SISTEM TEKNIK ISSUE
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INDUSTRIAL FURNACES

TECHNOLOGY NEWS

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We have established a system with high combustion efficiency that works in accordance with Industry 4.0 Principles

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Turkey has an advantage in exports

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Sistem Teknik Difference In Fire Resistance Testing

DESPITE THE PANDEMIC WE ARE GROWING, RENEWING

Our dear readers;

We are happy to be in front of you with the 7th issue of our magazine. When we published our first issue in July 2020, it was the beginning of the pandemic. There was great uneasiness in everyone and an incredible uncertainty ahead of us. Overall, the expectations were pretty bad. Fortunately, the dreaded worst-case scenario did not happen in the course of time. In this process, the activities of many sectors and companies increased; Our economy grew and our exports increased.

In this process, we have grown both in scope and human resources. Our human resources increased from 97 to over 130. We have invested heavily in our quality by increasing the number of employees in our quality department by 200%. We are trying to use our resources more effectively by increasing the number of our employees in planning by 100%. In addition, senior white-collar friends from the automotive and aviation sectors joined our team. Not just quantity; We also experienced significant changes in terms of quality. We aim to reach much better points with lean, 5S and total quality understanding. We see the returns of our efforts. We have recently received an order for heat treatment line for bearing rings, which will be a very important reference for us, from SKF. We have made our vacuum gas quench furnaces much more modular and provide great advantages for the users. In return, we received very valuable orders from companies such as BGH, Voestalpine, which are a world-class quality steel producers, and Bodycote, a world brand in heat treatment. We have made our after-sales service team more effective. Our aim is to provide the best service to our valued customers and to constantly improve.

With these thoughts, I greet you with respect, and look forward to your suggestions and criticisms. In this issue, I would like to emphasize that we share our knowledge on technical issues that we think are interesting for you. As in every issue, we have important guests. I would like to thank my dear friend, Tamer Taşkın who is the most senior veteran of our industry, Şükrü Ünsal from Çemtaş and Mike Jamieson from Schneider for their contributions.

Kind regards.

Mehmet Özdeşlik
Sistem Teknik A.Ş.
Group Chairman of the Board
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INDUSTRIAL SISTEM TEKNIK ISSUE
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STANDARDIZATION IN DESIGN

Tuğçe Bulçak - Mechanical Design Engineer
Ozan Yılmaz - Mechanical Design Manager

"Today's standardization is the necessary foundation on which tomorrow's improvements will be based. If you think 'standardization' as the best you know today, but which is to be improved tomorrow -you get somewhere. But if you think of standards as confining then progress stops."

(Henry Ford, 1926)

One of the principles of the Design for Manufacturing and Assembly (DFMA) and 5s method are the standardization of the parts. In these systems, which built on ease of manufacture and efficiency of assembly, standardization of part is a necessary condition for modular design. Therefore, design engineers of companies should focus process of standardization and to use standard parts with customer requests and in suitable designs.

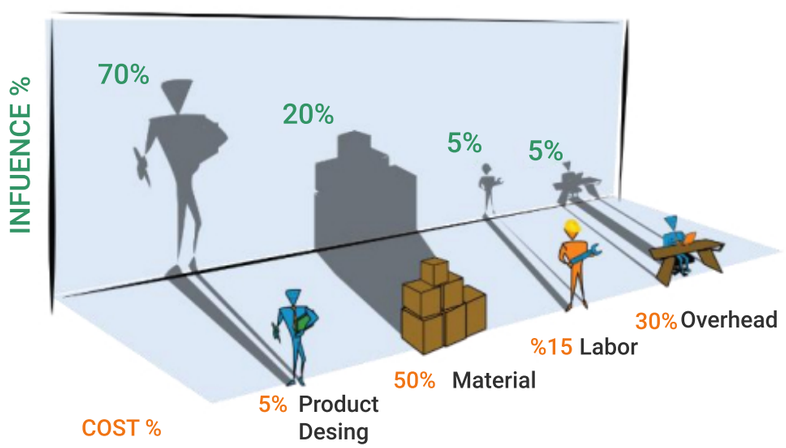

Fig.1: The effect of the manufacturing cost [1]

70 percent of the manufacturing cost is determined at the design stage [2]. Looking at Fig.1, it is seen that the effect of the product design stage on the costs is more than the other stages. The process becomes more efficient when the right steps are taken during product design.
To use standard part at the design phase positively contributes to this process.
There are many definitions of standard and standardization. According to the Turkish Standards Institute, the standard is defined as "Documents created by consensus, approved by an authorized institution, for common and repeated use, determining the characteristics or result of rules principles or activities and aiming to obtain the most convenient arrangement in a particular subject or scope.". Standardization, on the other hand is defined as "It is activity of creating the necessary provisions in order to obtain the most appropriate level of order for common and repetitive uses on a given subject taking into account existing and potential problems."

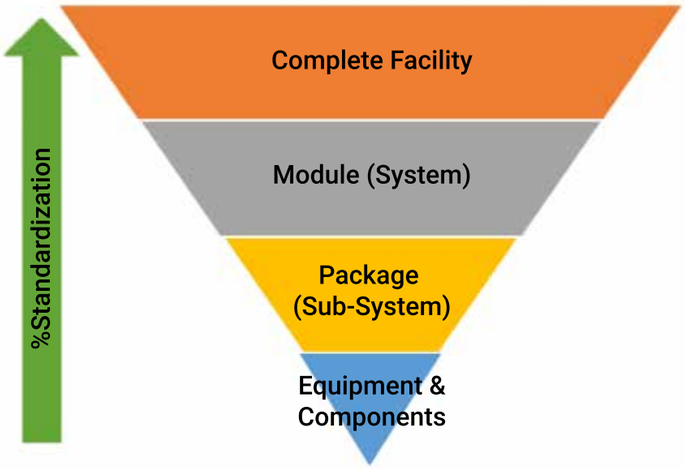

Fig.2: Levels of Standardization [3]

Each company's levels of standardization are different. Fig.2 show levels of standardization. The companies should determine and apply the suitable standardization. As the percent of standardization increase the cost decreases and the efficiency increases. Standardization must not be limited just design. It should be applied to process such as assembly line production methods process, product supply. The benefits of the standardization process in design can be listed as follows:
- It eliminates the loss of time and effort by increasing the quality and efficiency in production.
- It enables easier development of machine elements.
- It provides faster and easier manufacturing.
- Costs go down.
- Provides design and assembly flexibility.
- Improves competition in the market by facilitating the supply of spare parts.
- It helps to shorten the delivery time in production.
- It enables mass production.
The disadvantage of the standardization process in design can be listed as follows:
- It may cause loss of response in the market.
- There may be a decrease in product diversity.
- Failure to fully meet market expectations.
Companies get ahead of their competitors with their innovations. For this reason, standardization in design should become a corporate culture and be sustainable. All companies and employees should be given training on this subject and necessity of being a partner in this transformation should be explained. Awareness of companies and employees is required for this transformation.

