrows due to sharp flow turn, flow separation and vena-contracta effects. Unlike the unworn sharp-edged tooth tip, the mushroomed and rounded tooth tips smoothly canalize the passing flow that follows the tooth profile. Any type of rounding on the tooth tip yields less local flow disturbances on velocity vectors. For the grooved case; the flow passes by making curls through the groove. Flow recirculation forms within the groove.

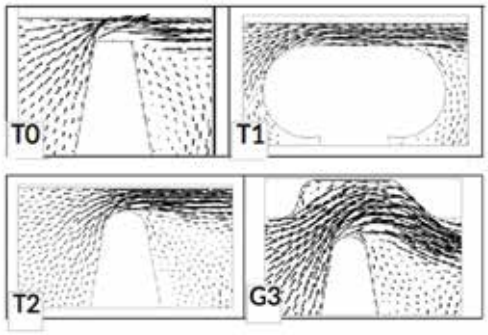


Figure 6 Velocity Vectors Around First Teeth for Various Tooth Wear Shapes Parameters (cr*=1, ∏=1.5, nt=4, n=0rpm)

In Figure 7, leakage values for these four configurations are plotted with respect to pressure ratio and clearance. The unworn tooth gives the minimum leakage due to higher vena-contracta effect. Any type of wear increases the leakage. The leakage order from least to most is: unworn geometry, round tooth, mushroom tooth, and round tooth with a groove. When compared to a round tooth, the mushroom tooth leaks more at a large clearance. The radius of the mushroom tooth (Rm) is greater than the radius of the round tooth (Rt). The larger radius canalizes the flow, causing it to smoothly pass around the tooth tip. The leakage difference between the mushroomed and round tooth tip is negligible at narrow clearances.

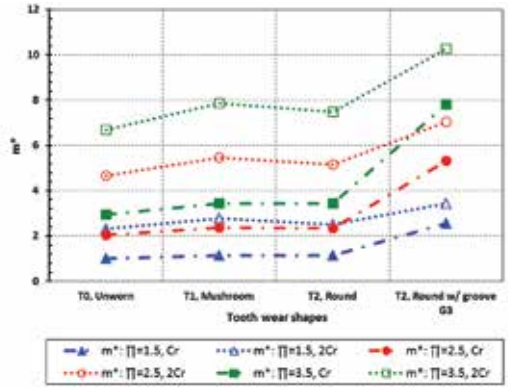


Figure 7 Leakage Versus Wear Shapes

CONCLUSION

Labyrinth seals wear during engine operations. During the engine design phase, it is important to estimate the leakage degradation due to wear. A detailed literature survey about tooth-rub groove wear shapes is schematically presented in this paper. The leakage degradation is quantified by using CFD analyses for rounded tooth, mushroomed tooth, rounded tooth with acute trapezoidal rub groove and compared with sharp edged labyrinth seal. Any type of wear increases the leakage. The leakage order from least to most is: unworn geometry, round tooth, mushroom tooth, and round tooth with a groove.

Nomenclature

c_c : Clearance at tooth center
c_d : Clearance at tooth downstream side
c_r : Tooth radial clearance
c_r^* : Non-dimensional tooth radial clearance
c_u : Clearance at tooth upstream side
d : Groove depth
h : Tooth radial height
m* : Non-dimensional mass flow rate
n : Rotor speed
n_t : Number of teeth
P : Pressure
r_R : Rotor radius
R_m : Mushroomed tooth tip radius
R_t,r : Rounded tooth tip radius
s : Tooth pitch
T : Temperature
w : Groove width
W_{tot} : Total wear depth
Π : Pressure ratio [=P1/P2]

Subscripts
1 : Upstream / Inlet
2 : Downstream / Outlet

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A STUDY ON THE STAIR STEPPING EFFECT IN DIRECT METAL LASER SINTERING OF A NICKEL - BASED SUPERALLOY

ABSTRACT

Like other additive manufacturing processes, the stair stepping effect is the main reason of a low surface quality in direct metal laser sintering (DMLS) due to the layered nature of the process. Furthermore, the processing variables such as build direction, layer thickness and process parameters may significantly alter the obtained surface quality as a result of this effect. This paper aims to predict the stair stepping effect on the surface quality for free form surfaces with validations on a demonstration part representative of a group of aero-engine components.

Keywords: Direct metal laser sintering, stair stepping effect, surface quality.

INTRODUCTION

Direct metal laser sintering (DMLS) is a powder-bed additive manufacturing process which is used to produce functional 3D parts or prototypes from a wide range of powder materials with good mechanical properties compared to those of cast or wrought materials. Its sectorial utilization expands in the production of medical and aerospace parts, taking the advantage of relative low volume, design freedom, customized and lightweight structures. Despite the appealing opportunities offered by DMLS, there are still some challenges to be overcome for a wider acceptance of the process in sectors with high requirements.

The surface quality obtained by DMLS is one of the inherent limitations of the layer-based process. The main reason for low surface quality is actually the layered nature of the DMLS process, and is similar to other additive manufacturing technologies resulting in a stair-stepping effect [1]. On top of that, the processing variables such as build direction, layer thickness and process parameters may significantly alter the obtained surface quality. Example study [2] indicates that, the difference between resulting surface roughness values can be more than doubled depending on build direction for the same process and material. There are two commonly used methods for improving surface quality in additive manufacturing. In the first one, secondary or post processes may be utilized [3, 4] and in the second one, different process parameters, layer thicknesses, build directions or scan strategies like re-melting can be evaluated [5, 6]. However, both options will increase the cost due to material consumption, machine time and labor. Moreover, the surface quality on internal and vertical walls cannot be enhanced by these methods. Current research involves various studies revealing preventive actions to overcome possible surface quality issues before they occur.

The majority of the work in the open literature is dedicated to determining process limits, and to setting design rules within the relevant additive manufacturing process [7-10]. Most of the research demonstrates the causes of surface roughness and points to the importance of stair stepping on surface roughness, particularly for up-facing surfaces [7-9]. Detailed predictive models are needed for additive manufacturing, in order to anticipate the impact of process variables on the surface roughness. Several studies included predictive models mostly for simple geometries with planar surfaces and specific angular increments [11-13]. There is still a need for research on surface quality prediction of free form surfaces produced by additive manufacturing processes, and of course stair stepping effect has a substantial influence on the surface quality. Moreover, stair stepping effect triggers surface irregularities including the waviness. The waviness has known influence on aero engine performance, leading to higher losses in certain modules such as compressors [14].

This paper begins by describing the prediction methodology and details the flow of the proposed method, explaining each individual step and related geometry. The following sections detail the experimental procedure and experimental results, and compare them to the model prediction. Finally, the predictive model is demonstrated for a representative geometry for aero-engine components.

PREDICTION OF STAIR STEPPING EFFECT

The stair stepping effect is a limitation for all layer manufacturing techniques particularly in the production of inclined or curved surfaces. It depends on various factors such as inclination angle as well as the layer thickness [15]. When considering planar surfaces of the part, the stair stepping effect is expected to increase with increasing layer thickness and decreases with increasing inclination angle. Similar to the inclination angle, on free-form surfaces, the curvature radius is another influencing factor. However, it is not easy to make rough estimates of the stair stepping effect for a particular radius value, since it changes also with the angle of the arc and concavity or convexity. Besides, the size distribution of the powder particles with a lowest mean radius possible reduces the stair-stepping effect. Yet, the need for homogenous powder coating limits the minimum particle size.

Since it is not possible to employ a general geometric model for free form geometries, the proposed prediction method utilizes a numerical approach. The methodology starts with a preparation step where the essential inputs such as CAD geometry and design requirements for the surface quality are provided. Design requirements indicate the regions and directions to be inspected for surface quality as a consequence of functional surface characteristics (e.g. air flow surfaces). Since the z-axis generally denotes the build direction in AM, the x-axis is selected to perform the calculations. This is, of course, important for the contact measurement methods. For non-contact methods, the data of entire region can be acquired independent of the chosen axis. Later on, point coordinates are extracted from the contour line utilizing z-axis increments equal to the layer thickness (see).

The total waviness, Wt is a sum of WV, the maximum valley and WP , the maximum peak as shown in Eq. (1).

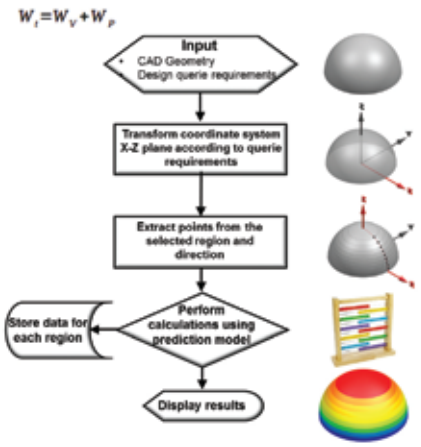


Figure 1 The Flowchart of Methodology with Illustrations

The study considers two main input factors, surface profile and layer thickness in the prediction model. The positions of the peak and valley points are varied. Moreover, the shape of the section of stair steps is circular due to melting and wetting phenomena. Figure 2 shows an illustration of three consecutive layers with layer number indicated by n, layer thickness indicated by t, coordinate values by Xn and Zn. The section of a surface profile is given along the z-axis. The surface profile is divided into linear segments and the center points of two consecutive layers are connected with horizontal and vertical lines to form a unit triangle between each layer. The angle for each layer is indicated by Θ; the peak is indicated by WPJ; and the valley is indicated by WVJ.

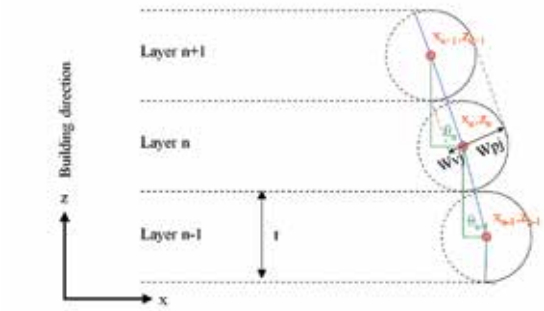


Figure 2 Schematic for Prediction Model

According to prediction model, WPJ and WVJ can be expressed by the following equations. In the equations, t represents layer thickness, and Θ represents the inclination angle of unit triangle between two consecutive layers.

$$W_{pj} = \frac{t}{2} \quad (2)$$

$$W_{vj} = \frac{t}{2}.\cos\theta \quad (3)$$

The inclination angle can be calculated by Eq. (3):

$$W_{vj} = \frac{t}{2}.\cos\left(\arctan\left(\frac{x_{n+1} - x_n}{t}\right)\right) \quad (4)$$

After this step, the final equation can be derived by putting Eq. (2) and Eq. (4) in Eq.(1), and by dividing the final equation by 2., to transform the waviness value of two consecutive layers into one layer.

$$W_{vj} = \frac{1}{2}\left(\frac{t}{2} + \frac{t}{2}.\cos\left(\arctan\left(\frac{x_{n+1} - x_n}{t}\right)\right)\right) \quad (5)$$

EXPERIMENTS AND MODEL VALIDATIONS

All experiments have been carried out on a DMLS system which employs a Fiber YAG laser with a wavelength of 1064 nm. EOS Nickel Alloy IN625 was selected as the part material because of its wide use in aircraft engine components. This includes exhaust systems, controls housing, turbine shroud rings and combustor liners see table 1 for material composition). The powder layer thickness is kept constant at 40 µm for the whole process cycle. The volumetric energy density, which is the laser power divided by the multiplication of scan speed, the hatch distance and the layer distance is, optimized for maximum density and set to 67 J/mm3.

A total of 11 parts were built with different inclination angles on a base plate with angles ranging from 30° to 80° with 10° increments. After the process is completed, parts were separated from the base plate by electrical discharge machining (EDM). This was done to

facilitate easy access for contact type measurement methods, which involve dragging a measurement stylus across the surface of the part. shows CAD models from the design stage and as-built specimens on the building platform.

Element	Composition	Element	Composition
Ni	Balance	Al	≤ 0.4%
Cr	20-23 %	Co	≤ 0.1%
Mo	8-10 %	C	≤ 0.1%
Nb	3.1-4.1 %	Ta	≤ 0.05%
Fe	≤ 5%	Si, Mn	≤ 0.5%
Ti	≤ 0.4%	P, S	≤ 0.01%

Table 1 Composition of IN625 Powder Material [16]

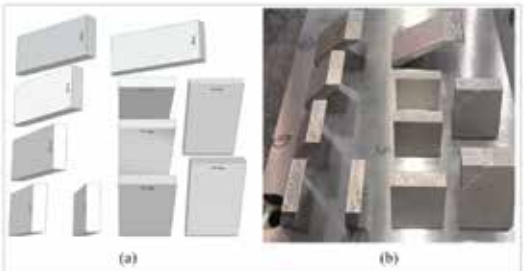


Figure 3 Specimen Parts (a) CAD Model, and (b) As-Built Condition

Since the specimen with minimum inclination, 30°, collapsed as a consequence of the overhanging geometry, surface quality measurements were performed on only the 10 remaining specimens. A Mitutoyo SJ-400 device, per ISO 4287:1997, was employed for surface measurements. As for the set-up conditions of measurement, a Gaussian filter was applied with a 2.5 mm sampling length and a 12.5 mm evaluation length. The evaluated surface parameters are listed below:

- Wa (arithmetical mean deviation of the assessed profile)
- Wt (total height of profile)
- Pa (arithmetical mean deviation of the assessed profile)
- Pt (total height of profile)

Average results of measurements for the surface parameters are listed in Table 2.

Inclination Angle	Pa	Pt	Wa	Wt
40°	8.30	69.08	3.43	22.03
50°	6.34	67.62	2.11	19.50
60°	6.42	68.48	2.22	13.98
70°	5.56	54.50	1.89	11.78
80°	5.56	63.85	1.92	13.00

Table 2 Average Results of Measurements

The surface quality was measured at 4 different locations for each sample, and average values were used for model validation. Figure 4 shows specimens with the specified inclination angle values.

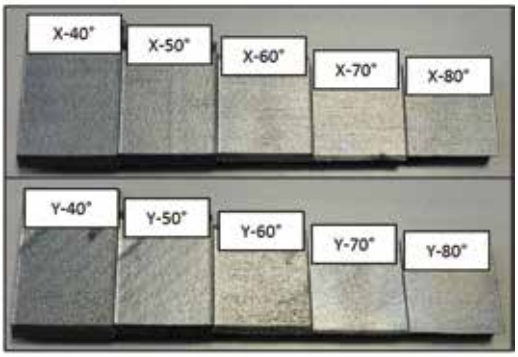


Figure 4 Sample Parts for X & Y Axis with Angle Values Indicated Above

Since the study is aimed at prediction of the total height of the waviness profile, measurements focused on Wt. To validate the model, the measured values of total waviness profile were compared to the predicted values of total waviness profile. Figure 5 illustrates a good agreement between predicted and measured waviness values. The prediction model results present a clear trend of the surface waviness that increases with the decreasing inclination angle as a result of the stair stepping effect. The measured values deviate at certain points due to manufacturing imperfections (Figure 6a) as well as variations in process/powder parameters.

Moreover, it is possible to use the predictive model for parts with free-form surfaces, as is the case for real industrial applications. Figure 6b shows the calculated total waviness value of a suction surface of an impeller part. The calculation has been done using the proposed model and the part rotational axis was assumed parallel to the Z axis. As opposed to conventional machining results, it is interesting to note that minimum waviness value is expected to be located near to the trailing edge and also close to hub, while the maximum waviness value is near to the leading edge and close to shroud.

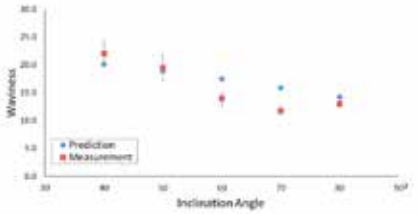
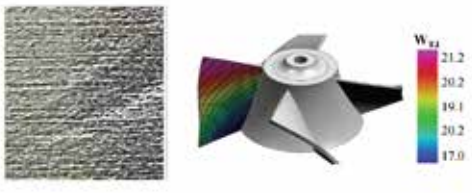


Figure 5 Comparison of Measured Waviness and Predicted Waviness Values (Error Bars Represent 95% Confidence Interval)



(a) (b)

Figure 6 Manufacturing Imperfections (a) Predicted Surface Waviness of an Impeller Part (b)

CONCLUSIONS

In this study, the surface quality as a result of the stair stepping effect was investigated for parts which are manufactured by DMLS processing of a nickel based superalloy, IN625. The total waviness value was selected as the focus measure of the surface quality, since stair stepping effect triggers surface irregularities in the form of waviness. Also the waviness is an important parameter for aero engine part performance. A predictive model was presented, followed by experimental results and model validation. Various parts were manufactured with different inclination angles ranging from 30 to 80 degrees and the total waviness of these parts was measured via contact type instruments. The validation showed that there is a good agreement between the model and experimental results for simple inclined wall geometries. Finally, the surface quality of an impeller part was calculated using the prediction model. Possible implementations of this model include the determination of the process window with certain process parameters, and selection of build direction to give better surface quality in critical parts and also the critical regions. This obviates costly trial-and-error experiments.

Acknowledgements

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HOW THE HELICOPTER HAS DEVELOPED

The article which have been published on Aviation Week & Space Technology Magazine on June 17, 2016 by Graham Warwick.

Getting from idea to reality took far longer for the helicopter than for the fixed-wing aircraft Efforts to develop what became the helicopter began long before those that led to the airplane and continued well after the Wright brothers achieved powered, controlled and sustained flight of a fixed-wing aircraft. It would take another three decades to arrive at a practical helicopter, but once developed, the idea was quickly embraced, entering military and commercial service within 10 years.

The helicopter, with its ability to take off and land in small spaces, and hover and maneuver at low speed, has become indispensable. But its pioneers might be disappointed with how narrowly the helicopter is used because of speed and range limitations and safety and noise concerns. Much research has been expended over decades on these issues, but true progress has been recent.

VERTICAL PIONEERING

Europe was the hotbed of rotorcraft invention through the first decades of the 20th century. France in 1907 saw not one but two landmark flights: In September, the Gyroplane No. I, a quadrotor built by brothers Jacques and Louis Breguet, lifted its pilot 2 ft. into the air for a minute. But it was unstable and uncontrollable and steadied by four men on the ground, so it is considered the first manned but tethered flight. What is considered the first manned free flight, albeit brief, came in November, when Paul Cornu's tandem-rotor helicopter lifted its pilot to 1 ft. for 20 sec.

Airbus Helicopters is developing a follow-on to the X3 high-speed compound helicopter; Credit: Airbus Helicopters

Pioneering flights followed thick and fast, not all of them in Europe. In the U.S., Russian refugee George de Bothezat built an experimental quadrotor for the Army. The H1 first flew in December 1922, and went on to carry passengers, but it was complex and hard to control and was scrapped. Also in 1922 Emile Berliner, a German immigrant and inventor of the gramophone record, modified a Nieuport biplane with twin wing-mounted rotors that could tilt slightly to control yaw. This aircraft could hover and fly forward, but had poor roll control and performance.

Pescara Model 3; Credit: German Federal Archives

But the breakthroughs continued in Europe. Working in France, Argentine marquis Raul Pateras Pescara developed a coaxial-rotor helicopter, its twin rotors each having four biplane blades with wing warping for cyclic control. The Model 2 hovered in 1922, and the improved Model 3 set a distance record of 738 meters (2,400 ft.) in 1924. Frenchman Etienne Oehmichen's helicopter No. 2 had four rotors for lift, six propellers for stability and control and two for propulsion. First flown in 1922, this aircraft completed the first 1-km (0.6-mi.) closed-circuit helicopter flight in 1924

COMPETING CONFIGURATIONS

wenty years after the Wright brothers had first flown their Flyer II in a complete circle, demonstrating their mastery of stability and control, the helicopter was still far from a practical machine. World War I had accelerated development of the airplane; by 1924, airmail and airline services were established and the surviving Douglas World Cruisers had circumnavigated the globe.