"Without standards, there can be no improvement." (Taiichi Ohno)

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AMMONIA CRACKERS

Alper KELEŞOĞLU, Technology Development and Innovation Manager

Ammonia is preferred in different sectors such as the production of fertilizers and chemical cleaning agents, in the cooling industry and industrial furnace industry. Ammonia contains 1.7 times more hydrogen per unit volume than liquid hydrogen [1]. It is known that ammonia is a promising fluid in energy production due to its high energy density with respect to the fuel cell technology that has emerged in recent years [2]. In the industrial furnace industry, ammonia crackers are used as a protective or process atmosphere. The main processes in this purpose are given below.

- Brazing,
- Sintering,
- Deoxidation,
- Nitration,
- Annealing of Stainless Steel,
- Annealing of Metal Powders,
- Annealing of Bimetal Products.

The main reaction in ammonia crackers, whose main function is to split ammonia into hydrogen and nitrogen, is given in Equation 1.

$$2NH_3 \leftrightarrow N_2 + 3H_2, \Delta H = 46{,}22 \frac{kJ}{kmol} \quad (1)$$

When Equation 1 is examined, it is observed that there is 4 moles of gas output (the outgoing gas stream is called synthesis gas) against 2 moles of gas input. Synthesis gas theoretically consists of 75% hydrogen and 25% nitrogen. The rate of decomposition of ammonia depends on the pressure, temperature, flow rate and the type and shape of the catalyst used. Within the scope of this publication, the parameters affecting the fragmentation rate have been examined separately.

The theoretical limit for the lowest operating temperature in ammonia crackers is given by the chemical balance of the decomposition reaction. In Figure 1, the decomposition rates of ammonia fed to the ammonia cracker at different pressures are given. As can be seen from the figure, as the pressure of the ammonia fed to the cracker increases, the reaction temperature must also be increased in order to increase the decomposition efficiency. It can be observed from Figure 1 that it is sufficient to reach approximately 430°C at atmospheric pressure for the decomposition of ammonia. However, the mentioned temperature range is valid for large reactors with an excellent catalyst. Since the ammonia crackers are small in size and the catalyst efficiency is not perfect, the temperature range needs to be increased.

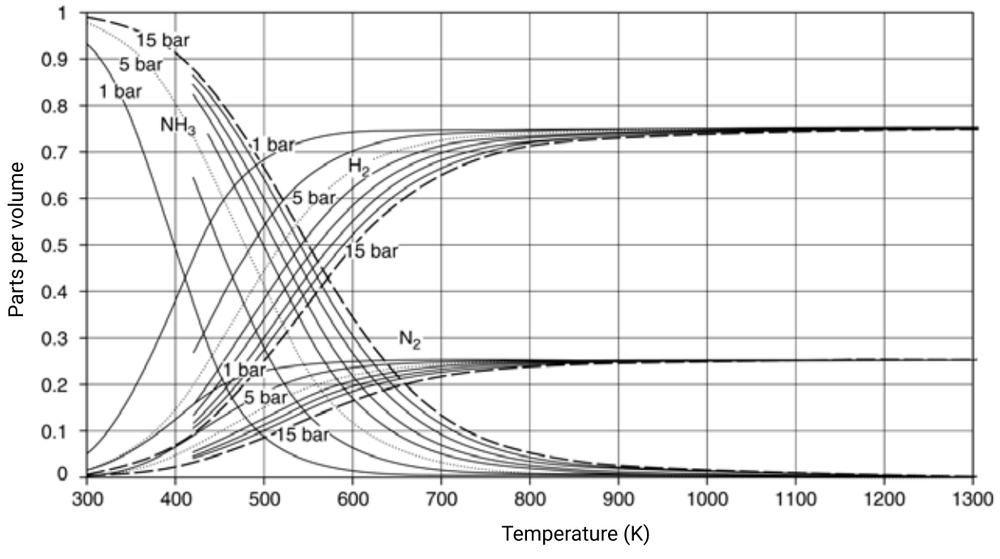

Figure 1. Effect of Inlet Pressure on Decomposition in Ammonia Crackers [1].

Catalysts are used in ammonia crackers to provide decomposition at lower reaction temperatures. In this context, the most preferred catalyst type in the industry is nickel-based catalysts. Some scientific studies have been carried out to increase the catalytic effect and thus the conversion (decomposition) rate at constant temperature and pressure with the contribution of elements and compounds such as platinum, palladium, lanthanum oxide and ruthenium to the nickel-based catalyst. The obtained results are given in Figure 2. As seen in Figure 2, the greatest contribution to the conversion rate was made by the inclusion of the ruthenium element in the catalyst. One of the remarkable results is that there is a temperature difference of 100 K between the nickel-based catalyst and the ruthenium-doped nickel-based catalyst in order to obtain a conversion rate close to 100%. Due to the scarcity of ruthenium and therefore the higher cost of the catalyst compared to nickel-based catalysts, higher reactor temperatures are preferred in order to provide the same efficiency instead of ruthenium-added nickel-based catalysts in the industry.

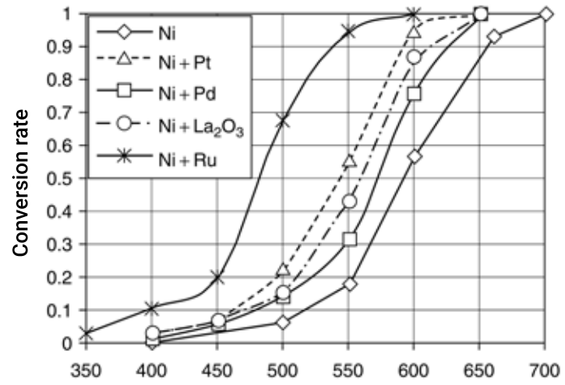

Figure 2. Effect of Catalyst Type on Conversion Rate [1].

It has been previously stated that with the increase of the ammonia flow rate, the reactor temperature must be increased to keep the conversion rate at its maximum. A graph reflecting this situation is given in Figure 3. In the figure, it is one of the important findings that the temperature of the ammonia feed between 0-100 l/h increases polynomially and linearly in case of higher flow rates.

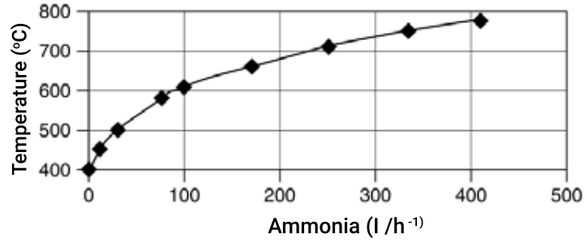

Figure 3. Reactor Temperatures Required for Obtaining 99.999% Decomposition Against Ammonia Flow Rate Fed in Ruthenium Doped Nickel-Based Catalyst [1].