Helicopter pioneers were still trying to find a successful configuration with sufficient lift for vertical flight on the power available, with the stability and control needed for prolonged flight. The Breguet Gyroplane had four rotors, each with four biplane blades, Cornu used tandem rotors, Berliner transverse, and Pescara coaxial biplane rotors.

In 1925, Dutchman Albert Gillis Von Baumhauer designed a helicopter with a single main rotor, two slender aerodynamically effective blades, collective and cyclic control via a swashplate and an anti-torque tail rotor powered by its own engine. It flew numerous times, but was destroyed in 1930 when a blade separated due to fatigue failure of a hinge bolt. Lacking funds, it was not rebuilt.

D'Ascanio D'AT3; Credit: Flight Global

Italian aeronautical engineer Corradino D'Ascanio in 1930 built the D'AT3, a coaxial-rotor helicopter that used three small propellers for roll, pitch and yaw control. Rotor control was by servo tabs on the blades-a technique used later by Charles Kaman. In the lean years after World War II, D'Ascanio went on to design the Vespa scooter for Piaggio before designing helicopters for Agusta.

Another early attempt that approached practicality was the 1-EA built by the Soviet Union's TsAGI aerohydrodynamic institute. Flown in 1932, this had a single four-blade main rotor and pairs of small propellers on both nose and tail for anti-torque control. The 1-EA had two rotary engines and good performance, setting an unofficial altitude record in 1932, but poor control.

Soviet-Georgia-born engineer Nicolas Florine, working in Belgium, designed the first successful tandem-rotor helicopter-a configuration later perfected by Frank Piasecki. In Florine's design, both rotors turned in the same direction, and torque reaction was countered by tilting the rotor disks in opposite directions. Florine's second helicopter flew in 1933 and set modest flight endurance and altitude records.

AUTOGYRO'S BRIEF REIGN

By the mid-1930s, the practical helicopter was tantalizingly close. But another type of rotorcraft had already in been in service for almost a decade-the autogyro. This used air flowing through an unpowered rotor to turn the blades and generate lift in forward flight-a phenomenon called autorotation that had first been demonstrated by Pescara.

The autogyro could take off and land in a short distance, but not hover. Nevertheless its development pioneered many of the breakthroughs that ultimately led to the practical helicopter. The autogyro was invented by Spanish engineer Juan de la Cierva, whose fourth design, the C.4, was the first to fly, in 1923. The improved C.6, based on an Avro 504K fuselage, followed in 1924, and its success led to formation of Cierva Autogiro Co. in the U.K. to develop and produce the machines.

His breakthrough was development of the flapping blade hinge. This overcame a fundamental problem with rotors in forward flight: The blade on the advancing side sees rotor speed plus airspeed and generates more lift, while the blade on the retreating sides sees rotor speed minus airspeed and generates less lift.

Pitcairn PCA-2; Credit: NASA

In early designs, this dissymmetry of lift caused an unbalanced rolling moment as soon as the rotorcraft started flying forward. Cierva added a hinge at the rotor hub that allowed the advancing blade to flap upward, reducing its angle of attack and lift, while the retreating blade flapped downward, increasing its lift. The flapping hinge balanced the rotor, and was a key to enabling practical helicopters.

In 1929, Harold Pitcairn acquired the rights to Cierva's designs and the Pitcairn-Cierva Autogiro Co.-later the Autogiro Co. of America-began developing and producing aircraft in the U.S. Kellett Autogiro Corp. acquired a license from Pitcairn and autogyro production accelerated, laying the foundation for today's rotorcraft industry. Cierva was killed in an airliner crash in 1936, the year the first practical helicopter flew, but roughly 500 autogyros were produced through 1945, when the helicopter's arrival essentially ended the autogyro's reign.

A NEW BREED

Although the ability to spin up the rotor on the ground to enable a "jump" takeoff was added to later autogyros, notably Austrian Raoul Hafner's AR.III, their inability to hover doomed them once a workable helicopter emerged. And by the mid-1930s most of the pieces were in place. Cierva had developed the articulated rotor. Hafner, in the AR.III flown in 1935, introduced the modern swashplate-a device that converted control inputs in a fixed frame into blade pitch commands in a rotating frame.

Focke F.61; Credit: All The Worlds Rotorcraft

The coaxial-rotor Gyroplane Laboratoire designed by Louis Breguet and flown in June 1935 was perhaps first, but was quickly overshadowed when German engineer Heinrich Focke's F.61 made its first flight in June 1936. With its stability, control and performance, the transverse twin-rotor F.61 is considered the first functional helicopter. The aircraft made its first autorotation landing in 1937, a capability Focke-and all subsequent designers-saw as a crucial safety feature of the helicopter.

Focke-Achgelis & Co. went on to produce the larger transverse-rotor Fa.223 Drache, but credit for the first series-production helicopter was to go to Germany's Anton Flettner in 1942 with the Fl.282 Kolibri. This had an entirely different configuration, dubbed the synchropter, with intermeshing rotors, first flown in 1939 with the Fl.265 and later used by both Kellett and Kaman.

While Germany had taken a lead, the progenitor of the modern helicopter is recognized as being Igor Sikorsky's VS-300. In the early 1900s, Sikorsky had experimented unsuccessfully with a coaxial-rotor helicopter but abandoned this to design large fixed-wing aircraft, first in Russia then in the U.S. after emigrating in 1919. The VS-300 first flew untethered in May 1940, but in December 1941 took to the air in its final configuration: single main rotor with cyclic control and a single tail rotor. The modern helicopter was born.

Flettner Fl.282; Credit: U.S. Government

Developments came thick and fast. The VS-300 led quickly to the Sikorsky R-4, the first helicopter produced in significant numbers (131 were built) and the first to enter service with the U.S. military, in 1942. In 1943, Arthur Young flew a two-bladed rotor with a stabilizer bar that acted as a mechanical gyroscope, partially controlling the rotor and stabilizing the helicopter. This led to the Bell 47, which in 1946 became the first helicopter to receive civil certification.

BIRTH OF AN INDUSTRY

The second helicopter to fly in the U.S. was Piasecki's single-main-rotor PV-2, in 1943, but he achieved fame developing the tandem-rotor transport helicopter, beginning with the HRP Rescuer first flown in 1945 and leading to the Boeing CH-47 Chinook, still in production 55 years later. Kaman flew his intermeshing-rotor K-125, ancestor of today's K-MAX, in 1947. Stanley Hiller developed a control system that made his helicopters easy to fly, leading in 1948 to the UH-12.

The industry spread rapidly. In the Soviet Union, Nikolai Kamov's first helicopter, the Ka-8, first flew in 1947, introducing the design bureau's signature coaxial-rotor configuration. But the first helicopter to enter series production there was Mikhail Mil's single-main-rotor

Mi-1, first flown in 1948. Today the two design bureaux are part of Russian Helicopters.

Sikorsky VS-300; Credit: U.S. Government

In postwar Europe, French state aircraft manufacturers began helicopter development, SNCASO flying the SO1100 Ariel I in 1949, its rotor powered by compressed-air tipjets. This led to France's first production helicopter, the army's SO1121 Djinn. SNCASE, meanwhile, flew the SE3110 in 1950, leading to the Alouette family. The companies were merged to form first Sud Aviation, then Aerospatiale, which joined with Germany's MBB in 1992 to create Eurocopter, now Airbus Helicopters.

Piasecki HRP; Credit: U.S. Coast Guard

In the U.K., Cierva and Hafner started a postwar rotorcraft industry that grew to encompass Bristol, Fairey, Saunders-Roe and Westland, but which was consolidated in 1960 around Westland, by then building Sikorsky helicopters under license. In 2000, Westland merged with Italy's Agusta, which had entered the industry in 1952 by building Bell helicopters under license. They formed AgustaWestland, now Leonardo-Finmeccanica's helicopters division.

BIGGER, BETTER . . .

Helicopters developed rapidly in capability after World War II, helped by the turbine engine with its higher power-to-weight ratio than the piston engine. The first turbine-powered helicopter to fly, in 1951, was Kaman's XHTK-1, with a Boeing 502 turboshaft. A modified HTK-1 became the first twin-turbine helicopter in 1954. (The HTK-1 was also the first to fly on electric power and unmanned.)

But the first turbine-powered helicopter to enter production was Sud Aviation's SE3130 Alouette II, powered by a Turbomeca Artouste. First flown in 1955, the helicopter quickly smashed the altitude record and accomplished two noted high-altitude rescues while still in development. The first turbine helicopter to enter production in the U.S. was the Bell 204, better known as the UH-1 "Huey."

Lockheed AH-56; Credit: William Pretrina

As performance improved, so did size. First flown in 1961, the tandem-rotor CH-47A Chinook had a maximum takeoff weight of 33,000 lb. and a payload of 10,000 lb. Today's CH-47F weighs 50,000 lb. with a 24,000-lb. payload. Sikorsky's single-rotor CH-53A weighed in at 35,000 lb. but in 1968 set a record by lifting off at 51,900 lb., including a 28,500-lb. payload, a record-for a non-Soviet helicopter, that is.

The largest helicopter ever built, Mil's transverse-rotor V-12, flew in 1968. With a maximum takeoff weight of 231,484 lb. and payload of 88,000 lb., the four-turbine helicopter had the same cargo-compartment dimensions as the Antonov An-22 airlifter so that it could rapidly deploy strategic ballistic missiles. The V-12 was never produced, so the modest-by-comparison Mil Mi-26 became the largest helicopter to enter series manufacture. First flown in 1977, the Mi-26 weighs 123,450 lb. with a 44,000-lb. payload.

Sikorsky S-97; Credit: Sikorsky

. . . BUT NOT FASTER

While most aspects of performance have improved dramatically over the 75 years since Sikorsky ushered in the modern helicopter, one has not changed much: speed. Fast for a conventional helicopter is 160 kt. Because of the retreating-blade stalling and the advancing-blade going supersonic, rotors do not like flying edgewise at higher speeds.

But there have been repeated attempts in that time to make helicopters faster, and some of them are making a comeback. One of these is to compound the helicopter by adding a wing for lift and propulsion for thrust. This offloads the rotor of the need to produce both lift and thrust to go faster, and delays retreating-blade stall to higher speeds.

The first attempts involved brute force. The Bell 533 High Performance Helicopter was an early Huey prototype fitted with a wing and two jet engines. Ultimately propelled by a pair of 3,300-lb.-thrust Pratt & Whitney J60s mounted on the tips of a stub wing, the 533 reached 274.6 kt. in 1962. Built to test a rigid, hingeless rotor designed for high speed, Lockheed's XH-51 reached 263 kt. the same year, fitted with a wing and single 2,500-lb.-thrust J60.

The XH-51 led to the U.S. Army's Lockheed AH-56 Cheyenne attack helicopter, which first flew in 1967 and reached 212 kt. on a wing and the power of a single 3,925-shp General Electric T64 turboshaft driving both the rigid rotor and a pusher propeller on the tail. The Cheyenne was canceled and replaced by the conventional, 150-kt.-plus Hughes (later McDonnell Douglas and now Boeing) AH-64 Apache.

TRYING AGAIN

Airbus resurrected the compound helicopter when it flew its experimental X3 to 263 kt. in 2013. A refined version is to fly in 2019 under the European Clean Sky research program's LifeRCraft technology demonstration. Airbus's hybrid-helicopter interpretation of the compound has twin turboshafts driving both the rotor and, via shafts running through the wing, variable-pitch propellers at the tips. LifeRCraft is expected to lead to a production high-speed helicopter in the mid-2020s.

Two other avenues of high-speed rotorcraft research have borne fruit. One traces back to the Sikorsky XH-59A Advancing Blade Concept. This reached 263 kt. in 1973. It was fast, but noisy, shaky and complex to fly, needing two pilots to control four engines: two turboshafts driving the coaxial rigid rotors and two turbojets for propulsion.

Bell XV-15; Credit: NASA

In 2008, Sikorsky revisited the concept, applying the latest in blade and airframe structures, and flight and vibration control to cure the XH-51's vices and unlock its potential to combine high speed with the helicopter's low-speed agility. The small X2 technology demonstrator reached 260 kt. in 2010. Sikorsky is now flight testing the 240-kt. S-97 Raider light tactical helicopter and, with Boeing, building the 250-kt. SB-1 Defiant medium-lift demonstrator for the U.S. Army, to fly in 2017.

The other avenue was the tiltrotor. First to fly was the Transcendental 1-G, in 1954, but it never made a complete transition to wingborne flight. Instead, the Bell XV-3, flown in 1955, made the first conversions between helicopter and airplane mode. This led to the highly successful Bell XV-15, first flown in 1977, which reached a speed of 300 kt. and paved the way for the 270-kt. Bell Boeing V-22 Osprey, which in 2007 became the first tiltrotor to enter service.

Development of a civil tiltrotor was begun by Bell in 1998 and ultimately taken over by partner Agusta in 2011. After development delays and difficulties, the nine-passenger, 275-kt. AW609 is now planned to be certificated in early 2018. Bell, meanwhile, is building its next tiltrotor, the 280-kt. V-280 Valor medium-lift demonstrator for the U.S. Army, which is planned to fly in 2017.

The service has not decided whether to buy a high-speed rotorcraft-compound, tiltrotor or some other configuration but for the first time since Sikorsky flew the VS-300 there is a real prospect that the helicopter's gains in performance and sophistication over the past 75 years will at last be joined by a long-sought increase in speed and range.

BOARD OF DIRECTORS OF TEI

KOKSAL LIMAN

Koksal Liman, who had been serving as a member of the Board of Directors of TEI since 26.03.2013, was appointed as Chairman to the Board of Directors on April 29, 2016.

(R) AIR COM. COL. **YALCIN KILINCKAYA**

Yalcin Kilinckaya has been appointed as a member to the Board of Directors of TEI as of 26.05.2016.

(R) BRIGGEN. **ISMAIL HAKKI DOGANKAYA**

We would like to thank Ismail Hakki Dogankaya for his valuable services as the Chairman of the Board of Directors between 31.05.2013-27.03.2014 and as a Member of the Board of Directors between 27.03.2014-25.03.2016 at our company.

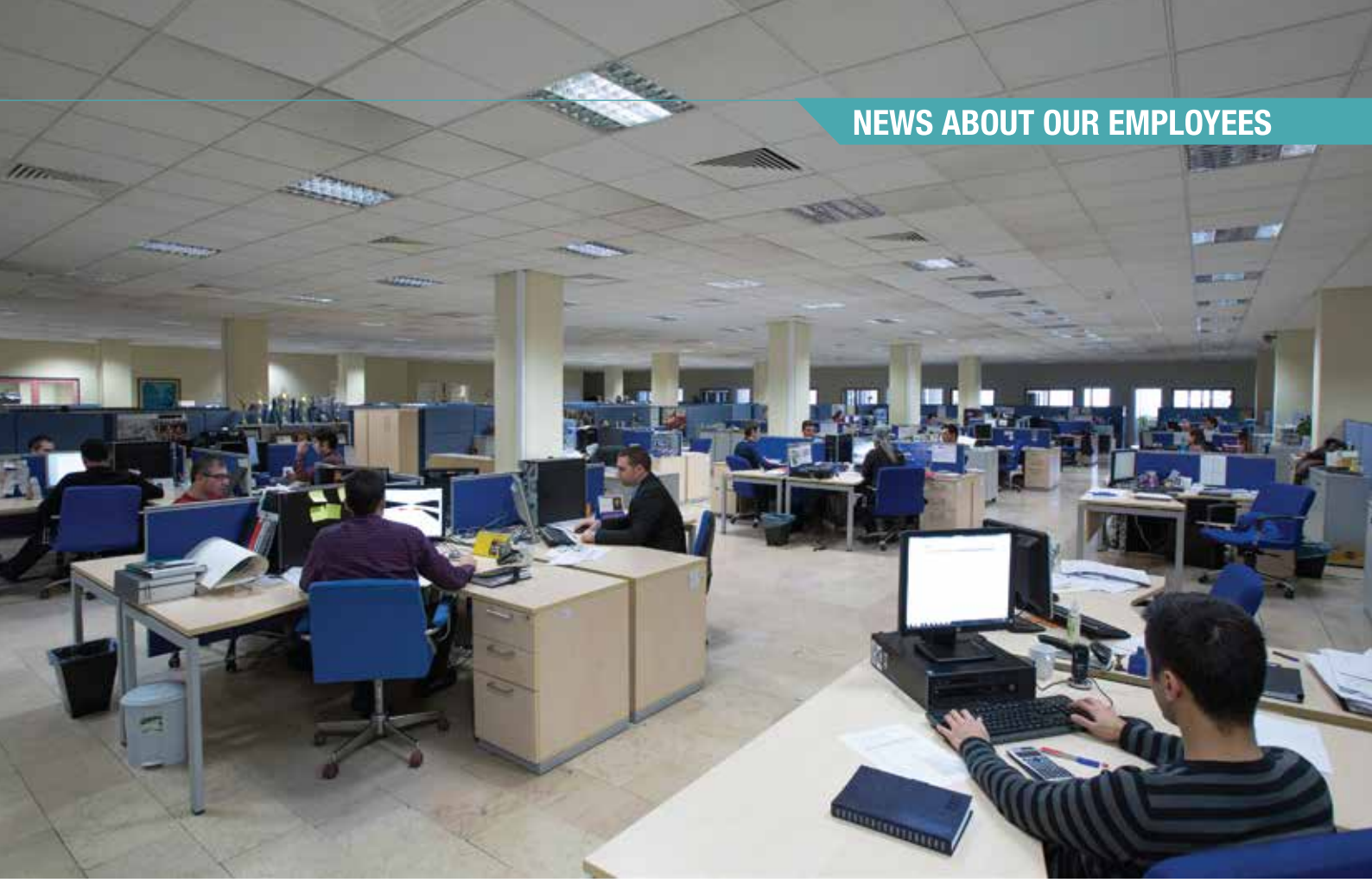
DEPARTMENTS ESTABLISHED AT TEI AS OF JANUARY 2016

At Human Resources Directorate;

Strategy and Quality Systems Management.

At Design Engineering Directorate;

Engine Prototyping and Testing Management,
Electrical, Electronics, Control and Embedded Systems Management,



ASSIGNMENTS IN OUR COMPANY BETWEEN 29.12.2015 - 30.06.2016:

• Tulin Ograk was assigned to serve as Strategy and Quality Systems Manager at Human Resources Directorate on January 25, 2015;
• Ozum Bursoy was assigned to serve as Administrative Leader at Career Development and Training Management on December 01, 2015;
• Emin Nadir Kacar was assigned to serve as Technical Leader at Aerothermal Engineering Management on February 01, 2016;
• Erman Ozkan was assigned to serve as Technical Leader at Blisk and Advanced Manufacturing Engineering Management on February 12, 2016;
• Emrah Yilmaz was assigned to serve as Technical Leader at Manufacturing Engineering Management on March 04, 2016;
• Ayse Demir was assigned to serve as Technical Leader at Strategy and Quality Systems Management on March 24, 2016;
• Emre Dalak was assigned to serve as Technical Leader at Procurement Management on April 21, 2016;
• Faruk Dagliyar was assigned to serve as Fabrication Shop Supervisor at Manufacturing Management (Fabrication) on May 18, 2016;
• Mehmet Gursoy was assigned to serve as Fabrication Shop Supervisor at Manufacturing Management (Fabrication) on May 18, 2016;
• Mehmet Yilmaz was assigned to serve as Technical Leader at Production Planning Management on June 01, 2016.