The catalyst shape is an also important parameter that affects the degradation efficiency. In order to increase efficiency in catalytic reactors such as ammonia cracker, catalysts with high surface area per unit volume should be preferred. A good example of this situation is given in Figure 4.

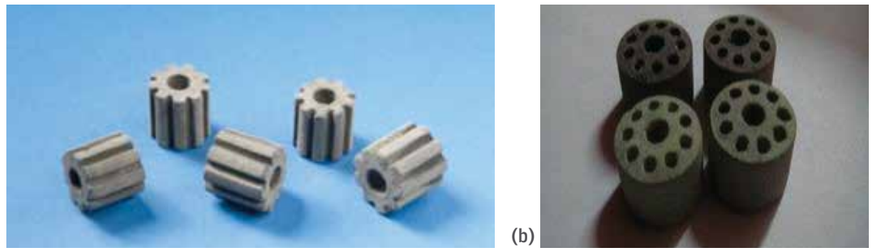

Figure 4. Catalysts with (a) High and (b) Low Surface Area per Unit Volume

In addition to the parameters described above, it has been determined that increasing the inlet temperature of ammonia increases the efficiency [2]. In this way, it is argued that high conversion efficiency can be achieved at lower cracker temperatures, as hotter ammonia enters the ammonia cracker to break down.

As Sistem Teknik Industrial Furnaces R&D Center, we are constantly updating our work and directing our designs in order to keep the efficiency of ammonia crackers at the maximum. In this context, the basic features of the ammonia crackers we have manufactured are given below, the visuals of the compact ammonia cracker we designed for use in nitration furnaces are given in Figure 5 and the most preferred ammonia cracker capacities and the outgoing gas flow information are given in Table 1.

- Continuous and stable gas production,
- Working Temperature Range: min. 850-max 1050,
- Temperature Homogeneity: ±10°C,
- Concentration of Undecomposed Ammonia: <75 ppm,
- Thermal Loss to the Environment: <550 kcal/m2h.

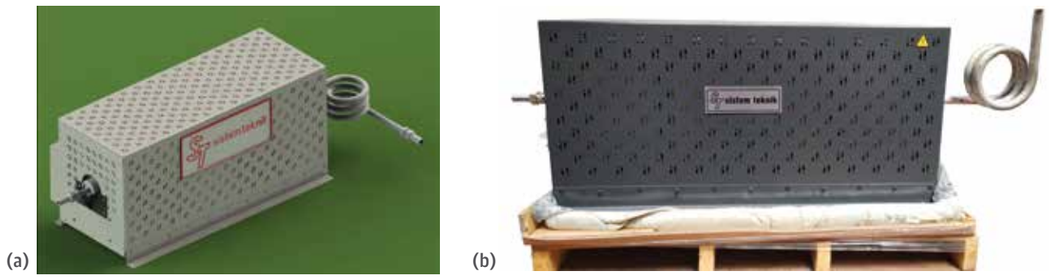

Figure 5. (a) Designed and (b) Manufactured Ammonia Cracker with 5m3/h Capacity

Production Capacity	Ammonia Consumption	Hydrogen Production	Nitrogen Production
5 Nm3/h	2,5 m3/h	3,5 m3/h	1,5 m3/h
10 Nm3/h	5 m3/h	7,5 m3/h	2,5 m3/h
20 Nm3/h	10 m3/h	15 m3/h	5 m3/h
50 Nm3/h	25 m3/h	37,5 m3/h	12,5 m3/h
70 Nm3/h	35 m3/h	52,5 m3/h	17,5 m3/h
100 Nm3/h	50 m3/h	75 m3/h	25 m3/h
250 Nm3/h	125 m3/h	187,5 m3/h	62,5 m3/h

Table 1. Ammonia Crackers with Production Capacity

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[1]- Handbook of Fuel Cells – Fundamentals, Technology and Applications, Edited by Wolf Vielstich, Hubert A. Gasteiger, Arnold Lamm. Volume 3: Fuel Cell Technology and Applications.

[2]- Afif, A., Radenahmad, N., Cheok, Q., Shams, S., Kim, J.H., ve Azad, A.K., 2016: Ammonia-Fed Fuel Cells: A Comprehensive Review, Renewable and Sustainable Energy Reviews, 60, 822-835.

Machine Automation with SEW EURODRIVE MOVI-C Products

Mihraç Özden - Automation Team Leader

SEW EURODRIVE presents a new perspective on machine automation with MOVI-C products. The perspective emerges in 4 important section with its differences.

1. Programming Software - MOVISUITE

MOVISUITE, is an engineering software which using in whole MOVI-C hardware and software modules. Only MOVISUITE is sufficed for planning, commissioning, programming, backup and debugging. It offers rapid, user friendly and consistent using.
MOVISUITE also contains MOVISUITE-CamEditor which allows you to create curve functions and MOVISUITE-RobotMonitor which you can easily use for your robotic applications.

2. Control Technology - MOVI-C Controller

The controller supplies modern, fast and professional using with ethercat communication and Codesys programming interface.

MOVI-C Standard
• PROFINET slave, EtherNet/IP slave, Modbus TCP/IP slave

• ≤ 2 interpolated axis, ≤ 6 auxiliary axis

MOVI-C Advanced
• PROFINET slave, EtherNet/IP slave, Modbus TCP/IP slave

• ≤ 8 enterpole axis, ≤ 8 yardımcı axis

MOVI-C Progressive
• PROFINET slave, EtherNet/IP slave, Modbus TCP/IP slave

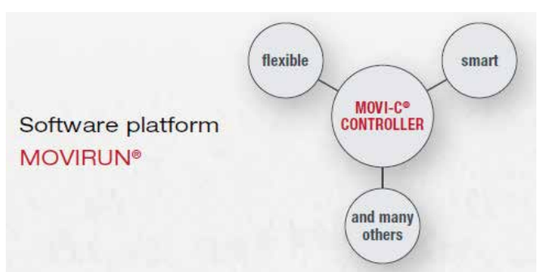
• ≤ 16 enterpole axis, ≤ 16 yardımcı axis

MOVI-C Power
• PROFINET slave, EtherNet/IP slave, Modbus TCP/IP slave

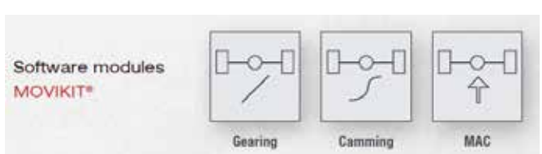
• ≤ 32 enterpole axis, ≤ 32 yardımcı axis

It is possible to find a “motion controller” for your all application from 2 to 64 axis.
Packaging solutions for the food and beverage sectors, flying shears and saw which indispensable applications for wood and iron-steel sectors, multi-axis shared loads and many popular applications like these are guaranteed with repeatedly tried software packages.

2.1. Softwares of Control Technology: MOVIRUN and MOVIKIT

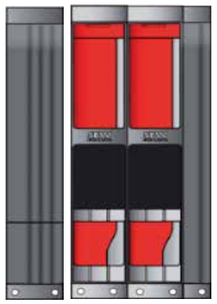


MOVIRUN: It is a software platform which allows to perform to users whole movement from simple drive functions to difficult motion control functions with pre-prepared software modules, easily, fast and comfortably.



MOVIKIT: It is a configured software modules which performing from simple driver functions like speed control and positioning to complicated motion control functions like camming and robotics.

3. Inverter Technology MOVIDRIVE Modular/ System /Technology



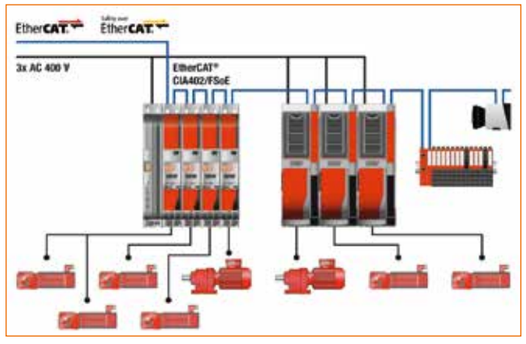
MOVIDRIVE Modular

MOVIDRIVE System

MOVIDRIVE Technology

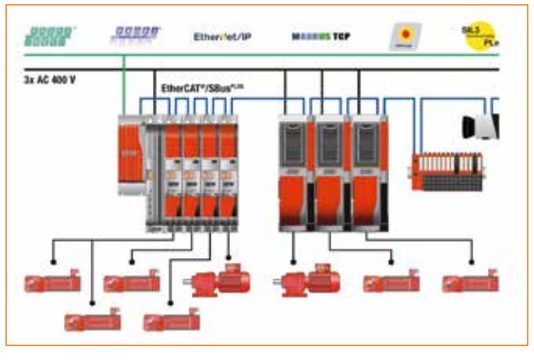
MOVIDRIVE	Nominal line voltage (V)		Nominal power supply module (kW)	Regenerative power module (kW)	Nominal output current –Single-Axis- (A)	Nominal Power (kW)	Nominal out-put current –Double-Axis- (A)	Overload Capacity
Modular	3 x AC 380 - 500		10 - 110	50 - 75	2 -180	-	2-8	250%
System / Technology	3 x AC 200 - 240	3 x AC 380 - 500	-	-	-	0.55 - 315	-	200%

With MOVIDRIVE inverters, synchronous motors, asynchronous motors and linear motors can be controlled with or without an encoder.
Axes are controlled by inverters for all power range between 0.55 kW and 315 kW, suitable for heavy duty conditions with overload capacity, and providing protection from STO size to more advanced safety functions. More than 15 extra safety functions can be added with Safety option cards.
In addition, the inverters allows to easy commissioning with excellent energy-saving using MOVIKIT modules.
It is possible to create configurations which can be using either SEW-Eurodrive motion controller or directly field-bus communication.



Cia402 Ethercat Motion Slave Profile

Fieldbus Communication Profile

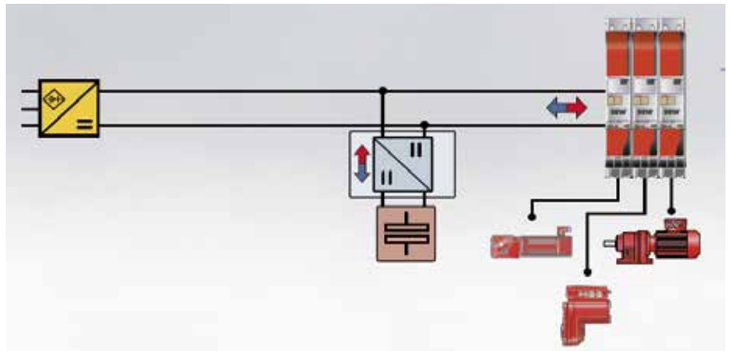


Motion Control Profile

3.1. Topologies

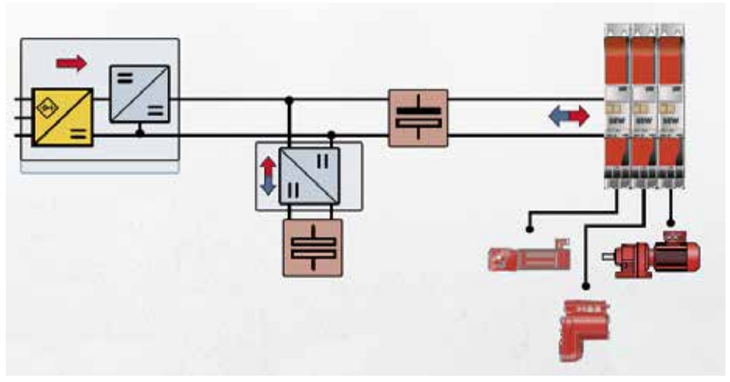
SEW INVERTER

Advantages:
- The power supply module can be operated in an input voltage range of 3x AC 200 V to 500 V. The DC link voltage can be set independent of the input voltage.
- This means drives can be briefly operated up to a hinger speed.



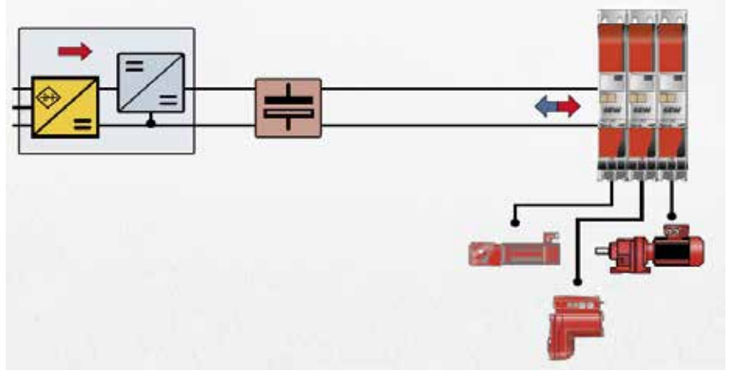
SEW INVERTER

Advantages:
- Reduction of peaks from the grid
- Reduction of energy cots
- Suited for large amounts of energy
- Power fail-safe for minutes



SEW INVERTER

Advantages:
- Reduction of peaks from the grid
- Reduction of energy cots
- Suited for high power ratings
- Power fail-safe for seconds up to minutes



SEW INVERTER

Advantages:
- Reduction of peaks from the grid
- Reduction of energy cots
- Suited for high power ratings and large amounts of energy
- Power fail-safe for minutes

3.2. Decentralized Drives and Mechatronics

Integrated in many applications and concepts, decentralized drive engineering has potential of reducing the average costs and it presents an efficient alternative to central automation technology.