We wish them success in their new positions.

RECENTLY RECRUITED EMPLOYEES:

• Ahmet Levent Erol joined TEI on 29.12.2015 to serve as Specialist at Procurement Management;
• Mehmet Cuneyt Ercan joined TEI on 30.12.2015 to serve as Chief Executive Assistant at Head Office;
• Yigit Okur joined TEI on 30.12.2015 to serve as Engineer at Structural Engineering Management;
• Hafize Yildiz joined TEI on 31.12.2015 to serve as Janitor at Istanbul Engineering Office Management;
• Koksal Kurt joined TEI on 31.12.2015 to serve as Lead Engineer at Structural Engineering Management;
• Murat Akbulut joined TEI on 31.12.2015 as Technical Leader at Electrical, Electronics, Control and Embedded Systems Management;
• Mehmet Zahid Yuzuguldu joined TEI on 31.12.2015 to serve as Senior Technical Leader at Information Technologies Management;
• Mehmet Zahit Dogan joined TEI on 31.12.2015 to serve as Support Specialist at Information Technologies Management;
• Metin Yilmaz joined TEI on 31.12.2015 to serve as Engineer at Information Technologies Management;
• Alican Oztan joined TEI on 04.01.2016 to serve as Engineer at Turkey Technology Center;
• Fatih Ekinci joined TEI on 04.01.2016 to serve as Engineer at Turkey Technology Center;
• Yakup Genc joined TEI on 11.01.2016 to serve as Assistant Special Process Technician at Special Process Management;
• Saban Safak joined TEI on 18.01.2016 as Advanced Lead Engineer at Strategy and Quality Systems Management;
• Furkan Copur joined TEI on 25.01.2016 to serve as Engineer at Turkey Technology Center;

• Cihan Erturk joined TEI on 25.01.2016 to serve as Engineer at Turkey Technology Center;
• Akin Gebologlu joined TEI on 02.02.2016 as Security Guard at Strategy and Quality Systems Management;
• Riza Algul joined TEI on 02.02.2016 to serve as Assistant NC/CNC Technician at Manufacturing Management (Turning);
• Basak Kocer joined TEI on 03.02.2016 to serve as Support Specialist at Procurement Management;
• Erdem Kus joined TEI on 05.02.2016 to serve as Assistant Quality Technician at Quality Management;
• Hamza Ulker joined TEI on 05.02.2016 to serve as Engineer at Manufacturing Engineering Management;
• Kadir Can Saka joined TEI on 08.02.2016 to serve as Engineer at Procurement Management;
• Alpaslan Demir joined TEI on 08.02.2016 to serve as Support Specialist at Career Development and Training Management;
• Ahmet Benli joined TEI on 16.02.2016 to serve as Assistant Quality Technician at Quality Management;
• Metin Ozturk joined TEI on 17.02.2016 to serve as Engineer at Manufacturing Engineering Management;
• Hamza Demiralay joined TEI on 18.02.2016 to serve as Assistant Facility Maintenance Technician at Plant Maintenance Management;
• Gokhan Dogray joined TEI on 18.02.2016 to serve as Clerk at Mechanical, Aero and Materials Technologies Group Management;
• Can Kulcanay joined TEI on 19.02.2016 to serve as Assistant Quality Technician at Quality Management;
• Cengiz Ekimci joined TEI on 19.02.2016 to serve as Clerk at Information Technologies Management;
• Gozde Gok joined TEI on 19.02.2016 to serve as Clerk at Social Affairs Leadership;
• Mehmet Mahir Yuruk joined TEI on 19.02.2016 to serve as Clerk at Piston Engines Design Management;
• Atila Soydan joined TEI on 19.02.2016 as Clerk at Strategy and Quality Systems Management;
• Murat Kalkan joined TEI on 19.02.2016 as Clerk at Strategy and Quality Systems Management;
• Aylin Enginsoy joined TEI on 22.02.2016 to serve as Engineer at Quality System and Certification Leadership;
• Doga Barutcu joined TEI on 22.02.2016 to serve as Engineer at Turkey Technology Center;
• Selin Kok Erdem joined TEI on 22.02.2016 to serve as Engineer at Turkey Technology Center;
• Ugur Akdogan joined TEI on 22.02.2016 to serve as Engineer at Manufacturing Engineering Management;
• Ayse Celikdogan joined TEI on 24.02.2016 to serve as Specialist at Contracts Management;
• Tufan Akba joined TEI on 29.02.2016 to serve as Engineer at Turkey Technology Center;
• Emre Calik joined TEI on 29.02.2016 to serve as Engineer at Turkey Technology Center;
• Burak Ozen joined TEI on 29.02.2016 to serve as Engineer at Manufacturing Management (Milling);
• Melih Esendemir joined TEI on 07.03.2016 to serve as Engineer at Blisk and Advanced Manufacturing Engineering Management;
• Alisa Bursa joined TEI on 07.03.2016 to serve as Engineer at Manufacturing Engineering Management;
• Murat Cakmak joined TEI on 08.03.2016 to serve as Assistant Quality Technician at Quality Management;
• Erdi Yildirim joined TEI on 11.03.2016 to serve as Assistant Fabrication Technician at Manufacturing Management (Fabrication);
• Metin Ayar joined TEI on 14.03.2016 to serve as Assistant Mechanical Maintenance Technician at Plant Maintenance Management;
• Sunay Ayyildiz joined TEI on 14.03.2016 to serve as Support Specialist at Procurement Management;
• Armagan Demir joined TEI on 14.03.2016 to serve as Engineer at Special Process Management;
• Isil Unal joined TEI on 15.03.2016 to serve as Engineer at Manufacturing Management (Milling);
• Seyhan Icen joined TEI on 16.03.2016 to serve as Specialist at Career Development and Training Management;
• Seda Oturak joined TEI on 21.03.2016 to serve as Engineer at Special Process Management;
• Gokhan Akkoyun joined TEI on 22.03.2016 to serve as Assistant Prototype Technician at Engine Prototype and Testing Management;
• Ilker Guler joined TEI on 22.03.2016 to serve as Engineer at Piston Engines Design Management;
• Samet Caglayan joined TEI on 22.03.2016 to serve as Assistant MRO Technician at Maintenance, Repair and Overhaul (MRO) Management;
• Murat Katirci joined TEI on 24.03.2016 to serve as Assistant Fabrication Technician at Manufacturing Management (Fabrication);
• Abdullah Ustundag joined TEI on 29.03.2016 to serve as Engineer at Quality Management;
• Kerem Adali joined TEI on 31.03.2016 to serve as Clerk at Production Planning Management;
• Mustafa Bal joined TEI on 04.04.2016 to serve as Engineer at Turkey Technology Center;
• Yasar Sir joined TEI on 04.04.2016 to serve as Lead Engineer at Blisk and Advanced Manufacturing Engineering Management;
• Vahdet Egin joined TEI on 04.04.2016 to serve as Engineer at Quality Management;
• Selcuk Tekce joined TEI on 04.04.2016 to serve as Support Specialist at Procurement Management;
• Cagri Abis joined TEI on 05.04.2016 to serve as Engineer at Manufacturing Engineering Management;
• Oyku Nil Avunduk joined TEI on 05.04.2016 to serve as Engineer at Manufacturing Engineering Management;
• Recep Kizilin joined TEI on 07.04.2016 to serve as Assistant Mechanical Maintenance Technician at Plant Maintenance Management;
• Civan Mert Akin joined TEI on 11.04.2016 to serve as Engineer at NDT and Special Process Quality Management;
• Omer Furkan Karagoz joined TEI on 11.04.2016 to serve as Engineer at Turbojet & Turboprop Engines Design Management;
• Mustafa Hakan Saldi joined TEI on 13.04.2016 to serve as Engineer at Lean Manufacturing Leadership;
• Muhammet Kaya joined TEI on 14.04.2016 to serve as Assistant Machining Technician at Manufacturing Management (Fabrication);
• Huseyin Kucuk joined TEI on 15.04.2016 to serve as Assistant Electronic Maintenance Technician at Plant Maintenance Management;
• Hamdi Ayture joined TEI on 18.04.2016 to serve as Engineer at NDT and Special Process Quality Management;
• Atakan Ondogan joined TEI on 19.04.2016 as Engineer at Electrical, Electronics, Control and Embedded Systems Management;
• Huseyin Ayvaz joined TEI on 20.04.2016 to serve as Workplace Doctor at Career Development and Training Management;

• Safak Kaya joined TEI on 25.04.2016 to serve as Engineer at Lean Manufacturing Leadership;
• Tansel Serkan Demirdag joined TEI on 25.04.2016 to serve as Engineer at Special Process Management;
• Halil Anapa joined TEI on 02.05.2016 to serve as Lead Engineer at Turkey Technology Center;
• Ali Baris Guven joined TEI on 02.05.2016 to serve as Engineer at Production Planning Management;
• Yasin Ozturk joined TEI on 02.05.2016 to serve as Assistant NC/CNC Technician at Manufacturing Management (Fabrication);
• Munip Satilmis Erkafa joined TEI on 02.05.2016 to serve as Assistant NC/CNC Technician at Manufacturing Management (Fabrication);
• Goktug Kobak joined TEI on 02.05.2016 to serve as Engineer at Special Process Management;
• Hakan Emiralioglu joined TEI on 04.05.2016 to serve as Engineer at Aerothermal Engineering Management;
• Alper Baydemir joined TEI on 05.05.2016 to serve as Engineer at Manufacturing Engineering Management;
• Umut Can Kinaci joined TEI on 09.05.2016 to serve as Assistant Quality Technician at Quality Management;
• Fatih Dalkic joined TEI on 09.05.2016 to serve as Engineer at Plant Maintenance Management;
• Samet Tasyurek joined TEI on 09.05.2016 to serve as Engineer at Quality Management;
• Oncel Kamil Gokdogan joined TEI on 09.05.2016 to serve as Staff Engineer at Technical Services Management;
• Murat Deha Deger joined TEI on 16.05.2016 to serve as Engineer at Aerothermal Engineering Management;
• Ali Kisaoglu joined TEI on 16.05.2016 to serve as Assistant Fabrication Technician at Manufacturing Management (Fabrication);
• Ismail Cifci joined TEI on 17.05.2016 to serve as Assistant NC/CNC Technician at Manufacturing Management (Milling);
• Burak Firat joined TEI on 23.05.2016 to serve as Engineer at Supplier Development Management;
• Engin Gunalay joined TEI on 23.05.2016 as Engineer at Strategy and Quality Systems Management;
• Ulku Gulec joined TEI on 26.05.2016 to serve as Staff Engineer at Information Technologies Management;
• Ufuk Uluturk joined TEI on 30.05.2016 to serve as Assistant NC/CNC Technician at Manufacturing Management (Milling);
• Kudret Muhziroglu joined TEI on 30.05.2016 to serve as Advanced Lead Engineer at Piston Engines Design Management;
• Muhammed Akdogan joined TEI on 30.05.2016 to serve as Engineer at Manufacturing Engineering Management;
• Mustafa Kadir joined TEI on 31.05.2016 to serve as Engineer at Turbojet & Turboprop Engines Design Management;
• Burak Buluslu joined TEI on 03.06.2016 to serve as Assistant NC/CNC Technician at Manufacturing Management (Turning);
• Oyku Duman joined TEI on 06.06.2016 to serve as Engineer at Turkey Technology Center;
• Ozgur Akgun joined TEI on 06.06.2016 to serve as Engineer at Manufacturing Engineering Management;
• Mahmut Kucuk joined TEI on 06.06.2016 to serve as Specialist at Financial Affairs Management;
• Okan Tascioglu joined TEI on 07.06.2016 to serve as Assistant NC/CNC Technician at Manufacturing Management (Fabrication);
• Furkan Bacakoglu joined TEI on 13.06.2016 to serve as Assistant NC/CNC Technician at Manufacturing Management (Fabrication);
• Mustafa Ozcan joined TEI on 13.06.2016 to serve as Engineer at Turkey Technology Center;
• Can Altug Ipek joined TEI on 13.06.2016 to serve as Engineer at Turkey Technology Center;
• Omer Inal joined TEI on 15.06.2016 to serve as Assistant NC/CNC Technician at Manufacturing Management (Turning);
• Yunus Dag joined TEI on 15.06.2016 to serve as Assistant NC/CNC Technician at Manufacturing Management (Fabrication);
• Simay Sezgi Uzel joined TEI on 06.06.2016 to serve as Engineer at Maintenance, Repair and Overhaul (MRO) Management;
• Fatih Alan joined TEI on 20.06.2016 to serve as Assistant NC/CNC Technician at Manufacturing Management (Turning);
• Yalcin Uzel joined TEI on 21.06.2016 to serve as Assistant Fabrication Technician at Manufacturing Management (Fabrication);
• Meryem Ayture joined TEI on 22.06.2016 as Engineer at Electrical, Electronics, Control and Embedded Systems Management;
• Ozgur Kilic joined TEI on 24.06.2016 to serve as Assistant Quality Technician at Quality Management;
• Ridvan Nazim Beyaz joined TEI on 24.06.2016 to serve as Assistant Quality Technician at Quality Management;
• Harun Gultekin joined TEI on 24.06.2016 to serve as Assistant Quality Technician at Quality Management;
• Hasan Erol joined TEI on 24.06.2016 to serve as Assistant NC/CNC Technician at Manufacturing Management (Milling);
• Ufuk Alp joined TEI on 24.06.2016 to serve as Assistant NC/CNC Technician at Manufacturing Management (Milling);
• Zeki Demircan joined TEI on 24.06.2016 to serve as Assistant NC/CNC Technician at Manufacturing Management (Milling);
• Fazil Yilmazzobu joined TEI on 24.06.2016 to serve as Assistant NC/CNC Technician at Manufacturing Management (Turning);
• Osman Ozyurt joined TEI on 24.06.2016 to serve as Assistant Quality Technician at Quality Management;
• Engin Guven joined TEI on 24.06.2016 to serve as Assistant Quality Technician at Quality Management;
• Ugur Akin joined TEI on 24.06.2016 to serve as Assistant Quality Technician at Quality Management;
• Batuhan Hos joined TEI on 27.06.2016 to serve as Engineer at Quality Management;
• Sedat Ergun joined TEI on 27.06.2016 to serve as Assistant Machining Technician at Manufacturing Management (Milling);
• Hasan Yildiz joined TEI on 27.06.2016 to serve as Assistant Quality Technician at Quality Management;
• Ercan Ercanlar joined TEI on 27.06.2016 to serve as Assistant Quality Technician at Quality Management;
• Halil Sanli joined TEI on 27.06.2016 to serve as Assistant Quality Technician at Quality Management;
• Necdet Kepir joined TEI on 27.06.2016 to serve as Assistant Machining Technician at Manufacturing Management (Turning);
• Yasin Ure joined TEI on 27.06.2016 to serve as Assistant NC/CNC Technician at Manufacturing Management (Milling);
• Mehmet Uysal joined TEI on 27.06.2016 to serve as Assistant NC/CNC Technician at Manufacturing Management (Milling);
• Abdi Teber joined TEI on 27.06.2016 to serve as Assistant NC/CNC Technician at Manufacturing Management (Milling);
• Serkan Fidan joined TEI on 27.06.2016 to serve as Assistant NC/CNC Technician at Manufacturing Management (Turning);
• Mehmet Ozsen joined TEI on 27.06.2016 to serve as Assistant Machining Technician at Manufacturing Management (Turning);

• Ceyhun Kor joined TEI on 27.06.2016 to serve as Assistant Quality Technician at Quality Management;
• Ertan Keklik joined TEI on 27.06.2016 to serve as Assistant Quality Technician at Quality Management;
• Satilmis Kaya joined TEI on 27.06.2016 to serve as Assistant NC/CNC Technician at Manufacturing Management (Milling);
• Mehmet Taskin joined TEI on 27.06.2016 to serve as Assistant NC/CNC Technician at Manufacturing Management (Milling);
• Melek Canbulat joined TEI on 27.06.2016 to serve as Engineer at Production Planning Management;
• Soner Gungormez joined TEI on 27.06.2016 to serve as Assistant Tool Manufacturing Technician at Tool Manufacturing Leadership;
• Yusuf Oksas joined TEI on 27.06.2016 to serve as Engineer at Manufacturing Engineering Management;
• Gokhan Gokbulut joined TEI on 27.06.2016 to serve as Assistant NC/CNC Technician at Manufacturing Management (Milling);
• Okan Sen joined TEI on 27.06.2016 to serve as Assistant NC/CNC Technician at Manufacturing Management (Milling);
• Oguz Agir joined TEI on 27.06.2016 to serve as Assistant NC/CNC Technician at Manufacturing Management (Turning);
• Abdullah Karatas joined TEI on 27.06.2016 to serve as Assistant Special Process Technician at Special Process Management;
• Onur Aydin joined TEI on 28.06.2016 to serve as Assistant Special Process NC/CNC Technician at Special Process Management;
• Mehmet Karasu joined TEI on 28.06.2016 to serve as Assistant Special Process NC/CNC Technician at Special Process Management.

We wish them success in their career.

OUR NEW RETIREES:

• Talip Paksoy retired on 23.02.2016 as Chief Technician;
• Adnan Oncu retired on 28.02.2016 as Senior Technical Support Specialist;
• Ibrahim Gul retired on 29.02.2016 as Staff Specialist;
• Zafer Dogramaci retired on 25.03.2016 as Senior Clerk;
• Munip Kaya retired on 25.03.2016 as Senior Clerk;
• Mehmet Cifci retired on 04.05.2016 as Shop Supervisor;
• Bilal Ozkan retired on 12.05.2016 as Expert Technician;
• Saban Yurt retired on 27.05.2016 as Staff Specialist;
• Omer Yilmaz retired on 30.05.2016 as Chief Technician;
• Ergut Kucukersen retired on 28.06.2016 as Chief Technician;
• Ibrahim Yucel retired on 28.06.2016 as Chief Technician.

We wish them happiness throughout their lives.