MOVIGEAR Classic
- Integrated, compact design
- Drive unit consisting of gear unit and permanent-magnet synchronous motor

MOVIMOT Flexible
- Decentralized inverter
- For installing electronics close to the motor

MOVIGEAR Performance
- Fully integrated, compact design
- Permanent-magnet synchronous motor, gear unit and electronics combined in a single mechatronic drive unit

4. Drive Technology

Whole these innovations are performed by drive technology. SEW Eurodrive crowns its drive technology with gathering its synchronous motors and asynchronous motors with the own unique gear units which made significant contributions to the industry for years.

	Standard and Servo gear units	Motors
Overview	**Five standard gear unit series** • R series: output torque 50-18000 Nm • F series : output torque 130-18000 Nm • K series : output torque 80-50000 Nm • S series : output torque 92-4000 Nm • W series : output torque 25-180 Nm	• DR.. and DT56 series AC motors • (1 speed), 2- , 4- and 6-pole • Pole-changing DR.. series AC motors • (2 speeds) cover outputs from 0.09 to 225 kW and energy efficiency classes from IE1 to IE4
	Two servo gear unit series • PS.F series: Nominal torque 25-3000 Nm , PS.C series: Nominal torque 30-320 Nm • BS.F series: Nominal torque 40-1200 Nm	• Synchronous and asynchronous servomotors for highly dynamic requirements, also with explosion protection • And linear motors and electric cylinders complete the modular motor system - *Combined with a wide range of brakes, encoders, plug connectors, forced cooling fans, special coatings and surface treatments, the modular system has the ideal drive for your application*

4.1. MOVILINK DDI Digital Motor Integration

With digital motor integration, power, brake, temperature sensor and encoder/resolver information can be transferred over a single hybrid cable. No matter whether you have a central or decentralized installation topology, synchronous, asynchronous or linear motor, you can avoid the need for extra cables by using MOVILINK DDI in your applications.

TECHNICAL REFRACTORY CHALLENGES TO CONSIDER IN STEEL REHEAT FURNACES

Jim Caprio, Matt Ciarrocca, Brian Rhoads / United Refractories Co
Demet ERTEN, Ebubekir KILIÇASLAN / AKM Metalurji

Abstract
There are many different types of reheat furnaces used by the steel industry to reheat slabs, blooms, billets, and other shapes. Each type of steel reheat furnace has its own set of technical refractory challenges to overcome in order for the reheat furnace to be efficient and operate smoothly. The goal of this paper is to identify the unique set of refractory challenges for each type of reheat furnace and offer product types that have been used successfully to address the challenges.

1. Introduction

The reheat furnace application is a critical part of the steel making process. Based on two different operations, continuous and batch, the reheat furnaces can vary in length, capacity, width, and thermal profile. Based on the furnace conditions, each will have a specific refractory design and configuration to maximize success. In addition, each reheat furnace will have specific technical refractory challenges to overcome in order to reach and operate at maximum efficiency.

When choosing the best refractory for a given application, it is important to consider what challenges are present. Once the refractory technical challenges are known, it must then be decided what type of refractory should be chosen and what installation method is best to meet the need of the specific project (furnace conditions, timing, cost, goal of furnace life, etc.).

Monolithic refractories offer very effective solutions for heat treatment furnaces used in steel production. Compared to firebricks, it can be applied with relatively fewer fasteners, allowing for a more effective and faster application. When the appropriate, state-of-the-art monolithic refractory is specified, the physical properties will be equal to or better than the properties of brick.

There are four (4) main types of monolithic refractories that are used in reheat furnaces. The types include cast, shotcrete, gunning, and plastic. Each type has specific advantages and disadvantages which should be considered when picking one over another.

1.1. Cast - Under this monolithic type, there are four (4) types of cast products as follows:

1.1.1. Hand Cast –This installation method is usually the easiest and least expensive to install, however, the disadvantages include usually higher water content and reduced physical properties.

1.1.2. Vibration Cast - This installation method usually uses lower water content and optimizes properties. The disadvantages include vibration equipment is required and physical properties can fluctuate based on too much or too little vibration.

1.1.3. Pump Cast - This installation method allows material to be transferred quickly from the mixer to the forms being filled and a large area can be installed without having to move the mixer and pump.

The disadvantages are that a pump and hoses are required and that some installers can add too much liquid to the material being pumped.

1.1.4. Self Flow - This method requires less labor and allows the material to take the required form easily. However, this method is often expensive as it requires a more specific chemical composition. It also risks having lower physical properties due to its high water content.

1.2. Shotcrete - this is a "wet" process where the mixed castable is pumped through a hose and is shot in place without the need for forms. This is done by adding an activator and compressed air at the nozzle. This type of installation is fast and usually reduces the furnace downtime. The disadvantages are special equipment is needed, the pump and nozzle operators are key to the success of the installation, and the rebound material is not reusable.

1.3. Gunning - this is a "dry" process where dry gun mix is transferred to the nozzle using a rotary valve gun and compressed air, then is gunned in place without the need for forms. This is done by adding a liquid at the nozzle to the dry gun mix so the now wet mix sticks to wherever it is being applied. It requires minimal equipment, is fast to set-up, not complicated, and is very good for quick repairs to get a furnace up and running. The disadvantages are reduced properties if too much liquid is added at the nozzle and usually higher rebounds versus shotcreting.

1.4. Plastic - a wet refractory mass that is usually supplied in slabs in a raw and unfired state. These refractory slabs are rammed with an air hammer, or beaten into place, so it is labor-intensive. The rammed plastic is ready to be heated as soon as it is installed. However, it must be heated slowly to remove water, but it is not nearly as "sensitive" as a castable during dry out. Plastic refractory is an excellent choice for fast repairs & quick turnarounds.

2. Types of Reheat Furnaces

2.1. Continuous Operation Reheat Furnaces

2.1.1. Walking Beam
2.1.2. Pusher
2.1.3. Rotary Hearth

2.2 Batch Reheat Furnace

2.2.1. Car Bottom
2.2.2. Stationary Solid Hearth

3. Specific Refractory Technical Challenges

3.1. Walking Beam Reheat Furnace –build-up, high temperature hot strength requirements, and thermal profile variations.

3.2. Pusher Reheat Furnace –high abrasion, high temperature hot strength requirements, and thermal profile variations.

3.3. Rotary Hearth Reheat Furnace –high abrasion and high temperature hot strength requirements.

3.4. Car Bottom Reheat Furnace –include thermal cycling, high temperature hot strength requirements of the car deck, and the thermal profile of the roof and upper sidewalls.

3.5. Stationary Solid Hearth Furnace –thermal cycling, high temperature hot strength requirements, and abrasion resistance.

4. Product Types to Address the Refractory Technical Challenges

4.1. Continuous Operation Reheat Furnaces

For continuous operation reheat furnaces, including walking beam, pusher, and rotary hearth, the following product types have been used successfully in the different areas to allow the reheat furnaces to operate at maximize efficiency.