BABIES OF TEI:

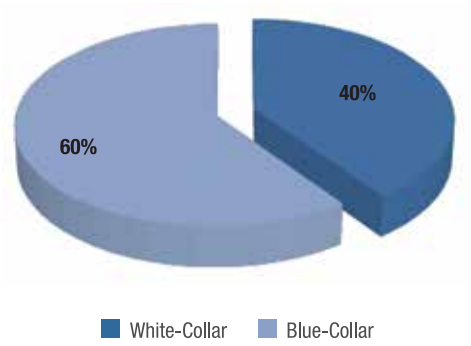
• Nuri Gokcinar's baby girl, Seyda, was born on 23.12.2015;
• Kaya Yavuz's baby boy, Ahmet Kagan, was born on 01.01.2016;
• Zeki Sert's baby boy, Uraz, was born on 04.01.2016;
• Musa Yavuz's baby girl, Buglem Erva, was born on 14.01.2016;
• Mevlut Izyat's baby girl, Zeynep, was born on 22.01.2016;
• Volkan Bayraktar's baby girl, Ela, was born on 16.02.2016;
• Ali Murat Gundogan's baby girl, Aysegul, was born on 20.02.2016;
• Goksel Altunay's baby boy, Yagiz Aybars, was born on 20.02.2016;
• Ilhan Gorgulu's baby girl, Zeynep Eylul, was born on 22.02.2016;
• Aziz Onal's baby girl, Melis, was born on 23.02.2016;
• Osman Aktas's baby girl, Zeynep Ela, was born on 03.03.2016;
• Yavuz Selim Mehel's baby boy, Dogukan, was born on 04.03.2016;
• Zihni Alper Unsan's baby girl, Ilke Elis, was born on 06.03.2016;
• Onur Ersay Us's baby boy, Erdem, was born on 10.03.2016;
• Guven Pekmez's baby boy, Hasan, was born on 12.03.2016;
• Fahri Ersoy Orhan's baby boy, Kemal Efe, was born on 17.03.2016;
• Aykut Zobur's baby boy, Ayberk, was born on 20.03.2016;
• Erman Delikoca's baby boy, Omer, was born on 22.03.2016;
• Kemal Engin's baby girl, Senem Naz, was born on 24.03.2016;
• Kadir Aladag's baby girl, Beren, was born on 26.03.2016;
• Guvenc Danaci's baby boy, Gokay Baris, was born on 26.03.2016;
• Murat Cakmak's baby girl, Elif, was born on 26.03.2016;
• Recep Kizil's baby girl, Nehir, was born on 29.03.2016;
• Fatih Kilic's baby boy, Mustafa Enes, was born on 05.04.2016;
• Ramazan Altas's baby boy, Alperen, was born on 07.04.2016;
• Korcan Ozyurt's baby girl, Bile, was born on 11.04.2016;
• Kerim Turgut's baby boy, Aras, was born on 11.04.2016;
• Gokhan Yavuz's baby girl, Zeynep, was born on 12.04.2016;
• Ibrahim Cebeci's baby girl, Hira Nur, was born on 12.04.2016;
• Mahmut Kucuk's baby boy, Kemal, was born on 17.04.2016;
• Sabahattin Coskun's baby girl, Duru, was born on 19.04.2016;
• Mustafa Saka's baby girl, Fatma, was born on 20.04.2016;
• Bilal Turkben's baby girl, Elif Dila, was born on 20.04.2016;
• Olcay Cakicier's baby boy, Mirac Izzet, was born on 30.04.2016;
• Emre Durdu's baby girl, Masal, was born on 07.05.2016;
• Lutfi Sen's baby girl, Maysa, was born on 09.05.2016;
• Ferhat Sahin's baby girl, Elif Zeren, was born on 12.05.2016;
• Ugur Sengun's baby girl, Sarenur, was born on 12.05.2016;
• Engin Gunalay's baby girl, Zeynep Nida, was born on 16.05.2016;
• Deniz Ozcan's baby boy, Cinar, was born on 20.05.2016;
• Erhan Mazlum's baby boy, Omer Yagiz, was born on 27.05.2016;
• Caner Uysal's baby boy, Ata, was born on 31.05.2016;
• Mesut Sari's baby boy, Kerem, was born on 06.06.2016;
• Erhan Yuksel's baby boy, Kivanc, was born on 17.06.2016;
• Erdi Badur's baby girl Elif, was born on 19.06.2016;
• Ercan Arican's baby boy, Atlas, was born on 22.06.2016;
• Canip Acar's baby girl, Alya, was born on 24.04.2016;
• Emre Kucur's baby girl, Elif Huma, was born on 25.06.2016;
• Ibrahim Cam's baby girl, Nisa Nur, was born on 26.06.2016.

We wish our babies and their families years full of health and happiness.

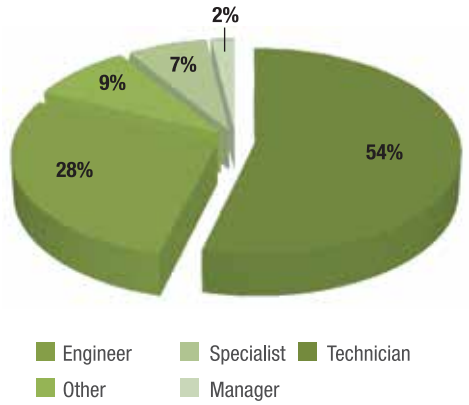
THE STATISTICS ON TEI'S EMPLOYEES

As of June 30, 2016, breakdown of our employees, corresponding to more than 1700 persons, is as follows;

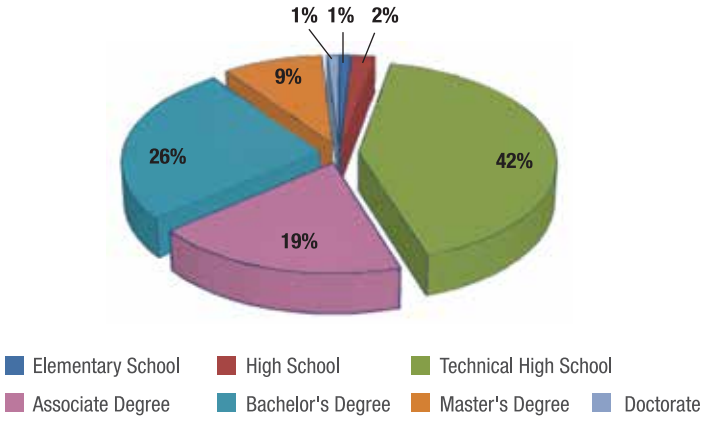
Breakdown of White-Collar and Blue-Collar Employees



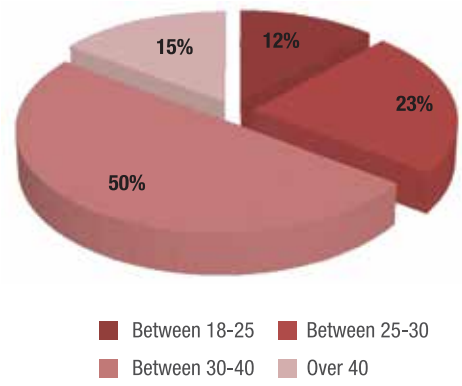
Based on Title Groups



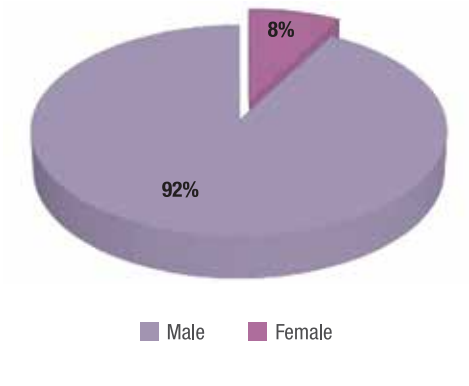
Based on Educational Status



Based on Age Group



Based on Gender



VISITORS

• Visit by ITU Defense Technologies Club (SAVTEK) / January 29, 2016

• Visit by 1st Main Jet Base Command / February 5, 2016

• Visit by "Programmable Metal Processing Machine Adjuster - Operator" / CNC Turning & Milling Machine Operator" Trainees, European Turkish Business Development Center (ABIGEM - Eskisehir) February 11, 2016

• Visit by ANKA Aviation and Aerospace Society of the University of Turkish Aeronautical Association / March 3, 2016

• Visit by Aircraft and Aerospace Society of Students of the Ondokuz Mayis University / March 11, 2016

• Visit by Dr.Hideaki Watanabe, Undersecretary of Defense, Hardware and Procurement of Japan, and His Committee / March 17, 2016

• Visit by Ankara Branch Office of the Chamber of Mechanical Engineers / March 17, 2016

• Visit by Turkey Air Technical Schools Command / March 25, 2016

• Visit by Abdullah Al Omari, CEO at MEPC company, and His Committee / April 13, 2016

• Visit by the Sakarya University - Industry Collaboration Society April 27, 2016

•Visit by Prof. Dr. Yusuf Ulcay, Chancellor of Uludag University May 9, 2016

• Visit by Saudi Arabian Industrial Investments Company (SAIIC) Committee / May 11, 2016

• Visit by James L. Jones, Chairman of the Board of Directors of American - Turkish Council (ATC), and His Committee / May 11, 2016

• Visit by Turkish Military Academy of the Turkish War Colleges Command / June 13, 2016

• Visit by Besim Sisman, Chairman and President of Turkiye Petrolleri Anonim Ortakligi (Turkish Petroleum), and His Team / June 19, 2016

TEKNOPARK ISTANBUL "TEAM OF THE YEAR" AWARD

The 2nd Teknopark Istanbul Golden Cube Awards Ceremony revealing the bests of Teknopark Istanbul was performed at the Conference Hall of Teknopark Istanbul on January 22, 2016. The personnel of Istanbul Engineering Office of TEI was awarded as "The Team of the Year" among 12 different categories, through which performance of 120 companies, situated in the Teknopark Istanbul campus, for the year 2015 was evaluated.

"RESPECT FOR THE HUMAN BEING" AWARD FOR 2015

Thanks to its successful works conducted, Human Resources Directorate of TEI was granted with "Respect for the Human Being" award for the year 2015 by the Management Center Turkey in Kariyer.net award ceremony on February 17, 2016.

"STARS OF THE ECONOMY" AWARD

Thanks to its total exportation figures, TEI was honored with the "Stars of the Economy" award by Gebze Chamber of Commerce in the "Stars of the Economy" Award Ceremony organized on February 26, 2016.

TIM "EXPORT FIRST RUNNER-UP" AWARD

Based on the Research for the Top 1000 Exporters published by Turkish Exporters' Assembly (TIM), TEI maintained its second rank among the companies with the highest export volume in Defense and Aerospace Industry in 2015. It climbed up to 47th rank from 52nd rank in the total export ranking covering all industries.

ISO TOP 500 RANKING

TEI climbed 42 ranks up to the 132nd place in the ranking for the Top 500 Large Industrial Enterprises of Turkey, which was prepared by Istanbul Chamber of Commerce (ISO).

"THE MOST PRODUCTIVE ORGANIZER WORLDWIDE" AWARD

TEI was selected as "The Most Productive Organizer Worldwide" by the Institute for Women of Aviation Worldwide on March 8, 2016 under the TEI Women of Aviation Worldwide Week as a consequence of the events organized for the purpose of raising the awareness in relation to the aviation industry.

"KAIZEN RUNNER-UP" AWARD

The 15th Eskisehir Quality Fest was organized by Eskisehir Branch of KalDer on April 6, 2016. TEI team was honored with the runner-up award thanks to the Spline Kaizen Project in the Kaizen Competition, which was organized for the first time under the Fest.

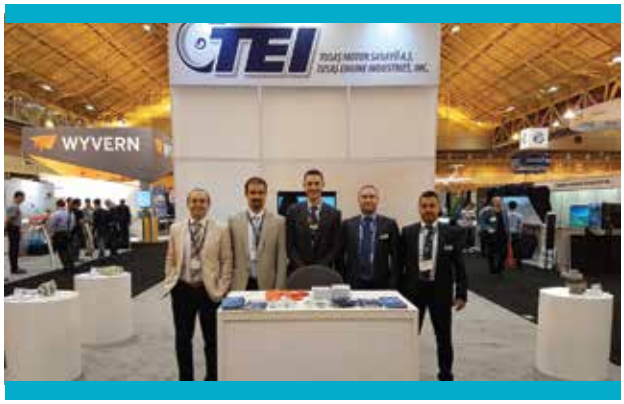
SASAD "1st PLACE EXPORT" AWARD

TEI was honored with the 1st place award thanks to its success for Export and Labor Productivity in the award ceremony performed on April 27 during the Ordinary General Assembly of the Defense and Aerospace Industry Manufacturers Association (SASAD), as a consequence of the evaluation carried out by the Undersecretariat for Defense Industries by taking into account the financial data of all member companies for the years 2012, 2013 and 2014. The award was granted to Prof. Dr. Mahmut F. Aksit, President and CEO of TEI, by Ismet Yilmaz, Previous Minister of National Defense.

EXHIBITIONS ATTENDED

AUVSI's XPONENTIAL 2016

TEI attended and ran a booth at the AUVSI's XPONENTIAL 2016, organized on May 2 - 5 in the city of New Orleans of the United States of America.



ORGANIZATIONS ATTENDED

TEI AT UNIVERSITIES

TEI ran a booth and answered the questions asked by the students in the Human Resources Summit organized at the campus of Istanbul Technical University on February 23-24 and the Career Day organized by Eskisehir Osmangazi University on April 28.

ENGINEERING DEVELOPMENT DAYS 2016 (EDD'16)

Ercan Arican, serving as Senior Technical Leader at Aerothermal Engineering Directorate of TEI, met the students at the event "Engineering Development Days" (EDD), organized by Electrical and Electronics Engineering Society (IEEE) of the University of Turkish Aeronautical Association on March 9 - 11.

DEFENSE INDUSTRY DAYS (SSG)

Taylan Ercan, serving as Turboshaft Engines Design Manager at TEI, delivered a presentation and answered the questions asked by the students at the event "ODTU Defense Industry Days", organized by Mechanics and Innovation Society of the Middle East Technical University on March 11 - 12.

TRAKYA DEFENSE AVIATION AND AEROSPACE SYSTEMS SUB-INDUSTRY NATIONALIZATION SUMMIT

TEI ran a booth in the event organized by Association of Support of Technical Production and Exportation (TUDEP) in Tekirdag on March 17 -18. Also, Gokhan Bursoy, serving as Turbojet and Turboprop Engines Design Manager at TEI, delivered a presentation at the event.

DEFENSE TECHNOLOGIES DAYS 2016 (STG)

Mustafa Tuksal, the Manager of Istanbul Engineering Office of TEI, attended the event "Defense Technologies Days", organized by Defense Technologies Club of Istanbul Technical University on March 31 - April 1, with the presentation "Engine and Technology Development Projects of TEI Design Directorate".

AVIATION DAYS

Samet Aydin, the Technical Leader, and Mujdat Aslan, the Engineer, both of whom serve at Piston Engines Design Management of TEI, attended the event "Aviation Days", organized by the Aircraft and Aerospace Engineering Club and Aviation Club of Istanbul Technical University on April 2-3, with the presentation "Piston Engines Practices and Safety Approach in Aviation Industry".

Photo15th QUALITY FEST

TEI attended and ran a booth at the 15th Quality Fest organized by Eskisehir Branch of KalDer on April 6. Also, TEI team was honored with the runner-up award thanks to the Spline Kaizen Project in the Kaizen Competition, which was organized for the first time under the Fest.

DEFENSE INDUSTRY R&D AND TECHNOLOGY MANAGEMENT PANEL

Prof. Dr. Mahmut F. Aksit, President and CEO of TEI, attended the event organized by the Ministry of National Defense under the 1st Defense Technologies Day in Ankara on April 12.

AVIATION AND AEROSPACE DAYS 2016 (HUG'16)

Taylan Ercan, serving as Turboshaft Engines Design Manager at TEI, delivered a presentation "Aviation Engine Industry in Turkey" at the event organized by ANKA Aviation and Aerospace Society of the University of Turkish Aeronautical Association on April 14 - 15.

11th CAREER DAYS OF THE FACULTY OF ECONOMICS AND ADMINISTRATIVE SCIENCES

Human Resources Department of TEI ran a booth and answered the questions asked by the students at the event of Career Days organized at Eskisehir Osmangazi University on April 28.

UNMANNED AERIAL VEHICLE (UAV) EVENT

Suleyman Altinorak, serving as Advanced Lead Engineer at Piston Engines Design Management of TEI, attended the UAV event organized by the Hezarfen Aviation and Aerospace Club of Eskisehir Osmangazi University on May 7, with the presentation "Controller Design Methodology in the UAV Engine Development Project".

THE EVENT FOR THE 90th ANNIVERSARY OF FOUNDATION OF THE 1st AIR SUPPLY AND MAINTENANCE CENTER COMMAND

Murat Karamahmutoglu, serving as Manufacturing Director at TEI, attended the ceremony organized on May 22 in the campus of the Command on the occasion of the 90th anniversary of foundation of the 1st Air Supply and Maintenance Center Command.

3rd CIRP CONFERENCE ON SURFACE INTEGRITY (CSI)

Ozgur Poyraz, serving as Staff Engineer at Technology Programs Management of TEI, attended the conferences, 3rd of which was organized by the International Manufacturing Researches Academy and the Faculty of Engineering of Charlotte University on June 8-10. A presentation was delivered and the details of the paper titled "A Study on the Stair Stepping Effect in Direct Metal Laser Sintering of a Nickel-Based Superalloy", issued under the conference, were revealed.

TURBOEXPO 2016 (TURBOMACHINERY TECHNICAL CONFERENCE & EXPOSITION)

A.Tuna Kirgiz, Senior Technical Leader; Altug Piskin, Senior Engineer; Ahmet Topal, Staff Engineer; Mustafa Kocagul, Lead Engineer and M. Cem Sertcakan, Engineer; all of whom are serving at Design Engineering Directorate of TEI, attended the conference organized at the Coex Convention Center in the city of Seoul in South Korea on June 13-17. During the organization, Altug Piskin and Mustafa Kocagul delivered presentations on "Heat Transfer and Flow Conjugated Analyses at the Combustion Chamber" and "Sealing Performance Loss in the Labyrinth Seal", respectively.

PRODUCTIVITY AND OCCUPATIONAL HEALTH SAFETY

Today human capital, as a business input, has become the most important factor of production that is needed for the enterprises to be able to achieve their goals, and makes production meaningful.

Productivity of human factor plays a key role in organizational success. The primary step in increasing employee satisfaction and productivity is to provide them with a safe and healthy working environment.

Provision of a safe environment is among the phenomena needed by individuals to accomplish the goals they set for themselves in their lives as Maslow states in his Hierarchy of Needs Theory.

Figure 1- Maslow's Hierarchy of Needs

The hierarchical pyramid represents an individual's priorities in life. According to this hierarchy, an individual meets his or her needs in a hierarchical order starting from the bottom to the top. He or she cannot move up to the next level unless his or her needs in a lower level are satisfied to a certain extent.

Physiological needs (nutrition, mobility, rest...) are at the bottom layer and people meet these needs primarily. Need for safety comes as the next layer after physiological needs. Therefore, it does not seem possible for an individual to take any action to satisfy his or her social needs before satisfaction of his or her need for safety. This need is followed by the needs for belonging-love (communication with others, being accepted, belonging to somewhere...), esteem (respect and recognition by others, achievement and self-sufficiency...) and self-actualization (self-satisfaction, revealing inner potential...) in respective order. Satisfaction of the physiological and safety needs, which are indicated as fundamental needs, has a direct impact on employee motivation, satisfaction and productivity.

Transition to mass production with the industrial revolution brought about long working hours, dangerous machines, lack of knowledge/-experience and as a result unsafe and unhealthy working environments. However, protection of the health and safety of employees at work constitutes the first step for working in an effective and productive manner. Occupational health and safety actions must be taken in order to eliminate dangerous conditions that might cause harm to human health, in particular, and environment, and to protect employees from unfavorable conditions at work, occupational accidents and diseases for the purposes of ensuring safety and continuity of production and increasing productivity.

The primary goal of occupational health and safety actions is to protect all employees from dangers that arise as an occupational accident or disease at workplaces and threaten our lives; minimize detrimental incidents to minimum; provide a fully safe working environment with zero risk, zero occupational accident, and zero occupational disease, and therefore to make happy people, happy work environment and happy society

Occupational Health and Safety Enhances Productivity

Raising awareness of occupational health and safety results in increased employee satisfaction and motivations as well as enhancing production quality and productivity. This is because, for the success of a business, the harmony between an employee and his or her job directly affects productivity. To promote harmony between the job and employee, training programs should be organized for employees and necessary physical arrangement should be made at the work place. To that end, physical factors in the work environment such as lighting, heating, noise level, etc.; work plan; technical measures intended for collective and personal protection; training to support the level of consciousness are closely related to productivity, business success, reduction of occupational accidents and increase of competitiveness.

To put it shortly, provision of a healthy and safe work environment has a positive impact on productivity of employees and work places as well as on national economy. Occurrences of occupational health and diseases result in depletion of national resources and a significant increase in losses of labor and working day. The gains to come with the increased productivity to be achieved when businesses allocate their resources to activities that will raise the occupational health and safety level will have a positive impact on national economy through the agency of labor-employer.

With this in mind, the following measures are taken at TEI to achieve the desired goals (zero risk, zero occupational accident, zero occupational disease...) and productivity level through occupational health and safety.

• Efforts are made to create and maintain a high-quality work environment and constantly improve it. A number of projects were implemented in 2016 to improve ventilation system in many areas in order to keep the quality of air in the environment at ideal level.

• New working methods and equipment are being developed to improve working position and decrease tensions that occur due to physical work. To that end, "Ergonomic Improvement Project" is being carried out and planned to be completed in 2016; and our improvement efforts will continue in the next period.

• Theoretical and practical training courses are organized periodically to make occupational health and safety a part of our corporate culture.

• Occurrences of near-miss events, hazards, accidents... are investigated and corrective - preventive actions are being taken to prevent recurrences.

• Environmental and occupational health and safety is addressed as part of an integrated management system, and efforts are made for continuous improvement and management system steps are being followed.

• We have had work uniforms designed and created a corporate work uniform catalog with the Corporate Communications department in order to ensure that work uniforms are work-specific and as comfortable as the work environment itself.

TEI SPRING TOURNAMENT HELD FOR THE 30th TIME

TEI Spring Tournament, which was first held in 1987 and became a company tradition since then, was held for the 30th time this year. Football, basketball, tennis, table tennis, badminton and bowling games were held as part of the tournament, which was launched with a football game on Sunday, May 1, 2016.

A total of 514 employees took part in the tournament with 10 football teams, 8 basketball teams, 24 sportsmen in tennis games, 50 in table tennis games and 20 in badminton games, as well as 50 bowling teams. Except the Bowling and Badminton Tournaments, all tournament games were held on the relevant fields at TEI campus. All staff members and their families attended TEI Spring Tournament which was enlivened with the food&beverage stand and playground that were open on Sundays during the event. The qualifying teams and employees will be presented with their medals and cups at the upcoming TEI Picnic.

1200 TEI EMPLOYEES ATTENDED IFTAR DINNER

Our President and CEO Prof. Dr. Mahmut F. Aksit organized an iftar dinner for all staff members at the TEI Dining Hall and Social Facilities Building on Tuesday, June 23, 2016. Around 1200 TEI employees attended the iftar dinner we had as the entire TEI family.

TEI SUMMER SPORTS SCHOOL ATTRACTS HEAVY ATTENTION

TEI Summer Sports School, which was first launched in 2014 to promote interest in sports among our employees' children; was organized between June 20, 2016 - June 30, 2016 for the third time with contributions of external instructors from Provincial Directorate of Youth and Sports and the Scouting and Guiding Federation of Turkey.

This year 153 children from TEI family attended the football, basketball, volleyball, taekwondo, tennis and scouting classes of the program which was taken by a total of 114 and 140 children in its first and second year, respectively. "Closing Ceremony for TEI Summer Sports School" was held on June 30 at the TEI Social Facility Building with the attendance of the TEI employees and their families.

The participants were given a certificate of participation by the end of the program, and they said that they could not get enough of the program and were looking forward to TEI Summer Sports School next summer.

TEI CELEBRATED WOMEN OF AVIATION WORLDWIDE WEEK WITH **"PINK PAPER PLANES"** EVENT

TEI made a record attempt with "Pink Paper Planes Challenge™" to celebrate Women of Aviation Worldwide Week, which is celebrated globally within the week covering March 8, in a meaningful and strong way.

High-school girls made and flied planes at the school ground at TEI's "Pink Paper Planes Challenge™" event.

TEI HAVACI KADINLAR BULUŞMASI '16

TEI provided its support with 4092 planes, made by 600 participants, to the Guinness World record attempt titled "Pink Paper Plane Challenge™" organized simultaneously all over the world this year as part of the Women of Aviation Worldwide Week celebrations. Aviation for All Association assisted TEI in the organization.

The attempt took place in the garden of Haci Suleyman Cakir Anatolian High School for Girls, which was attended by the 200 students of the schools as well as 200 female students selected from 11 other Anatolian and Science High Schools chosen across Eskisehir by the Provincial Directorate of National Education.

80 female employees from TEI, GE Leaders, Female Columnists, press members and female leaders from other sectors also attended the event which was intended for celebration of both the Women of Aviation Worldwide Week and the International Women's Day on March 8. As a consequence of this event, TEI was awarded with the "Most Productive Organizer Worldwide" prize by the Institute for Women of Aviation Worldwide.

MARCH 7-13, 2016
Women of Aviation
WORLDWIDE WEEK
ENGAGE • EXPERIENCE • INSPIRE

Women of Aviation Met With Future Women of Aviation

The record attempt continued with the panel "Meeting of TEI Women of Aviation". The panel kicked off with provision of industry-related information at the meeting hall of Haci Suleyman Cakir Anatolian High School for Girls. At the end of the panel, Canan M. Ozsoy, Chairman and CEO of General Electric Turkey; Flt. Lt. Fatma Oz; Assistant Prof. Nilay Sezer Uzol, Department of Aerospace Engineering, METU; Buket Topel, NDT and Special Process Quality Manager, TEI and Naile Bayraktar, General Coordinator of MSI Magazine gave inspiring speeches.

Future Women of Aviation are at TEI

The event ended with a visit to TEI, after the panel, and the female students took a tour at TEI's premises during which they got to see the working environment at TEI and learn everything they would like to know about the industry on site.

"INTELLIGENCE WORKSHOPS" PROJECT BY TEI

TEI added a new social responsibility project to the existing ones with intelligence workshops. Driven by the aim of introducing games, to support intelligence development of children aged 7-10, to the primary school students at the needy regions, TEI set up the first "TEI Intelligence Workshop" in Ali Riza Efendi Primary School.

TEI Intelligence Workshop was opened on February 8, 2016 with a ceremony attended by Necmi Ozen, the Provincial Director of National Education in Eskisehir; K. Levent Tufekci, Human Resources Director at TEI and the TEI's volunteer employees performed the painting-white washing processes and provision of intelligent games. Furthermore, the furnishings in the workshop were supplied by TEI.

As a result of the positive outcomes of the first intelligence workshop, this project was titled as "TEI Intelligence Workshops Project" and made traditional in a manner to add intelligence workshops to two Eskisehir-based schools every year. The second TEI Intelligence Workshop was realized on April 26, 2016 in Sehit Mucahit Top Primary School in the district of Gunyuzu in Eskisehir. The students performed zeibek dance in the opening ceremony of the Second Intelligence Workshop. Upon the ribbon cutting ceremony, TEI Intelligence Workshop was opened to be used by the students.

TEI'S EMPLOYEES WILL DONATE **BLOOD BIANNUALLY**

Providing contributions to the Turkish Red Crescent with its blood donation campaign at its Eskisehir-based premises in 2015, TEI signed a "Blood Donation Protocol" with the Turkish Red Crescent's Blood Donation Center in Eskisehir on April 14, 2016, which makes its contributions regular. TEI's volunteer employees may donate blood biannually as part of this protocol.

The first blood donation under this protocol was organized on May 10, 2016 so as to coincide with the Give & Gain Week of May 9-15. TEI's 80 volunteer employees donated blood on the Red Crescent's truck deployed at TEI premises.

1ST SEMESTER OF VOCATIONAL HIGH SCHOOL COACHING PROGRAM WAS COMPLETED SUCCESSFULLY

First semester of Vocational High School Coaching Program, initiated in December 2015, was completed upon finalization of the meetings by all groups. A barbecue organization was held on May 28, 2016 at TEI premises to celebrate the productive and enjoyable semester. Delicious food and snacks were offered, then tug of war was organized between the groups and students competed in gunny sack race individually.

Hurkus Grup became the winner of the tug of war and received their championship cup from Hasan Yilmaz, the Vice Principal of Ataturk Vocational and Technical Anatolian High School.

Murat Gumus from Gokcen Grup became the winner of the gunny sack race and received his championship medal from his coaches Tulin Ograk and Erkut Ozdenkos.

MESLEK LİSESİ KOÇLARI PROGRAMI

Visit to a Nursing Home

16 coaches from TEI, assigned in the Vocational High School Coaching Program, and 96 students from Ataturk Technical and Industrial Vocational High School visited Safiye Gonul Bayar Nursing Home as part of the Give & Gain Week of May 9-15. during the visit, bunches of flowers and various gifts were presented to the elderly people living in the nursing home. The nursing home residents said that they were pleased with the visit and TEI's employees and the students expressed their happiness to be a part of this meaningful organization.

TEI SHARED **MOTHERS' HAPPINESS ON ITS BIRTHDAY**

Carrying out various social responsibility activities until today, TEI realized a new project. TEI presented sets for newborns to the women who gave birth to their children at the Obstetrics Clinic in Eskisehir State-Run Hospital and shared their happiness on January 25, marking the date of its incorporation. TEI's volunteer employees joined this event, organized by TEI's Social Responsibility Group, and visited all 47 mothers who gave birth to their children on that day.

BEYZA MERCAN CALLED FOR NATIONAL TEAM

Beyza Mercan runs from one achievement to the next under the sponsorship of TEI. First, in March, she qualified for the National Team at the end of 3km cross country race at the "High Schools Championships Turkey" in Adana, which was also a trial for the national team. Then, she came 3rd at 4-km race at the "11th International Bursa Osman Gazi Historical City Road Race" organized in Bursa in April. And finally in May, her team came 3rd and brought the bronze prize to Eskisehir at the "World Schools Championships" held in Budapest by the International School Sport Federation.

TEI SPONSORS ESKISEHIR'S ATHLETE **FURKAN YILDIRIM**

Furkan Yildirim, 17, is a very promising athlete from Eskisehir and sprinter who competes in 60m, 100m and 200m. His achievements so far include 3rd place in Turkish Record Attempt Championships in 2014 held in Istanbul in 2014, and 3rd place in Turkish Youth Club Championships - 2nd Stage, and now TEI volunteered to sponsor his career. Mahmut F. Aksit, CEO and President of TEI, was also present at the ceremony held at TEI. He congratulated Furkan on his achievements and wished him success in his career. Furkan's achievements in 2016:

- January 22-23-24, 2016 - Turkish Indoor Championships Youth Category 60m -2nd place (Istanbul)
- March 12, 206 - Provincial School Championships 100m, 1st place (Eskisehir)
- April 11, 2016 Group School Championships 100m, 1st place (Ankara)
- May 3-4, Turkish Clubs Championship, 100m, 1st Place (Denizli)
- May 7-8, Turkish Youth Clubs Championships 1st Stage 100m and 4x100m, 1st place (Denizli)

FROM **BURAK BALCI**'S PEN **"MUSE"**

She won five European-wide and 58 Nation-wide championships throughout her career. When she was just 17 years old, she set a national record in the field of 800 meters in her third race. She was holding 6 different world records(1) before taking part in 1948 London Olympics. At this Olympics, since the competition rules prevented an athlete from competing in more than three individual field events (although she held the world record), she couldn't compete in high and long jump fields. In spite of this, she won gold medals in 80 meters hurdles(2), 100 meters, 200 meters(3) and 4x100 meters races and became few of the athletes who won 4 gold medals in a single Olympics. Upon completion of the Olympics, she was welcomed back home like a folk hero (whose statue will be erected in near future) and the queen granted order of knighthood to her. When she was alive, a stadium was built in the name of her in her country, and then an athletics competition bearing her name was organized regularly.

But, who is "she"? She is the Dutch Fanny Blankers Koen. In 1999, she was voted "Female Athlete of the Century" by the International Association of Athletics Federations (IAAF). Would the above-mentioned achievements be sufficient alone for holding such a magnificent title among numerous athletes with major and brilliant careers who competed in a century? We will never know the answer. As for the effect of the other below-mentioned factors on this mighty honor, I leave it to the discretion of you after reading.

30-YEAR-OLD MOTHER OF TWO

Koen was just 18 years old when she took part in 1936 Berlin Olympics. Subsequent to this Olympics where she couldn't win any medals, she kept on self-improving with two bronze medals in the 38' Vienna European Championship and started to get prepared as a potential gold medal winner for the Olympics planned to be held in Helsinki in 1940. However the Olympics could not be held in both 1940 and 1944 due to the Second World War.

In 1948, Koen was 30 years old, which could not be considered too late despite being not ideal to achieve a high level of performance. In fact being 30 years old would not have been considered a hinder if she was not a mother of 7-year-old boy and a 3-year-old girl. She went through two pregnancies and raised her children in the Second World War atmosphere.

In those days when it was impossible to maintain a well-balanced diet, she didn't give up doing exercises (even if she had

breaks sometimes)[4]. It is narrated that Koen was doing exercises just two hours for two times a week (ridiculously when compared to present) in some periods of those days, and that she was sometimes taking her children to her exercises in the saddle of her bicycle.

Furthermore, it is important to note that all these things were occurring at a time when women had just recently started to gain a place in the society and the people didn't lean towards racing of a woman. While it was already not a common thing for a mother to take part in top-tier competitions, Koen was also trying to overcome this point of view in those years. When she decided to take part in the London Olympics, the sports community said that it was too late for her on one hand, and she was receiving letters from both the press and the people including critics and even high words on that her primary duty was to look after her children on the other hand. The Dutch athlete got prepared while putting a brave front on these difficulties, and won 4 medals in the London Olympics, which put her stamp on history.

It was not easy for her to win these 4 gold medals. When she became the champion of the first two fields "100 meters and 80 meters hurdles", she wanted to quit the Olympics in tears upon getting in the mood of "Now I'm the champion, this is enough for me" accompanied with the longing for her home and children; but she was persuaded to continue by her husband Jan's[5] great efforts, then she returned and completed her own legend.

POSITIVE VIEW TOWARDS WOMEN ATHLETES

As you see, Koen didn't get any of her achievements easily. She is an inspirational figure to make the people, who always give up easily and hide behind excuses, feel ashamed of themselves. Also for the athletes who betray their own skills and don't (can't) get maximum of themselves. But it is clear that the highest level of inspiration is on women (especially the ones having child(ren)). Koen is such an important figure that we can divide the women's sports history into two: before and after Koen. The women athletes, who once weren't taken seriously and were humiliated, started to be welcomed with a far more positive view after her achievements. Koen is the greatest figure to have the concept "women's sports" adopted entirely.

Leading the way for her future fellow athletes by putting her signature on world sports history with her achievements in London, Koen maintained her success after the Olympics with three gold and 1 silver medals in 1950 European Championship in Brussels, and she set her last world record in pentathlon in 1951. If she didn't suffer from a skin boil in Helsinki in 1952, she could have added new Olympics medals to the existing ones. Koen became the national champion in the shot put in 1955, marking her 58th and the last national title, and after her athletic career, she served as the team leader of the Dutch athletics team between 1958-68.

Besides her sports achievements, known for her different and inspirational story out of sports, Fanny Blankers Koen died in 2004. Let this article be a sign of respect to this great-hearted woman nicknamed as "The Flying Housewife" who stands firm against the cliche suggesting that age and motherhood are hindrances for achieving success in sports...

ABOUT **BURAK BALCI**

He was born in 1984 in Ankara. He graduated from the Department of Mechanical Engineering in the METU in 2006 and took his master's degree on Computational Mechanics in the Munich Technical University in 2008. He started to work at Turkey Technology Center in 2009. He has been serving as Lead Engineer at TEI's Engineering Office in Ankara since 2015.

(1) 80 meters hurdles, high jump, long jump, 100 yard (91 meters), 4x110yd (4x100 meters) and 4x200 meters.
(2) It has been run as 100 meters hurdles since 1972.
(3) She won 0.7 seconds ahead of the runner-up. This is still the greatest difference between the winner and the runner-up in this field.
(4) During the war period, she kept on engaging in sports and participated in national championships, which corresponds to the time when she set the 6 world records indicated in footnote #(1).
(5) Koen's husband Jan Blankers was a former Dutch triple-jump champion who also participated in 1928 Amsterdam Olympics, and also the-then coach of the Dutch women's athletics team (so, also Koen's).

BY **MUJDAT ASLAN**

“WHAT IF IT CRASHES?”

There have recently been so many talks in the aviation society on the potential situations if one of the engines shutdown. Both the guard kept by the airline companies for maintaining their prestige, and fears of the aircraft manufacturers for loss of trust on their designs result in statements, interviews and conversations like "if the engine shutdown during the flight, nothing will happen". Actually, they are not wrong at all. Because, in respect of any aircraft with two engines and/or more than two engines, all calculations are performed based on the performance values reckoning on the fact that one of the engines is not running. So, we can say that one of the engines serves as auxiliary engine in any aircraft with two engines. If one of the engines shutdowns, then the other engine enables you to keep your inflight for a while. Considering today's technology, it is far less likely that all engines available in any aircraft shutdown. It is all very well; however, one cannot help thinking what if all engines shutdown! In such a case, aircraft may glide in the air like a bird and fly for a while in various ranges based on the altitude. For example; considering more simple calculation, any aircraft with a mean gliding performance at an altitude of 10.000 meters may continue to fly in the range of 150-200 km when all of its engines stop.

Considering any measures for all of such design-performance calculations, and technological developments, the inflight engine shutdown is deemed "minor impact" in accordance with the regulations issued by the international aviation authorities.

So, what is minor impact? Shortly, it may be defined as "any matters, which do not considerably affect the system safety, and which cause additional load for flight crew members, and which may require additional maintenance or inspections, and which may pose a problem for passengers".

Just as each safety-effective design, aircraft engine designs are required to be created by focusing on the possibilities for conclusion of any failure in the system negatively not on the possibilities for conclusion thereof positively. In brief, do not take the easy way in design analyses like "If engines shutdown, it is impossible to crash", but ask yourselves "What if it crashes?" and search for a solution.

The flight nr. 9268 performed by Metrojet Airlines; the most fatal accident of Airbus A321, October 31, 2015

In particular, since designing organizations avoid financial burden, they prefer to satisfy minimum requirements set out by the authorities. However, doing the best in order to give no chance for Murphy in a system having the risk of loss of lives must be a conscientious responsibility. If we discuss why an aircraft will crash when its engines shutdown, instead of discussing why an aircraft will not crash when its engines shutdown, the possible cases will be as follows:

Critical Engine Shutdown:

In respect of the propeller and twin-engine aircraft, if the engines shutdown during the

flight, the concept of critical engine will be in question. Critical engine refers to the engine which will cause the worst impacts on aircraft performance and/or usage characteristics in case of any failure. In respect of any propeller twin-engine aircraft, both propellers of which turn rightward, the moment, caused by the descending blade of the right propeller, will be higher than that of the left propeller due to the fact that lever arm is more distant from the center line of aircraft. Accordingly, in case of occurrence of any failure in the left engine, heading control will be affected much more than occurrence of any failure in the right engine. In such a case where the critical status of the left engine is in question, any actions to be taken to control the aircraft are of great importance. Aircraft may crash if the pilot cannot control the flight control surfaces in case of a critical engine failure.

Shutdown The Wrong Engine:

Especially in respect of twin-engine aircraft (regardless of turbine or propeller), if one of the engines shutdown, then loss of control may be in question again. Because flow of the induced airflow deriving from engines, through the wing, produces Lift (force). Since airflow and Lift in the relevant wing decreases when the engine shutdowns, aircraft will rollon the wing where the failed engine is located. In case of any inflight engine failure, the pilot banks the aircraft towards the engine side and uses the rudder towards the relevant side. Thereafter, the pilot should feather the blades of the failed engine and minimize the drag and flexing. Finally, the failed engine is required to be shutdown. However, if the pilot shutdown the wrong engine, then all of such controls may be lost, and the aircraft may crash!

Failure in Re-Starting the Engine:

In respect of any aircraft, all engines of which shutdown, re-starting function is also one of the matters scoring the points. Because re-starting period of the engines takes just 2,5 minutes thanks to today's technology. However, in case of any failure in this function, aircraft may crash as a consequence of failure combinations.