Burners Walls and Side Walls : High alumina pumpables and shotcretes with high hot strength and thermal shock resistance work best. Plastic refractories, both phosphate-bonded and air set, designed with good hot strength and volume stability also work well in these areas.

Wall Back-Up Insulation – A 960–1280 kg/m3 lightweight insulation castable or gun mix works well as a back-up lining to the working face.

Burner Surround – A high alumina, phosphate-bonded, plastic refractory with high hot strength and good abrasion resistance works well.

Roof - High alumina pumpables and shotcretes with high hot strength and thermal shock resistance work best.

Roof Back-Up Insulation – A 560-960 kg/m3 lightweight insulation castable or gun mix works well as a back-up lining to the roof working lining.

Hearth - High alumina pumpables with high hot strength good abrasion resistance and good thermal shock resistance work best.

Hearth Back-Up Insulation – A lightweight castable in the 960-2,080 kg/m3 range with good strength has worked best in this area.

Pusher & Skid Blocks – A high alumina, spinel enriched, low cement castable designed with high hot strength works well in these areas.

Charge and Discharge Doors – A lightweight castable with high strength and a medium density high alumina pumpable both perform well in these areas.

Repair Products – A high alumina, low cement, gun mix designed with rapid-fire technology, good abrasion resistance, and minimal rebound has worked well to repair skids, posts, and other areas of the furnace for additional furnace life.

4.2. Batch Operation Reheat Furnaces

For batch operation reheat furnaces, including car bottom and stationary solid hearth, the following product types have been used successfully in the different areas to allow the reheat furnaces to operate at maximize efficiency.

Car Bottoms and Hearths - High alumina pumpables with high hot strength good abrasion resistance and good thermal shock resistance work best.

Subhearth – Lightweight castables in the 1,280-1,760 kg/m3 range with good strength have worked best in this area.

Roofs – UltraBloc panels work well in this area. UltraBloc custom engineered panels are manufactured with extremely high-compression ceramic fiber and minimal joints. With a high tensile strength, low thermal conductivity, and the ability to withstand temperatures up to 1650ºC, UltraBloc Panels are perfect for use in reheat furnaces.

Upper Side Walls – Log Modules work very well in this area. Log Modules are ceramic fiber manufactured to full furnace lining thickness & are designed to eliminate the joints & shrinkage commonly associated with standard module furnace wall designs. Each log module is continuously folded to the custom length requirements and compressed to specific density utilizing compression & banding system. The log modules are installed with an external anchoring system which allows for maximum weld quality during installation. The end result are linings with low heat loss which increases the overall furnace efficiency.

Lower Side Walls - High alumina pumpables and shotcretes with high hot strength and thermal shock resistance work best. Phosphate-bonded plastic refractories designed with good hot strength and volume stability also work well in these areas.

Jambs – Phosphate-bonded plastic refractories designed with good hot strength and volume stability work well in this area.

Doors – Pyro-Bloc works well in this area.

Why Should FURNACE MODERNIZATION Be Done ?

- Ensuring Energy Efficiency
- Prevention of Heat Losses
- Compliance with Changing Environmental and Emission Standards
- Ensuring Facility and Equipment Safety Requirements
- Increasing Furnace Capacity
- Transform the Furnace in Terms of Latest Technology Needs as Software and Hardware

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WE HAVE ESTABLISHED A SYSTEM WITH HIGH COMBUSTION EFFICIENCY THAT WORKS IN ACCORDANCE WITH INDUSTRY 4.0 PRINCIPLES

We had a pleasant interview with Serhan Özkaya from the Production Technology Department of the Paint-Quality Production Technology Department of Tofaş, the only automotive company in Turkey that produces both passenger cars and commercial vehicles and has been selected as the Best R&D Center in the Automotive industry for two consecutive years.

Contributing to the development of the Turkish automotive industry since the day it was founded, TOFAŞ is among the largest companies in our country with its annual production capacity of 450 thousand vehicles and nearly 7 thousand employees. We came together with Serhan Özkaya, Manufacturing Engineer, Paint Process and Product Specialist of TOFAŞ that blends the experience of the past with the innovative perspective of the future, and we wanted to hear this success story firsthand. The happiness of contributing to TOFAŞ as Sistem Teknik in the equipment supply of the gas-burning furnaces used in the paint shop and subsequently in the technical service was crowned with the words of dear Özkaya. We would like to thank Serhan Özkaya once again for his valuable words who said, "The enthusiasm and determination of Sistem Teknik Heating Engineering met the expectations of our Project Team with their customer-oriented approach and kept the customer satisfaction at the highest level. We wish you a pleasant reading.

First of all, can you please briefly advise us regarding your company and your position here?

Established in 1968, TOFAŞ is the only automotive company in Turkey that produces both passenger cars and light commercial vehicles. Koç Holding and Stellantis Group are equal shareholders in Tofaş's fund. Our company is also included in the Corporate Governance Index and Sustainability Index. Tofaş is Turkey's eight largest industrial enterprise with an annual production capacity of 450 thousand vehicles and nearly 7 thousand employees. Headquartered in İstanbul, on an area of approximately 1 million m2, 350 thousand m2 of which is closed Tofaş which produces at its Bursa factory increases its competitive power by continuing its investments. Tofaş is also one of the group's two largest R&D centers in Europe. We worked as a project team in the Paint/Quality Production Technology department of Tofaş Production Technology Department. As the Directorate, our duty is to commission new models and equipment without any problems and to deliver them to the production units.

From which part of Sistem Teknik Heating Engineering's products and services do you benefit?

We cooperate with Sistem Teknik Heating Engineering in the equipment supply and technical service of gas burning ovens used in the paint shop.

Could you tell us about the scope of the Furnace Burner Groups Modernization Project?

Furnace Burner Group Modernization Project covers the supply and commissioning works of Primer paint and Catophoresis paint plants on a turnkey basis, including facility management automation of burner and gas lines.

What is the importance of the system that Sistem Teknik Heating Engineering renewed in your Paint Drying Ovens for you? Why did you need this change?

Curing of paints applied to the produced vehicles is provided with direct and indirect combustion ovens. This process is provided with natural gas burner heating groups. Since the burner, gas distribution line and control equipment, clean combustion air fan and installation, electrical panel and existing automation and security systems of our existing automation and heating groups have expired, the need for modernization has emerged with systems with higher combustion efficiency, working in accordance with Industry 4.0 principles, ensuring production continuity and eliminating fire and occupational safety risks.

There are many sensors on your lines that make instant measurements. As an important step in the digitalization process, what has this project brought you and what are your future goals in these lines?

Monitoring the system parameters (pressure, temperature, flow, rate, etc. of all the fluids required for the system) in order to control the combustor groups, the system can be managed autonomously, providing fully efficient combustion and 100% safe according to the feedback received. An operational capability was gained, including emergency scenarios such as shutting itself down and notifying the relevant units. With the installation of the LVM-52 series "Burner Management System" integrated into the system, the safety and the equipment failure checks specified in the procedure before and during combustion were made, and the system was operated safely in a way that would not allow the operators maintainers to by-pass the errors. With the UV-Sensors, pressure and HT Sensors, and thermocouple and driver applications, the parameters of the system safety are continuously measured. For visibility and easy management, easy observing for all parameters on a single screen and instant monitoring of fault codes and parameter trends are other capabilities of our renewed system.

As Tofaş, how much do you apply the 4.0 concept; can you please advise us about the general evaluation and future goals?

Digital transformation is one of our company's prioritized issues. Not only the production areas of the factory, but also the HR and purchasing processes are included in the scope of digital transformation. For example, various applications have been implemented using methods such as smart sensors, RPA, image processing, and digital twin.

Separate control of air and gas proportional valves is now safe and accepted by EN -746-2 Standard. What kind of benefits did this project have for you in terms of energy efficiency?

Considering the paint shop as one of the riskiest points of the factory in terms of fire safety and the bad experiences of other companies in the sector, the desired product is produced according to the specification prepared in order to minimize all fire risks, 100% compliance with EN 746-2 has been put forward as an acceptance criterion for Tofaş. By controlling the air and gas flow rates independently of each other with electrically controlled flaps, keeping the system at the full combustion level by adapting itself according to the combustion efficiency at different thermal loads has provided improvements in our natural gas consumption.

Can you please make an evaluation about your cooperation with System Teknik Heating Engineering and the process and general progress of the project?

In the process managed by Sistem Teknik Heating Engineering, from the exploration, contract and the delivery of the project; the enthusiasm and determination, the customer-oriented approach met the expectation of our project team and kept the customer satisfaction at the highest level.

"TURKEY HAS GAINED AN ADVANTAGE IN EXPORTS"

Tamer Taskin, Honorary Consul-General of The Republic of South Africa in Izmir and also Chairman of Petrofer Turkey, who said that Turkey has an advantage in exports, sent a message through our magazine and said: "2022 will be a very good year for Turkey."

Tamer Taskin, Honorary Consul-General of Izmir, South Africa and Chairman of petrofer Turkey, is very special. In his statements, He explained both Petrofer company; and underlined the positive situation that the Turkish industrial sector has and how much potential Africa has for our country. He specifically stated that Turkey has an advantage in exports. "Due to the closure that started in March 2020, we had a troubled period as an industrialist first. However, turkey has taken advantage of exports due to the rise of the currency, the decrease in product shipments from the Far East to Europe, the closure of China and India, and the lack of containers. In addition, due to the fact that the main market of Turkish products is Europe and exports to Europe are made by road, it caused Turkish industry to work in exports during the pandemic period. This situation is felt in every region of Turkey. Whichever factory you visit in Turkey right now, you'll see it's full until New Year's Eve or even 2023. There are currently no new investments coming to Turkey from abroad, but the Turkish industrialist is continuing his new investments rapidly. Everyone's looking for land, building buildings. The only problem is that the counter delivery times are extended..." Said.

Tamer TAŞKIN
Petrofer Turkey
Chairman

Edirne to Gaziantep

"We have established the most modern, highest capacity grease plant in Turkey. This situation will continue until the end of the year and will continue in the coming periods. During the pandemic period, small tradesmen in Turkey and companies working in the domestic market have big problems, which is true, but the Turkish industrialist, which is aimed at exports, has no problems other than finance and trained personnel."

Turkey's exports to Europe are increasing

According to Taskin, who also said that there is no transportation problem in Turkish exports, Turkey's exports to Europe are increasing. We continue to listen from Taskin: "Many factories in Europe cannot work. All their work began to shift to Turkey. As a result, for the first time in Turkey, exports exceeded the level of 20 billion dollars per month. In this case, Turkish exports will exceed 240 billion dollars by the end of the year. We also capture this figure despite the markets we have lost in exports. For example, we lost markets such as Saudi Arabia, Egypt, Iran, Iraq, Yemen, Syria, Libya, but we achieved this figure."

A brief overview of Turkish-German relations

According to Taskin, who also touched on Turkish-German relations, the reflection of the tension between the two countries on the business world was as follows: "Volkswagen is the biggest reflection of the tension in Turkish-German relations in the business world. Our country should not have lost this investment. It's not good that he lost. When Volkswagen goes to a country, I go to many factories and you say come, and many factories come to your country without even arguing. All of a sudden, there's 100 factories with him. Volkswagen's gone in the world, and we're going to have a great positive image to go to. It was very important in this respect."

"Africa is a potential for Turkey"

Stating that there are currently 12 organized industrial zones in Izmir and 5000 factories in different sectors, Tamer Taşkin explained that the whole of Africa has great potential for Turkey: "Our company has guests from Africa, I say there are 5000 factories in Izmir, you didn't say wrong, did you? Maybe there are not that many factories in the whole of Africa. Izmir is a strong city with exports and imports, with a figure of 12 billion dollars per year. The whole of Africa is a great potential for Turkey. Since 2002, our state has seen this potential. We have 54 countries in Africa, we had ambassadors in 7-8 countries until 2002, today we have embassies in 44 countries. The number of embassies of African countries in Ankara has increased to 33-34 states. THY flies to several countries and today it flies to 50 destinations. Every study contributes to the development of the African market. The bank is the biggest shortfall in the region right now. Without a Turkish bank, businessmen are forced to fall into the hands of French or British banks. When we compete with Europeans in the African market, we use our price advantages. We are 25-30% more suitable than European products. However, since there are no Turkish banks in Africa, we only pay 6-10% commission to the bank. That's a very large number. In addition, customs are applied to Turkish products. Today we pay 20-30% customs on our products going to South Africa. The bank commission, customs and transport take all the advantages of Turkish products."

Relationship between South Africa and Turkey

Noting that the economies of Turkey and the Republic of South Africa are very similar, Taskin said, "They also produce, and we produce. We can't reach their markets, they can't reach our Eurasian markets. For this reason, it is necessary to marry the companies of the Republic of South Africa and our companies. Today , South African investors bought The Happy Battery, and Arçelik acquired the active Defy brand in the region. Here, it is necessary to introduce South African companies and Turkish companies to each other. While there used to be customs unions in many regions in Africa, today they have singled out the customs union on the African continent. Which means that you're not going to be able to A company investing in any country of the African continent will be able to sell its product duty-free to the whole continent and will move to the most advantageous position. In the past, Turkish contractors only did business in Russia, Libya, Algeria and all Arab countries. Today they can do business all over Africa. But they have problems because they don't have easy access to finance. Turkey should take the necessary steps in this regard."

"2022 will be a very good year for Turkey"

Tamer Taskin, Honorary Consul-General of Izmir and Chairman of Petrofer Turkey, said, "The African continent has great potential for Turkey with 54 countries. Our government, Ministry of Foreign Affairs, ambassadors, commercial attachés, Eximbank, DEIK and TOBB are doing their best to make Turkey effective in Africa." In his statements, he also wished the world and our country a healthy, peaceful, peaceful year through our magazine and said: "2022 will be a very good year for Turkey, all we wish is political and economic stability..."