Engine Failure During The 2nd Phase of Take-Off:

Take-off phase of aircraft is divided in two categories. Such categories are pre- and post-V1 speed, specifying the limit at which the flight may be canceled in case of any possible engine failure. In respect of any aircraft reaching the V1 speed varying based on the length of runway and environmental conditions, flight cannot be aborted, and it is required to be proceeded to the climbing phase. In such phase requiring full power, aircraft with unsatisfied gliding conditions arising from the engine may crash!

Absence of Any Area To Float:

In respect of any aircraft with failed engines, gliding capability is one of the characteristics scoring the points at most. However, it is obvious that our iron birds at the tons of weight cannot perform soft landing. Moreover, there may not be broad plains where you can float. Your engines may fail while flying over any mountainous terrains and/or crowded residential areas, and aircraft may crash!

Eatonville Aircraft Accident, May 30, 2013.

Other many possible cases posing a risk...

System designers should remember that their products will be used by a user. Just as each field, where humans and environmental factors are active, human error and poor conditions are in question in the aviation industry, as well. Therefore, any organizations, providing service in such a field as aviation industry where the safety is the most efficient factor, should not be contented with satisfaction of minimum parameters with respect to their own designs, and they should improve their designs and intend to minimize the user's effects.
Remember that engine is the beating heart of a airplane, and that it is not possible to save aircraft in case of any wrong implementation of emergency procedures. Each flight, during which the engines fail, may not be resulted in any loss, just as the Flight nr. 9 performed by the British Airways, or not all aircraft may be operated by skilled pilots. The aircraft, crashed the beach in the USA, and another aircraft, crashed the sea in Samsun, and the aircraft, crashed in "Finowfurt" in Germany due to the failed engines, which resulted in loss of lives, show how minor impacts are important.
In addition to loss of lives, loss of commercial prestige and financial losses are also important. The requirement for subjecting any aircraft with the failed engines to the maintenance, and for organizing additional flights are some examples of financial losses. Instead of reinforcement of the optimism by means of possibility of non-realization of such risks, development of a professional pessimism by investigating the possibility of realization of risks is a requirement with respect to any employees serving in the aviation industry. When any products are manufactured for humanity purposes regardless of any commercial concerns in today's world, where commercial concerns are prioritized instead of conscientious responsibilities, the essential slogan of the aviation industry "Safety First!" will take its own place in the heart and mind of the employees of the entire aviation industry.

Be Safe...

ABOUT **MUJDAT ASLAN**

Mujdat was born in 1990 in Ayancik/Sinop. Mujdat completed his studies in 2013 at the department of Aircraft Engineering, Faculty of Aeronautics and Astronautics, Istanbul Technical University, and during the same period, at the two-year Psychology program of Istanbul University with the title of the Psychological Counselor. In 2014, he started to serve as Engineer at Piston Engines Design Management of TUSAS Engine Industries, Inc.

SHE WORKS HER MAGIC

Born with hearing impairment, Sema Kurt Dalayli turned her interest in handicrafts, dating back to her childhood years, to hobby. Dalayli currently makes special-design decorations for Islamic memorial services, birthdays and henna nights.

She shares the story lying behind her transformation with TEl Post readers:

I was born with hearing impairment. I was keen on pencils and notebooks when I was a child. Thanks to my keenness, I won the painting contest organized by the magazine Milliyet Kardes when I was 8 years old, which made me burst into happiness.

My aunt was a tailor and I made baby dolls from the excess fabric of her sewing works in my childhood years. I made baby dolls from empty mineral water bottles, necklaces from calendar papers and jeweleries from ceramic paste which was followed by wood carving works and various decorations I made from woven felt.

My friends admired my works and started to place orders. I made special-design decorations for Islamic memorial services, birthdays and henna nights. I have been making lamp-shades from calabashes grown in my uncle's garden.

ABOUT
SEMA KURT DALAYLI

Born in 1983 in Denizli and joined Human Resources Directorate at TEI in 2007, Dalayli currently serves as Clerk at Social Affairs Leadership.

'DERVISH'ES OF MODELLING

Taking up a hobby of modelling, TEI's employees Gokhan Erten and Onur Basaran considers to rent a house in Odunpazari and turn it into a workshop to deliver training with the aim of making modelling widespread.

The story of Gokhan Erten and Onur Basaran started independently from each other and then found a common ground; let's listen to their story by their own words:

Gokhan Erten:

"I become happy when the model is done."

Model is a copy of a real or fictional object produced on specific scale using various materials. A model is different from a toy or mock-up in principally that it is scaled and real-like. Due to these characteristics, modelling requires a high level of patience and a small-scale workshop equipped with necessary tools and equipment.

I became acquainted with my hobby in 2011 when I saw a fishing boat adjacent to the dock. I saw this stunning boat and said to my wife "I can make this boat." As my wife suggested that I would fail, I felt a great ambition and started to look into the modelling. It took several months just to look into, then I purchased the necessary tools and equipment. Upon determination on the model, I purchased the Marina II model kit and took my first step in modelling. I made some arrangements on one of the rooms in my house to engage in this hobby. At first I got angry sometimes, but as the model was rising over time, I started to enjoy. Considering that building a medium-size ship model takes more than 1 year, I believe that a model is far more valuable than a readily-sold knick-knack. Although I enjoy so much, my wife doesn't think so sometimes. As I am working in one of the rooms of our house, wood dust and even paint and thinner odor may lead problems in keeping the house clean.

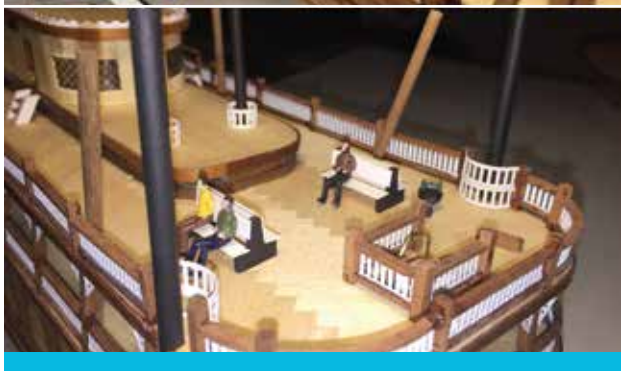
I will never give up my hobby of modelling as my happiness gets more and more at each time the model is done.

Onur Basaran:

"Behind this door lies there a different world!"

Making a model is not only one of the best ways to make use of spare times well but also a hobby that improves your manipulative skills and at the same time teaches you what a great merit patience is. I think the contribution of self-confidence, brought by making a model from scratch, to both private and business life is undeniable.

My modelling adventure started in 2004 when I first bought a remote control boat from a toy store. In my first workshop that I set up on a small area in our kitchen, I tried to make a replica of this boat, marking my first significant activity on modelling. Despite the negative environment due to the-then restricted means, incapacity of the workshop and my circle's point of view on modelling, I kept on improving myself on modelling.



When I was engaged in modelling and started to make in-depth searches on the matter, I realized that making a replica of a boat purchased from a toy store is not modelling actually, and then all my plans changed. I purchased the licensed 'Albatros Galley' from an expert model maker, and made it in strict line with the building plan, and took my first step in the "scaled model" world.

After 12 years, I cannot even describe how great times I have at a well-equipped workshop with my friends I have made thanks to this hobby. Besides ship modelling, I am also engaged in making plastic car and plane models on 1/24 - 1/18 scale as well as a collection of on-road vehicles on 1/87 scale.

Now I know that behind the doors of my workshop lies there a different and scaled world where I am so happy.

ABOUT **ONUR BASARAN**

Born in 1978 in Eskisehir, Onur Basaran joined TEI in 2006. Currently he serves as Quality Technician at Quality Management.

THEY WILL SET UP A MODELLING WORKSHOP

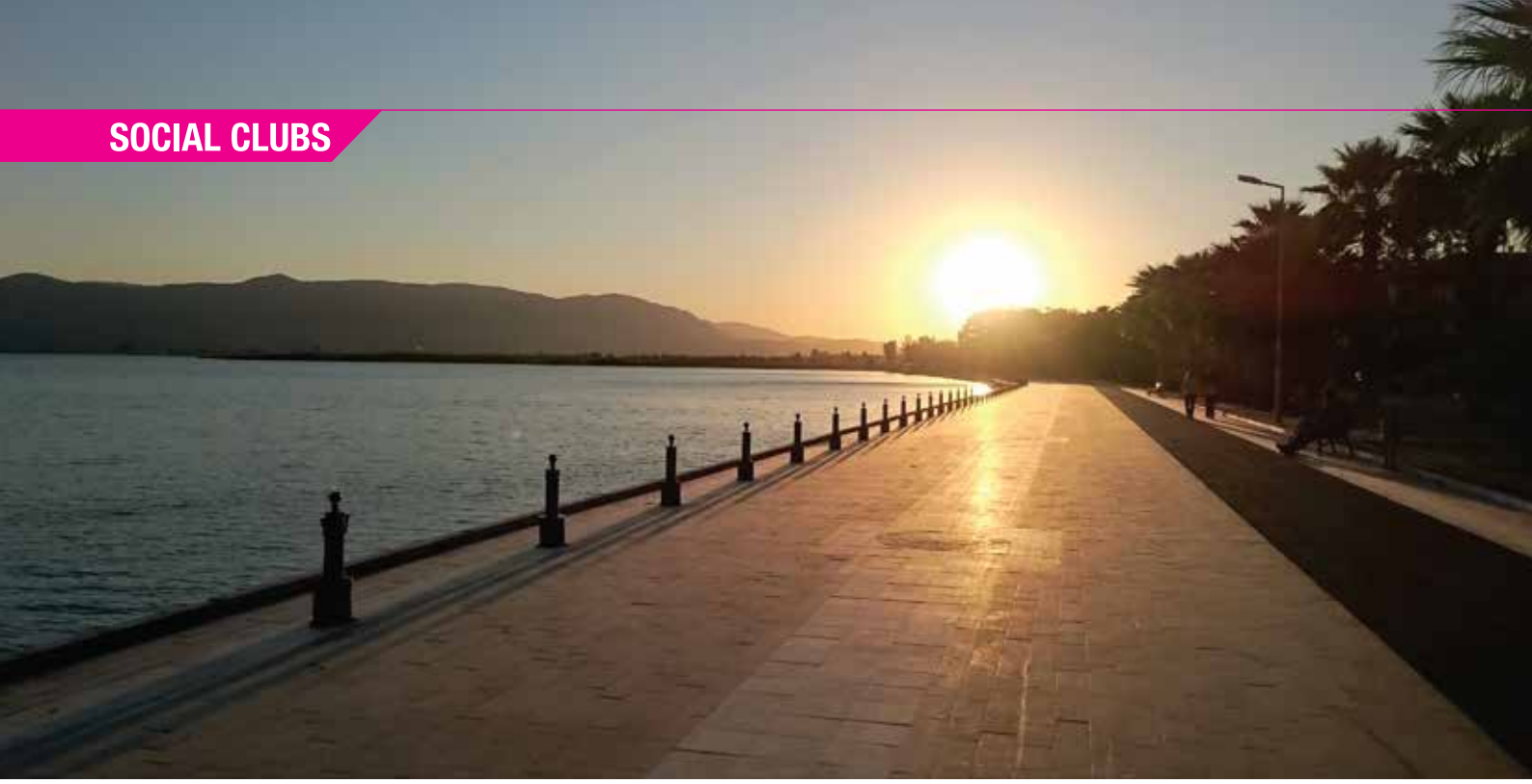
Once Gokhan and Onur learned that both of them were engaged in the same hobby, they started to exchange their ideas with, and provided support to each other for making up for their lackings.

Over time, they decided to make "Mississippi" river boat with their joint efforts, and say that they completed more than 50% of the boat as a consequence of approximately 1-year effort. Confessing there was a competition even if a little bit between each other, they underline that this competition made this process even more pleasant.

Considering to rent a house in Odunpazari and turn it into a workshop to deliver training with the aim of making modelling widespread, Onur and Gokhan are getting ready to realize this project.

ABOUT **GOKHAN ERTEN**

Born in 1982 in Eskisehir, Gokhan Erten joined TEI Family in 2010. Currently he serves as Lead Designer at Manufacturing Engineering Management.



THE "blisket" ATTENDED THE SECOND KOYCEGIZ ORANGE BLOSSOM FEST

The “blisket”, TEI Bicycle Club, attended the bicycle fest for the first time. The “blisket” attended the “Second Koycegiz Orange Blossom Fest”, which was organized in Mugla - Koycegiz on April 28 - May 1, together with its five members.

Early in the morning on April 28, the team took the road after having loaded their bicycles and the materials, they will need, to their vehicles, and they arrived at the camping site in Koycegiz in the afternoon, and they set up their tents and toured Koycegiz for a short while.

The team passed through village roads and arrived in Dalyan in the leg called as Caretta Road on April 29. Thereafter, they arrived at Iztuzu beach, which was the reproduction area of Caretta Caretta turtles, through the southern side of the Lake Koycegiz. The team returned to Dalyan by following up the same road after they had lunch; and they pedaled nearly 50 km and returned the camping area in Koycegiz by means of the boats through the western side of the lake.

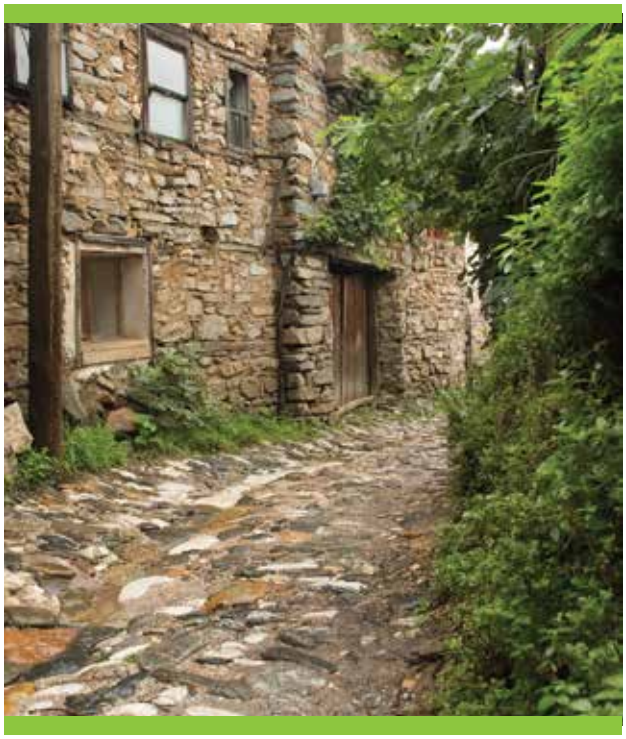
On April 30, the second leg was KAUNOS Road. The “blisket” followed the highways available in the western side of the Lake Koycegiz, and watched the Lake and natural beauties, and arrived at Sultaniye Hot Springs. After challenging climbing up and downs, they arrived at the former port of Kaunos Ancient City, and they loaded their bicycles to their boats to return to the camping site, and they ended the day.

On May 1, the third and last leg was Sigla Road. They arrived in Yuvarlakcay in this stage, consisting of the hard roads passing through Sigla Forests located in the east of Koycegiz, after having climbed for a long time. The team cooled off in the running water as cold as ice, and then they completed the leg and ended the tour.

The “blisket” team had experiences during the tour, which was their first camping tour organized out of the city within the natural beauties; and they are planning to organize more joyful tours in the future.

CUMALIKIZIK AND GOLYAZI
BY FURKAN BILGIC

With its historical buildings, streets and friendly people, Cumalikizik offers a good destination choice for those who wish to see and experience the heritage of the Ottoman period. It is one of the 5 villages situated on the outskirts of Uludag. Its name comes from that Cumalikizik was the only village where the villagers attended Friday (Cuma) prayers compared to the other four villages, namely Degirmenlikizik, Derekizik, Fidyekizik and Hamamkizik.



A Journey to the Past

You can see the traces of its historic texture in every corner, which takes you to the daily lifestyle of those times as if you were in a time machine. At the entrance of the village, you can see the tour buses and the curious tourists, who come to visit the village, even early in the morning. Various local products offered for sale by the local salesman, and breakfast smell of the delicious freshly-made gozleme, a Turkish flatbread variety, will make you feel hungry as soon as you arrive. When you pass the entrance of the village and walk up along the streets lined up with Ottoman houses on both sides, the streets get narrower and narrower and are divided into side streets to take you to the past.

While walking along the road, you may have a hard time in believing that the houses standing right next to you have a history of nearly 700 years. The houses demonstrate the architectural style of the Ottoman period in the best way; mostly built as two- or three-storey buildings, these houses were constructed in masonry, using rubble stone and bonding timbers to make sure that the courtyard of the house cannot be seen from the street as privacy of family was very important in the old times. Here you can see houses intersecting narrow streets, which makes you feel like to take a photo and post it. So, you can see a lot of travelers taking photos in front of the historical gates of these houses.

The Narrowest Street of the World

Another must-see attraction in the village is the Cin Street. Known as "Cin Araligi" (literally the Jinni Lane) is known as the narrowest street of the world. The remains of a Turkish bath, also from the Ottoman period, the ruins of a church, even believed to be built by Byzantines, and the ethnography museum are among the must-see attractions of the village. In Cumalikizik, raspberry festival was organized from 1998 to 2010; and since 2010, it has been replaced by Cumalikızık Festival which is organized with the contributions of the Ministry of Culture and Tourism.

Inscribed on World Heritage List

The village, with its more than 250 houses and narrow streets that shed light on the Ottoman period lifestyle, was also inscribed on UNESCO World Heritage List in 2014. Besides those visitors that come to the village to witness the history, a great many people also visit the village to have a good village breakfast.

You will enjoy a rich breakfast table abundant in jams, bread varieties, honey, clotted cream and cheese varieties, all made locally by the villagers, to the accompaniment of gozleme flatbread with ground meat, potato or cheese. You can also came across many small stalls on side streets where you can buy delicious local flavors such as jars of raspberry and strawberry jam, pastries, pickles, honey, packaged bulgur wheat, eriste (homemade fettuchini) and many other local flavors. There are some inns in Cumalikizik if you want to stay over and become a part of the village life even for a short while. The inns offer clean rooms and serve their guests like a real guest house. Also, there is a walking track up in Cumalikizik for trekking lovers. You will feel refreshed after trekking in the arms of nature on the outskirts of Uludag.

If you are looking to see the historical village houses and witness the traces of the Ottoman heritage on the narrow streets of the village which demonstrate the daily lifestyle of the time, have a feast with the delicious smell and taste of the local flavors, meet the friendly villagers and buy the local products they sell, and most importantly get away from city life for a while and take a journey to the past, then I recommend you to add Cumalikizik on your places to visit list.

GOLYAZI VILLAGE - ULUABAT

Golyazi is a beautiful fishing village located on the historical peninsula on Lake Uluabat... It is one of those places that will make you wonder "So, do we have such beautiful places in Turkey?". You will be amazed at the splendid view of a peninsula lying in the beauty of Lake Uluabat, reflecting all shades of blue and green, and the small village resting on it. The beauty of the village will strike you as soon as you arrive. The picturesque view, with a deep blue lake surrounded by every shade of green, will make you want to wander around the village and explore it right away.

The peninsula where the village is located is connected to the mainland by a bridge. When you cross the bridge and arrive at the island, the village square coffeehouse, mosque and hospitable people of Golyazi, sitting at the tables beneath the plane trees, will welcome you. Nearby the coffeehouse, the mouth-watering smell of freshly baked bread comes from the village bakery and pervades the entire village.

It is actually a fishing village... Small, cute fishing boats and fishing nets flapping around in the air grab your attention wherever you turn your eyes. Tourists and villagers are accustomed to each other; the villagers continue to do their daily chores regardless of the curious glances of tourists. The entryway to the village will lead you to the village square which accommodates the docks where the fishermen repair their fishing nets, a line of village coffeehouses where tourists and villagers sit side by side, and the village market where the voices of local salesmen fill the air.

The Weeping Plane

If you cross the square and keep walking towards the inner parts of the village, you will come across a mighty Plane tree. Known as the Weeping Plane, this tree is believed to be nearly 750 years old and it has an interesting epic tale. The Plane tree first witnesses the love story of a Greek girl named Eleni and Mehmet, a Turkish boy, and when Eleni is forced to leave village because of the population exchange agreement and they fall apart, it also witnesses the tragic end of their love story that ends with death, and so it has been weeping since then. Scientifically, the pseudo tears on the tree is in fact nothing but release of the sap within its trunk, but it perfectly completes the story.

Here all the roads will take you to the lake in the end. You cannot help being amazed again and again every time you come across the lake view at the end of each street and remember that this village is actually located on a peninsula in the middle of a lake. You can find traces of the historical heritage from different periods since it was first founded in the name of Apollo, the God of Light, in ancient times. Previously, Turkish and Greek people used to live together in the village, but with the population exchange between two countries after the Independence War, the Greek population immigrated to Greece and some of the Turks emigrating from Thessaloníki settled here and founded the village. However, there are many Greek houses and buildings still standing in the village.

Some of the tourist attractions include historical ruins of an ancient necropolis, a sacred temple, remnants of city walls, stadium and St. Panteleimon Church, which was built by the Greek in the 19th century and renovated to serve as a culture center today, and the Golyazı House standing next to it which was recently renovated to host writers and translators today. It is not known when exactly the village mosque and bath, two important architectural works from Ottoman period, were built. The village bath is one of the recently renovated buildings in the village and today it serves as a coffeehouse and some parts of the building are open for visit.

Zambak Hill offers the best view of Golyazı. The hill is known as a place for all seasons to go trekking, have a picnic or take beautiful photos.

You can also rent a boat and enjoy the view during a lake cruise and take beautiful photos even if you are an amateur photographer. Especially the amazing frames captured during sunset attract groups of photographers to the village.

Bird Sanctuary

If you get to visit the village in the spring, you can see a great many of storks perching on their nests on the poles and lamp posts. The lake and its surroundings host a diverse variety of bird species especially together with the Uluabat Bird Sanctuary, which is very close to the village. This makes it one of the most attractive places for bird watchers.

If you like fish, you can have cat fish, carp and pike, coming from the lake, at the restaurants around or you can try the gozleme varieties baked with delicious herbs sold at the stands at the village square.

If you are looking to take amazing photos while wandering along the streets of this village to see its natural beauty and historical texture, enjoy the riot of blue and green during a ferry excursion on Lake Uluabat, get the chance to observe many different bird species inhabiting in the surroundings of the lake, taste Pike fish, buy delicious local village foods or sit at the coffeehouse beneath the plane tree and witness the curious glances of the tourists who visit the village for the first time, then you should definitely visit Golyazı Village. I'm sure you will come to visit this place again once you see the village life on this peninsula in the middle of Lake Uluabat and its numerous untouched beauties.

ABOUT **FURKAN BILGIC**

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NEW YORK, NEW YORK
BY DORUK KOCER

I went on a journey to New York City (NYC) on my annual leave, which was on my mind for quite some time. For me, it was like seeing a dream finally come true. I have a real passion for movies, and considering that many of my favorite movies were set in New York City and the idea of walking along the same streets as many movie starts which I watch with great admiration did, fueled my excitement to the highest level.

Although 7 days seem long enough for the journey, a good planning was imperative to explore New York. First, I decided to arrange accommodation and started to check hostels. I preferred “Jazz on the Park”, a hostel located on the 106th Street, Central Park, for its affordable prices and almost central location, and I was pretty satisfied with this hotel by the end of my stay.

After accommodation arrangement, I set to plan which attractions to see in town. For this, I bought a City Pass online at 116 dollars, which includes pretty much all the main activities in New York, notably visiting the Empire State Building, Rockefeller Building "OR" Guggenheim Museum, the Statue of Liberty and Ellis Island "OR" a Sightseeing Cruise, Metropolitan Museum of Art, American Museum of Natural History and Intrepid Museum "OR" 9/11 Memorial & Museum, for which separate tickets cost 194 dollars in total.

Take the Subway!

You are supposed to choose one between two attractions given above with an "OR". For instance, if you want to climb top of the Rockerfeller Building, then you need to skip Guggenheim Museum. When you receive the stub of these tickets, do not forget to check the discount coupons on the last pages. In addition to these tickets, I also bought a 48 hour Hop-on Hop-off Ticket which grants you a free 24 to 96 hour ticket with all multi-day Passes for a touristic tour on sightseeing buses. Besides unlimited 2-day bus pass, this ticket also granted me with free admission to an attraction I would choose. So, I

chose New York Sightseeing Cruise, and this way, I could save my City Pass option to visit the Statue of Liberty. But I can say that I wish I had not bought these hop-on hop-off tickets, then I could have easily saved that 49 dollars. Because the New York subway system is the second most impressive subway network I have ever seen after the Paris subway; it is possible to access almost every corner of the city by subway. The fare for a subway rise is $2.75 whereas 7-day unlimited pass costs $30, so definitely buy a 7-day metrocard. It is fun to walk around and explore the city by foot at first, but as your time starts to run out, you will take the subway more often. I even took more than 10 subway rides one day, so I strongly advise you to buy a 7-day metrocard.

Central Park

Central Park was just as I imagined it and maybe even better. A well conserved paradise in the middle of NYC, one of the most hectic cities in the world; like a therapy session in the middle of a chaos. I explored different parts of the park on 3 different days. Just like movies, it was packed with moms having a picnic with their babies on checkered table covers, kids playing baseball, New Yorkers cycling, jogging, walking their dogs and tourists, like me, taking pictures at every step. I recommend everyone in New York to spare a whole day to soothe your soul and relax at Central Park, if you get that chance. Of course there are many beautiful places to find peace but it is a completely different experience to slow down the life at the very center of the most fast-living city of the world. You can see an aerial view of Central Park and take wonderful photos from the observation deck at the Belvedere Castle located in the middle section of the park. Finally, don't be surprised when you come across squirrels everywhere at Central Park. Don't forget to bring some nuts if you want a closer contact with these lovely friends because these little guys are brave enough to come by you to get the nuts from your hand.

Times Square

It would not be wrong to say "If NYC is the center of the world, then Times Square is the center of the NYC." Day or night, it is always beautiful and very crowded. By the way, as much as it is called "a square", do not imagine a wide area closed to traffic like the ones in Europe. This is the square of the new world and a heavy traffic flows right through it. When you visit there at night, you can witness a riot of colors reflecting from the huge screens mounted on skyscrapers. You can have a short break on the ruby-red stairs, if you could find an empty spot to sit, and take lots of photos.

Burger Joint

I decided to visit Burger Joint, one of the best burger restaurants in the city according to my search. When I learnt that it was located in Le Parker Meridian Hotel, I assumed that it was chic burger restaurant but obviously I hadn't searched well enough. They guided me to a long, narrow corridor next to the lobby of that chick hotel and soon after, the chicness was replaced by a dim, shabby atmosphere. There was a shortish queue ahead of me and I could get in after waiting for 15 minutes but that was not it. I waited inside for another 10 minutes before I could finally give my order. There are only hamburger and cheeseburger on the menu. You can add tomato, pickles and sauces, to your taste. I chose a double hamburger and once again, I had made the right choice. The place was dim-lit and the walls were covered with words written by visitors; and the tables were not very clean because of the busy visitor traffic. But still, the burger's taste makes you totally forget about the dirty tables and almost half-an-hour-long wait. Definitely add Burger Joint to your list and do not forget to write your name on the wall if you find any space left!

American Museum of Natural History

Another attraction that you can never skip if you visit NYC is this museum. You should spare at least half a day for this colossal museum, where the "Night at the Museum" was set in. Although the hall of dinosaurs is the prime attraction center of the museum, what I enjoyed most was the movie theater where we watched "Dark Universe" in our reclining seats, as I couldn't help thinking and feeling pleased that we have the same in Eskisehir.

Carlo's Bake Shop

I waited for around 10 minutes to give order at the shop of Buddy Valastro, the star of the "Cake Boss" which is also aired in Turkey. I ordered cannoli, an Italian pastry dessert, and Oreo cupcake. I had not tried cannoli before but for me, it was not so tasty as to leave a mark, but I eat Oreo cupcake at several places and Buddy's definitely cannot make it to top 3.

Metropolitan Museum of Art

"The Met", one of the most prestigious museums in the world, is located on Harlem side of Central Park and it is definitely a must see attraction in every New York tour. I felt both surprised and happy when I saw the Koç Family's name in "Islamic Art Collection" of the Museum. Later I learnt that the Koç family made a considerable donation to support the museum and that's why a hall of the museum was named after them.

Angelo's

"Angelo's", which is said to be one of the best places for a pizza in New York, was the first pizzeria I visited in NYC. I was planning to try many pizzas at different places, so I decided to make a classical choice and order margherita pizza at all pizzerias as I wanted to make a fair comparison and feel the taste of pizza bread rather than the topping. (That every additional ingredient for topping cost another 3 dollars was definitely not one of the reasons behind my choice:)) Angelo's have a very pleasant ambiance and the waiters are doing such an elegant work. The pizza was the second best that I had tasted in NYC. I would definitely recommend Angelo's because of its location in Broadway, one of the most central places in the city, wonderful pizza and friendly staff.

The Intrepid Sea, Air & Space Museum

If you would like to see Intrepid aircraft carrier, Growler submarine and space museum, this way please! For me, it was an amazing experience; how often one can get the chance to ride a submarine? Besides the aircraft carrier, the aircraft displayed at the exhibition were really in good shape. Here let me give you an advice; it's 10-minute walk from the berth of the Intrepid Aircraft Carrier to the departure point of the ferries that offer sightseeing cruises around the Statue of Liberty and Manhattan. And transport to these two ports takes almost 40 minutes from downtown Manhattan because the subway station is far. So, schedule these two visits on the same day with half a day for each one; this will allow you to minimize the time you spend on the way.

Brooklyn

There are many ways to go to Brooklyn, but I choose to go there by hop-on hop-off buses through Manhattan Bridge and return to Manhattan on foot by walking across the Brooklyn Bridge. I had three reasons to visit Brooklyn. The first two reasons were that I could capture the exact image as the one in the poster of "Once Upon A Time in America", one of the top 10 movies in my list of favorite movies of all times, and listening to "Yesterday" on the soundtrack album on the movie while wandering along the streets where Noddles, the protagonist, walked. And the third reason was to have pizza at "Di Fara", supposedly the best pizzeria in NYC.

Di Fara

Di Fara has been called "the best of the best" by Chef Anthony Bourdain, and its pizza chef Dom, now 79 years old, still makes every pizza by himself. I waited for almost 45 minutes to eat at Di Fara, where maximum 10 people can sit (cheek by jowl). It was both because of the high demand, and that Dom hand-makes every pizza by himself slowly with the calmness of a 79-year-old person. You can order your pizza in round or square shape or get in slices. I ordered one round classic margherita and one round DiFara Classic. I also wanted to try the square one, so I ordered a slice of square pizza. All I can say is that I had never had such delicious pizzas in my entire life but sadly the square pizza, of which I had only ordered a slice, was more delicious than the round one. Let me remind you that they only take cash. Even if "Once Upon A Time in America" is not on your list, you should still go to Brooklyn and visit Di Fara to have a pizza handmade by Dom.

Wall Street

Probably because it was Sunday, it was very calm around the famous “Charging Bull” sculpture except a few tourists. You can schedule your Wall Street visit on the same day as Brooklyn visit because you can arrive at the bronze bull after a 10-minute walk from the Brooklyn bridge. As an alternative plan, you can schedule it on the same day you spared for the "Statue of Liberty" visit. The "Battery Park" where the Statue of Liberty ferries depart from is only 5 minutes' distance to the bull.

Doughnut Plant

While I was doing some research to schedule my NYC visit, I added the Doughnut Plant's branch on the 23rd Street in my schedule as it was recommended by Vedat Milor as the best doughnut spot in New York. After waiting for around 10 minutes, I could get my square doughnut -one of their specials- glazed in peanut butter and filled with blackberry jam and coffee One bite was enough to make me decide that what I had eaten in Turkey till that time were not even doughnut. When I visited the place again 2 days later, I also tasted creme brulee and Manhattan cream doughnut and I loved it! Never never skip it!

Chinatown

Located around the Manhattan side of the Manhattan Bridge, Chinatown really feels like you are in China. Not only almost everyone in the neighborhood is of Chinese origin, but also all shop signs are in Chinese, including those of the American brands. Just out of curiosity, I entered a supermarket and the first thing that attracted my attention was the diversity of exotic fruit varieties and the live frogs for sale at 6 dollars. I suggest you spare 2 hours, if you have time, to experience the China in the New World.

Little Italy

When you keep walking through the Chinatown toward Manhattan, suddenly the Chinese signs come to an end and you find yourself in Italy. Honestly, for me it was more pleasing than Chinatown. It might be partly because the best pizzerias and gelato shops are lined up along the neighborhood.

Lombardi's

Located in Little Italy and known as the first pizzeria of NYC, Lombardi's has a lovely place and friendly waiters. When I said the waiter I couldn't decide between margherita and the Lombardi's special white pizza, he told me they could make it half margherita and half white pizza, and won my heart. The white pizza is made with three different cheese varieties without any tomato sauce, but to tell you the truth, the margherita half of my pizza was much more of a success. Like Di Fara, Lombardi's also does not accept credit card.

The Empire State Building

It is very similar to the Rockefeller Building experience but in my opinion, Top of the Rock is much more impressive. Because here you can enjoy the view and take photos through wire fences even when you climb to the top; but at the Top of the Rock, you can enjoy the view without any wire fences or glass.

Top of the Rock

Another must-see attraction. Although all the articles I read had warned me against an incredibly long queue, I only waited for about 10 minutes, probably because I went there right at the opening hour. Once you take the elevator and get upstairs, I recommend you to take the stairs to climb the top floor instead of taking photos immediately like I did. Because the top floor has the best view! You can enjoy the Central Park's view on the one side while seeing the Empire State Building on the other side.

Hometown Bar-B-Que

When a friend of mine living in New York suggested me that "Go to Hometown Barbeque and have brisket, you will tell about in all year when you are back in Turkey", so I went to Brooklyn for the second time just to visit that place. I was devastated when I arrived there at 11.00 am to find the place closed but I decided to wait anyway. At around 12.00, the door was opened from inside and I started to check the menu right away. Meanwhile, a lady got ahead of me and gave her order. We started to chat while she was waiting for her order and she told me not to order more than one portion because a regular portion would be more than enough, and said that I was right on time because there would be a long queue in front of the place in half an hour. Brisket is a tender and juicy meat dish made by cooking veal for 16 hours. The person who takes your order also makes the disk and I think he offered us the first pieces of meat s/he cut since we were the earliest customers of the day. I took her/his advice and also ordered brisket baked beans. I'm glad I listened to her/him because the best food I had during my entire USA visit was the one at Hometown Bar-b-que. Never leave without trying it or you will be sorry!

Steve's Authentic Key Lime Pies

I crowned the excellent food I had at Hometown Barbeque with a lime pie, in ten minutes' walking distance from there, which was a perfect combo. The shop is really small and not very good to sit there. But you can take away your pie and eat it up at the park just ahead across the view of the Statue of Liberty. Add this place in the Brisket-driven Brooklyn tour.

The Flatiron Building

For me, it was a must to see this triangular building, which we frequently see in Hollywood movies. If you have time, you can charge the battery of your mobile device at the free solar charging stations located at the little square right in front of the building while taking photos of the building. And if you are as lucky as I am, you can even come across music video shooting of an Indian pop singer.

M&M's World

This M&M's heaven is located in 2 blocks' distance from the Times Square and besides a great variety of M&M's-themed toys and articles, it offers you the opportunity to make your customized

The Statue of Liberty - Ellis Island

M&M's. That's right, I sad "to make" because you push a button to start production of the M&M's that will bear the photo or text you choose so you are actually making your own M&M's by yourself.

Midtown Comics

Located in 5 blocks' distance to Time Square, this store not only has the largest comic book archive I have ever seen but also hosts incredibly detailed superhero action figures. I didn't buy anything because of the extremely high prices and the risk of breakage during transport but still, being there made me feel great.

The Mills at Jersey Gardens

This section concerns those who are planning to spare a day for a wild shopping session. That friend of mine, who lives in New York, also directed me to this place, saying "They have the best prices" so I decided to go this outlet shopping center, which is located in New Jersey, as its name suggests and luckily there is no sales tax in New Jersey. The Port Authority subway station in Manhattan is also the departure point for buses. So, you can get off the subway at this station and take the bus numbered 111 and get off right in front of the shopping center. Round trip ticket costs $14 and the journey takes around 45 minutes. Stop by the welcome counter located at the entrance of the shopping center and show your passport. They will give you a discount catalog with extra discounts and coupons. Remember to take the sketch of the shopping mall or else you can easily get lost while rushing crazily from one store to the other.

The Statue of Liberty - Ellis Island

Visiting this gigantic statue, which is the most well-known symbol of the USA today, is definitely a must-do in NYC. Ferries to Liberty Island, where the statue is located, depart from Battery Park at the tip of Manhattan. You arrive at the island after a pleasant 15-minute cruise. The ferries take off immediately after they disembark their passengers. This is because a new ferry arrives at the island in every 20 minutes. By the way, you need to make an extra payment to go inside the Statue of Liberty. If you are not planning to make this payment and get to the top of the monument, maximum 30 minutes would be enough to see the island and take photos. When you complete your island visit, you can proceed to Ellis Island by ferry or return to Battery Park. Ellis Island served as a station where the immigrants to

the United States were admitted to denied admittance between 1892 and 1953. Now it is possible to see many documents and photos in the Immigration Museum on the island. After completing your visit, you can return to Battery Park by the ferries that depart in every 20 minutes.

Raclette

Raclette is named after a French cheese variety and its menu offers French toasts, tasty sandwiches and "Raclette", their special for which the place is really known, which is actually melted cheese served over a plate of potatoes, pickles and sliced meat.

The guest relations agent at the entrance told me because I didn't have a reservation, they could be available after 2.5 hours. But I told them that I wanted to wait in case somebody canceled their reservations, and I started to linger around the restaurant. Luckily, they arranged a table for me in 15 minutes. Raclette is a small restaurant which can accommodate maximum 10 people; their biggest deal is that they pour the melted layer of raclette cheese round on your plate of selected items at the table. It reminded me of how they serve butter by pouring it over Iskender Doner at the table.

By the way do not eat up all the food on your plate quickly, because they serve cheese for the second time after a while. You should definitely try if you could get a chance and remember to record it while they are pouring the cheese over your plate.

Roosevelt Island

This tiny and cute island on the East River in eastern Manhattan offers a peaceful life in the middle of a wild crowd. The largest point of the Island is 240 meters wide, which is the best information to describe how small the island is. That is to say, you can see the end of the island from the other end. I took the subway to go there and could discover almost everywhere on the island within nearly 45 minutes. And of course I took the famous cable car for return trip, just like Mathilda did in "Leon". Even this experience was a good enough reason to visit Roosevelt Island. By the way, the cable car ride takes around 7-8 minutes and they take metrocard.

New York Public Library

Probably because book are one of the most important things in my life, New York Public Library reminded me of Borges's famous words "I have always imagined that Paradise will be a kind of library". This is a special place where bookworms can feel themselves at home. You should definitely spare some time to see it.

Levain Bakery

This amazing cookie shop at Harlem has completely changed the way I see cookies. Needless to say, we have many exquisite desserts but these cookies are great man! Especially “Dark chocolate peanut butter chip cookie” which has a very long name like Kaan Yakuph-anogullarindan was my favorite.

Bare Burger

I was surprised when I first saw brisket burger on the menu of a burger house, and probably because it could feel the taste of the brisket I had at Hometown Barbeque, I found myself ordering one, with my hand on the waiter's arm. Brisket burger is really good; also they serve milkshake in its shaker, which I think was a nice and different serving method.

Finally, I have to say that the hot dog stands we see in movies and you can come across at every corner were really frustrating. Except the cooked onions, it had nothing different from the ones we have in Turkey; and honestly onion does not go well with hot dogs at all. But unlike hot dog stands, I strongly recommend you to stop by the stands that sell honey-roasted cashew, almonds and peanuts; you could see them at every corner!

ABOUT **DORUK KOCER**

Born in Ankara in 1981, Doruk joined TEI in 2012 at Programs Directorate. Currently he serves as Lead Specialist at Human Resources Directorate.

PURSUE THE REALITY,
NOT YOUR DREAMS!

Prof. Dr. **Acar Baltas**
Psychologist

"Pursue Your Dreams" one of the fake messages introduced by those who try to become famous and make money on psychology although they have no knowledge about it, at all. According to them, all successful people first started by dreaming. And if an individual do not give up on his or her dreams and works hard, they will definitely achieve their goals.

To support this idea, some aphorisms taken out of their context help strengthen the main message. For instance, a sentence like "External barriers are nothing compared to the internal ones" may also have an eye-opening function. In that case, all one needs to do is to muster up courage and get rid of his or her fears. Thus, you can "free yourself from the person who you think you are", uncover your own personality and achieve your dreams.

The message that you should "Want" and "Pursue your dreams" is also reinforced by examples about successful people. See how "that person" achieved "that thing" which "seemed impossible at first". If she or he can, why not you? Because these dream-mongers believe that there is a model for success and anyone who follows it can achieve success.

Barnum Effect

Indeed, given the examples and stories told, all these may sound plausible. However this is a very basic delusion, which is called the "Barnum Effect" in psychology. Barnum was an American circus entertainer who lived in the USA during the second half of the 19th century. He is the founder of a circus empire which is still active today. Barnum misled people's perceptions and made them see what he wanted to show instead of the reality by touting bunkum and so he became famous and rich. The personalities of astrology signs are also similar to that. “You like buying expensive gifts for your friends if you can afford it", "People may find you cold and distant at first but they change their minds as they get to know you better."

Statements like these are approved by a great majority of people. Because when you like a part of a fact, it is easier to accept the rest of it.

One becomes more optimistic and softens up with the message that "if you can overcome your internal barriers and fears, you can achieve success", and tends to actually believe the message itself. They start to think "if other have that potential, why not I?" On top of that, given the belief that "we only use 3% or 5% of our brain", which is a nonsense who knows where it came from, one is ready to believe that they can make their own history.

Students studying for an entrance exam and people who are trying to make a change because they are unsatisfied with their lives are more exposed and vulnerable to these lies.

At this point, one should take a few steps. Firstly, to believe, and then to identify weaknesses and improve them. Validation of these approaches depends on an irrational and non-realistic acceptance (assumption) that all people have the same potential.

The Limit of Resolution

All people differ by personality and talents. The only outcome of striving in an area which you are not cut out for, and do not fit your personality is frustration. Resolution and determination are two highly critical factors

of success. However they only help you acquire knowledge and new skills. If you watch a tennis match where Federer, Nadal and Djokovic play versus each other, you know that their performance cannot be achieved by resolution, determination and hard work only. For resolution and determination to be useful, they should be demonstrated in an area where the individual has talent. If a person is striving in an area which they are not inclined to, the result will be a deep feeling of inadequacy and guilt.

Today, many parents, teachers, guidance specialists, HR specialists and executives, who lack in fundamental psychology, knowledge pursue an illusion. They believe that if they could improve the deficiencies and weaknesses of their children, students or colleagues, they can turn them into a perfect person. As an extension of this approach, HR specialists develop performance systems based on determination of "Improvement Areas" of the employees.

The Source of Delusion

These well-intentioned efforts have two main reasons. The first one is the delusion that "if you pursue your dreams and want strongly enough" you can realize them. And the second one is they do not know the differences between knowledge, skill and talent.

There are three types of knowledge. The first one involves material which the individual is conscious of and it is based on data. For a salesman, features and benefits of a product is a that kind of knowledge and it can be easily taught and learnt. The second type of knowledge is abstract and based on experience. It is relatively harder to transfer. And the third group of knowledge is about the self. One needs feedback to learn this type of knowledge which involves personal awareness.

Skill is the answer of "How?" and is transferable. For an executive assistant, use of computer software, designed for various purposes, or for a nurse, giving an injection without causing pain fall under this category.

Talent is, on the other hand, is the quality of repetitive thoughts, behaviors and feelings of an individual. It is an important part of the personality and develops during the first years of life based on innate dispositions.

Sensitive parents, even if they do not know the difference between these terms as clearly as mentioned above, do not try to turn their children into the perfect (ideal) child in their dreams. They accept them as is and support their development in areas in which they are interested. Capable teachers and guidance specialists try to identify what is different and unique in each student and encourage them to develop in the area they are effective.

While ordinary executives manage based on generalizations, influential executives focus on strengths of each employee and ensure that they contribute to the team with strengths. With a customized approach like this, executives spare time for each employee and stay informed of their achievements in life as well as the recognitions and awards they get. They learn what drives them and therefore they know how to motivate them in the future.

Sensitive parents, capable teachers and guidance specialists, HR specialists who are familiar with fundamental principles of psychology and influential executives are like gardeners. A capable gardener knows that each plant in his garden is different and provides each one of them as much humidity, water, lighting and daylight as they need; prunes as necessary and ties them to support where necessary. He would not expect a rose plant to be like hydrangeas or a Japanese magnolia to look like camellia. He strives to grow each plant to the maximum limit he can.

At this point HR specialists (staff) has three important duties. The first one is to know what can and cannot be changed in an employee. The second one is not to propose performance assessment criteria that involves contradictory expectations from a person. To give an example, some performance systems behaviors that require being both assertive and fast behaviors as well as concepts that require being cautious and prudent. As per personality psychology, it is not possible for an individual to have these attributes all together. And the third duty is to simplify the performance assessment system as much as needed so that executives, whose primary responsibilities do not involve it, can implement the system. Training programs designed for employee development should be measures and monitored. The behavioral change desired for business life can occur only if these conditions are met.

For success, it is important to dream and want. Resolution and determination are also important. However, dreams can only be realized when one focuses on the areas in which they are talented. Because only then they would demonstrate the discipline needed for success and will be recognized for the positive results they get. As a result, their newly-acquired behaviors will develop, making it possible to achieve their dreams. Otherwise, in an area where they do not have talent, the resolution they demonstrate would simply be wasted. And there will only be feelings of frustration, guilt and insignificance left.

Conclusion

In my experience with life, there is not a shortcut or magic formula for success. I believe success depends on four key rules: Focusing on areas where you are talented, placing activity in that area at the center of life (working relentlessly day and night), making people feel good and finally having confidence in your own self. Those who are interested in American psychology say that confidence is the prerequisite for success. As a matter of fact, confidence is nothing but a feeling of adequacy that develops as a result of hard work, endeavor and effort. This is why one should be aware of and pursue their realities, not their dreams and strive on this path, which will open the doors to not only success but also a happy, harmonious and satisfied life.

LISTEN TO YOUR BODY WHILE YOU WORK OUT!

Such mistakes as forcing the capacity, ignoring the pains, using wrong technique while doing exercises may cause significant sports injuries.

Regular exercises are very useful for the body. However, when you are not careful while doing exercises, you may be injured. Even if such injuries frequently constitute minor injuries such as muscle strain, major injuries such as cartilage separation or bone fracture may sometimes occur.

Prof. Dr. Taner Gunes, Specialist in Orthopedics and Traumatology at Acibadem Eskisehir Hospital, pays attention to the fact that such kinds of injury risks may be minimized by means of simple measures, and he says that "Effective measures to be taken in order to prevent occurrence of minor injuries are to allocate sufficient time for pre-exercise warming-up, and to do exercises within the limits of the capacity, and to increase the level of exercise gradually. If you force your capacity while doing exercises, then your heart health will be affected negatively."

Also, if you ignore to take simple measures or force the capacity of your body while doing exercises, then you may be injured and may even have heart problems. Dr. Gunes emphasizes that each athlete, being at any levels whatsoever, must know the methods for protection from the injuries, and that they must apply such methods, and he also states that any measures to be taken are the most realistic and the most effective methods in order to be protected from the injuries arising from sports.

Levels of Injuries Varying Based On The Levels of Athletes

Injuries concerning the musculoskeletal system occur frequently based on the sports. Sudden and gradual injuries may occur in the tissues such as muscles, tendons, cartilages, ligaments, bones, joints, meniscus constituting such system.

Sudden injuries may arise from instant overburdening or adverse movement. Injuries such as muscle strains or more advanced fracture, ligament tearing, meniscus tearing and joint dislocation are such kinds of injuries. If the condition of the person is sufficient, and if s/he has knowledge about the sports techniques, and if s/he uses equipment specific to the sports s/he does, then s/he can protect herself/himself from such kinds of injuries.

Injuries occurring gradually in the course of time results from overburdening the relevant body area, or applying the wrong technique. Such kinds of injuries are called as overuse syndromes. Professional athletes are generally exposed to overuse syndromes due to intense practice schedules and overburdening. Dr.Gunes says that “For example, if marathon runners make a mistake with respect to their running styles, they can have problems in relation to the overuse in the course of time due to the fact that they do the same sports for a long time. Also, the muscles and tissues have no sufficient time to recuperate during repetitive difficult exercises. Therefore, even low loads and forces may cause injuries such as stress fractures in the bones."

Dr. Gunes pays attention to the fact that more significant injuries and even deaths occur rarely during exercises or workout, and he also states that "Generally, in such kinds of situations, there are underlying or unknown heart problems. Overburdening the physical stress on the body may be the main reason of such problem."

Do Not Ignore the Signals Delivered by the Body!

If you feel any pain while doing exercises or workout, you may cause the existing injury to be worsened and also cause the returning period to be extended.

Dr.Gunes lists the actions to be taken during workout as follows:

• Have sufficient time before workout, and do the appropriate warming-up exercises without getting tired of and ignoring such exercises. Do not hurry to start to workout.

• Do not force your body much; any athlete should know her/his capacity and should overburden accordingly.

• For example, use any equipment to prevent you from being injured just as footballers use protective equipment to protect their shin-bone.

• Obtain any correct techniques from a good trainer, and do practice frequently in order to perfect such techniques.

• Go through medical examinations and find out whether you are appropriate for the relevant sports type if you start to do a new sports type.

What Are The Frequent Injuries Arising From The Sports?

• Stress fractures: It occurs as a consequence of repetitive stresses arising from overuse. In general, it causes the athlete to keep away from the sports for a long time.

• Feet and heel pains: Heel spur and stress fractures occur due to overuse. Also, ingrown toenail may occur due to the inappropriate nail care and use of inappropriate shoes.

• Ankle pains: Achilles tendon injuries, ankle ligament injuries, and bone spurs, being suffered from footballers, in particular, may the reasons of pains.

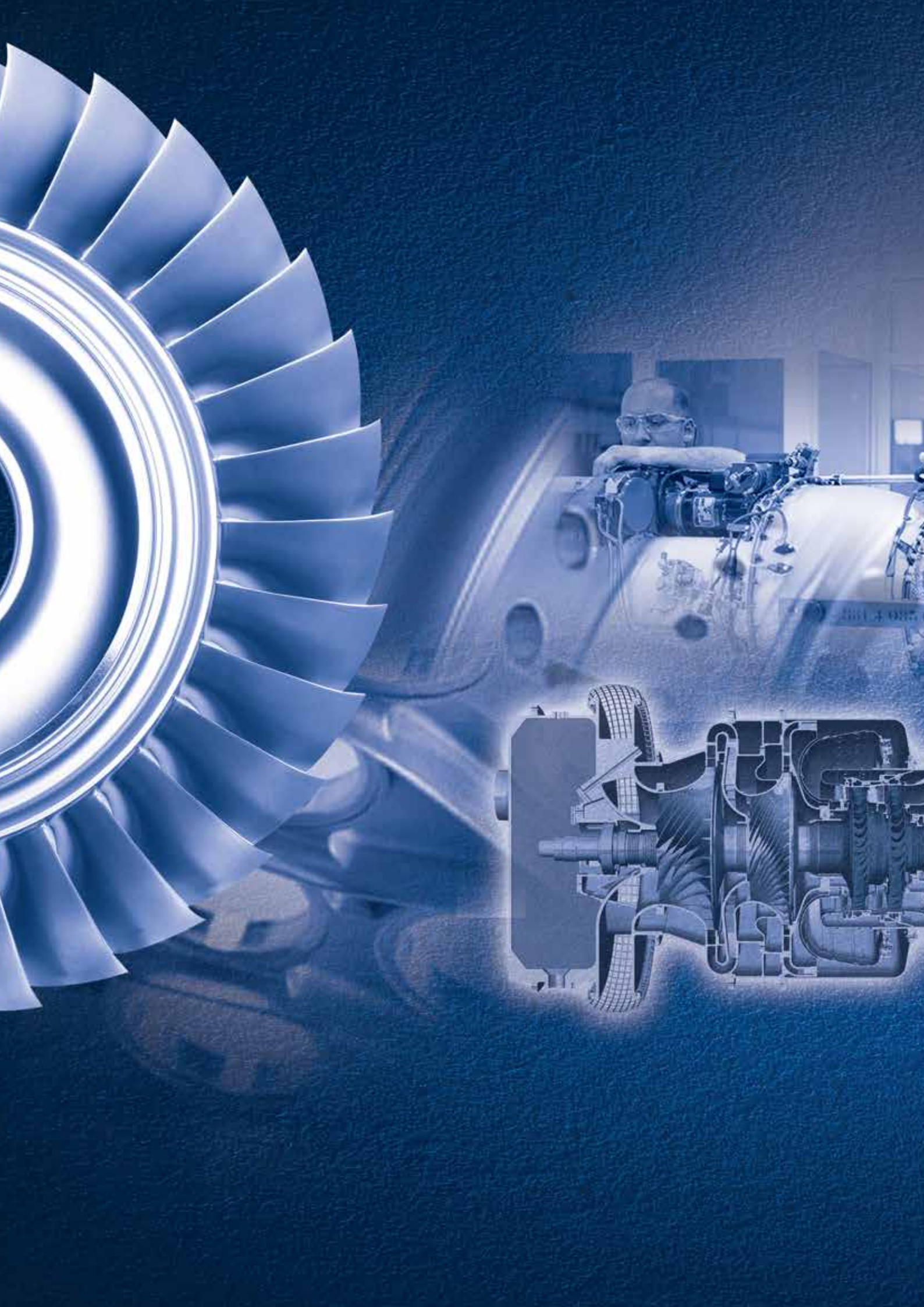
• Leg pains: The most frequent reason thereof is muscle contraction or muscles tearing.

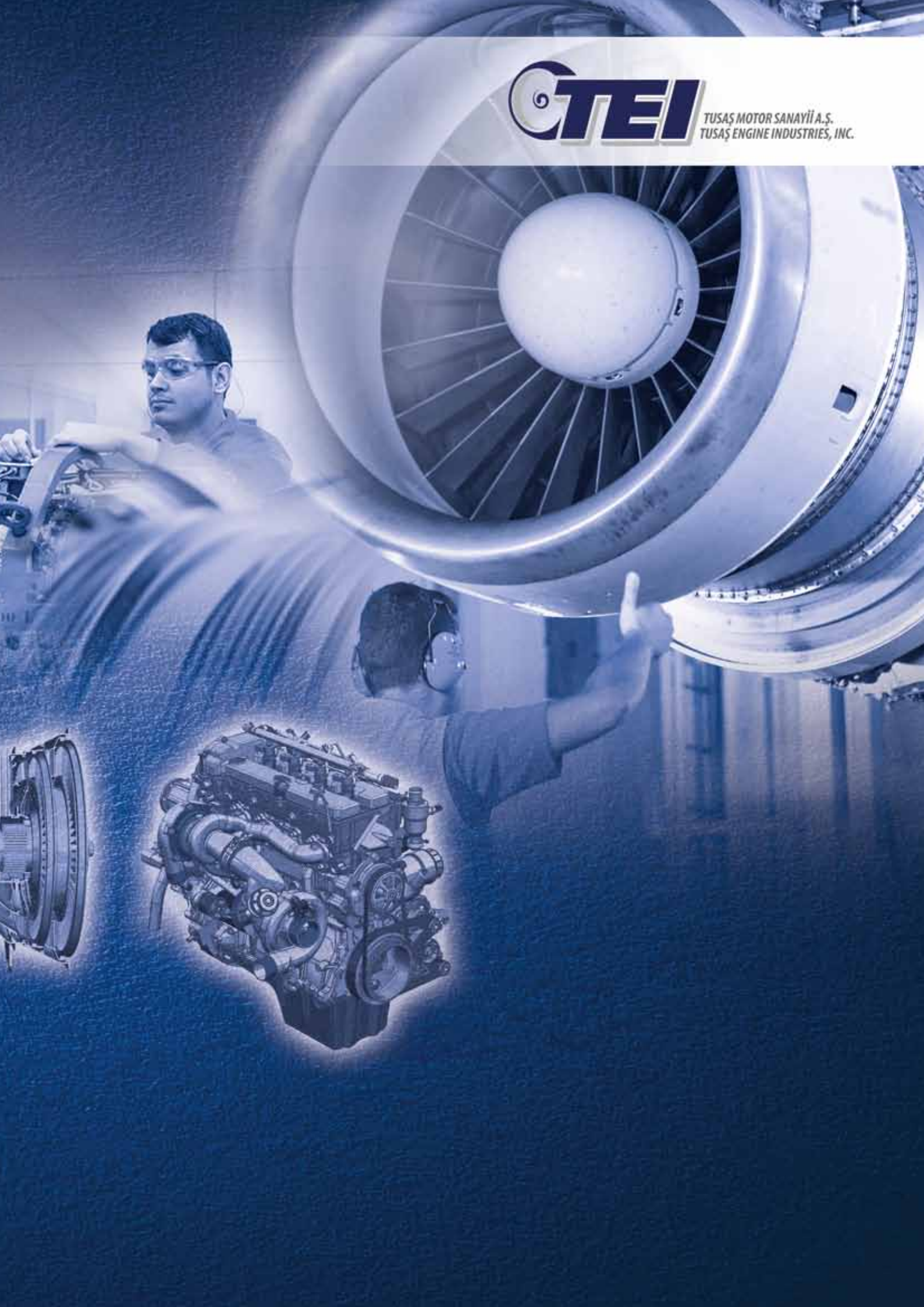
• Knee problems: Meniscus tearing, ligament rupture, and cartilage problems may occur frequently.

• Chest pains: In general, such pains arise from muscle spasm occurring while doing exercises.

• Shoulder problems: In particular, elastic athletes have higher possibility of shoulder dislocation. Also, throwing athletes may frequently suffer from muscle and tendon tearing.

• Elbow problems: In particular, tennis players, who use rackets inappropriate for their hands, or whose technique to grasping the racket is not correct, may frequently suffer from elbow problems.

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