A SUCCESS STORY WITH THE COOPERATION OF BEYOND THE LIMITS AND PARTNERSHIP OVER 20 YEARS: ÇEMTAŞ

One of the first companies that come to mind when it comes to quality steel is undoubtedly Çemtaş. R&D investments and 20 years of professional solution partnership are of great importance for Çemtaş to have such a deep-rooted success today.

We are talking about a 20 years partnership. We built this reliable success with these three items: R&D, production and added value. We are proud to see Çemtaş reaching all around the World by passing the borders with sustainability of these three items. In this issue of our magazine, we are hosting Deputy General Manager of Çemtaş, Şükrü Ünal and listening to him for learning how their path crossed with Sistem Teknik.

Şükrü ÜNAL
Deputy General Manager for Operations of Çemtaş

We would like to thank you for accepting our interview request. First, can you please introduce your company briefly?

Çemtaş is a strong company which is established in 1970. Some industrial investors of Bursa who knew the importance of steel production had gathered and established Çemtaş for steel production. After steel mill, commissioning of blooming mill unit has completed in 1976. After Bursa Cement Factory gaining most of its shares in 1988, investments finalized on quality steel production. Today, Çemtaş is one of the first companies when it comes to quality steel in Turkey. Our shares have been active in stock market in İstanbul since 1994. Today we are producing quality steel for automotive and machinery industry with our 60.000 m2 closed area and 100.000 m2 total area in the Bursa Industrial Zone. With 200.000 tons of steel production capacity, we are qualified supplier to mainstream producers such as Mercedes, BMW, VW, Toyota, MAN, Ford, Iveco, Renault, Tofaş. With the awareness of the importance of continuous improvement and value added production, we built first R&D center for quality steel industry in 2015 in Turkey.

Which countries you are exporting to ?

We export a significant part of its production, mainly to Germany, to Europe, North Africa and South America. While producing quality steel for the automotive industry with our Steel Mill, Rolling Mill, Non-Destructive Unit Lines, Heat Treatment Units and Peeling lines, we have also started the production of vehicle stabilizer bars since 2012. Anti-roll bars are very important safety parts, two of which are at the front and the rear of each vehicle, enabling the vehicles to be stabilized on bends. The fact that we produce the steel raw material ourselves in the production of stabilizer bars has been an advantage for both us and our customers. In addition, with the anti-roll bars produced for heavy segment vehicles, Çemtaş has become the supplier of leading truck and bus manufacturers such as Mercedes (Daimler), Mercedes Benz Türk, MAN, Iveco, Isuzu, Solaris, Hess, Irizar in a short time. It is the only supplier in Turkey for Mercedes trucks and in different locations in Europe and the world, and the only supplier for Mercedes buses in Turkey and Europe. For MAN trucks and buses, it supplies anti-roll bars to various European campuses, primarily Germany, as well as Turkey, and is growing day by day in the production of anti-roll bars.

Can we get information about the industrial furnaces you use in your production plants?

We have different types of furnaces in our business. In addition to the billet annealing furnace in our rolling mill, we have steel heat treatment furnaces as our continuous reclamation line and batch type multipurpose heat treatment furnace. Moreover, we have tempering and annealing furnaces in our stabilizer bar production lines, where hot forming and simultaneous heat treatment are performed. These equipments are the most important workstations of our facility in meeting customer requirements. It is vital to prevent decarbonisation during heating with atmosphere control.

And how did your path cross with Sistem Teknik?

I've been working at Çemtaş for 28 years. We met Sistem Teknik about 20 years ago when we wanted to make a modernization for our furnaces' combustion systems. I've always seen Sistem Teknik as a dynamic company. In serial production facilities like us, it is often that emergency actions should be taken to maintain production. Whenever we needed urgent support, Sistem Teknik responded us very fast and took quick actions. I would like to thank to Mr. Mehmet Özdeşlik and Ms. Beste Özdeşlik for their supports.

Which products and services of Sistem Teknik you are using?

We have done many kinds of works with Sistem Teknik Group for furnaces as well as modernization. We have been working on modernization and maintenance works on annealing furnace line for stabilizer bar production line with Sarvion company. Also, we work on improvements and technical services on our annealing and hardening furnaces that are produced by Sistem Teknik.

> "Şükrü Ünal, Deputy General Manager for Operations of Çemtaş, says, "Sistem Teknik is one of the valuable companies of our country that is open to development, constantly expanding its service range, with its young and dynamic staff ."

What would you like to say about your R&D investments?

In quality steel sector, we are the company that has the first R&D center. In an environment where competition is increasing day by day, studies on steel materials provide very important cost advantages and technical superiorities together with technical improvements. There are R&D offices, Metallography and Mechanical Tests Laboratory, Stabilization Bar Laboratory, and Non-Destructive Test Lines Departments within the R&D center established on an area of 1,370 m2 in Çemtaş. Çemtaş has been carrying out projects supported by the Technology and Innovation Support Programs Directorate – TEYDEB/TUBITAK and the Technology Development Foundation of Turkey-TTGV for many years within the scope of R&D. Increasing its project capacity with its R&D center, Çemtaş has accelerated its projects with which it collaborates with TÜBİTAK, BTSB, the European Union and its customers. It continues its research and development activities on issues such as improving existing steel grades and developing new steel grades with higher strength, increasing product performance, increasing production efficiency by designing new production and control techniques, and increasing energy efficiency with an environmentally sensitive approach.

SİSTEM TEKNİK DIFFERENCE IN FIRE RESISTANCE TESTING

The key to success is to be a solution provider. Today, this perspective is the basis of the cooperation between ZAG and Sistem Teknik. With the design and furnace assembly solutions offered by Sistem Teknik, ZAG is very pleased that their flexibility demands in furnaces are met.

In the new issue of our magazine, we are here with our interview with Friderik Knez, Head of Building Physics Department of the Slovenian National Institute of Building and Civil Engineering. As Sistem Teknik, we understand once again how valuable cooperation is, established with a professional perspective, as well as the happiness of meeting Knez's demands and expectations. In this exclusive interview, where we listen to a kind of evaluation of Sistem Teknik furnaces designed for fire resistance tests, we leave the word to Friderik Knez, Head of Building Physics Department of ZAG.

Can we get brief information about your company?

ZAG, The Slovenian National Building and civil engineering institute is a public, research institute, dealing with all kinds of problems in construction, both buildings and infrastructure. It has several departments and laboratories which are accredited and notified for testing according to most European standards. One of these laboratories is also the Fire Laboratory, where ST and ZAG meet on the project of new furnaces for fire resistance testing.

And, how have you set a strategy for this challenging process that we've gone through with Covid-19? How do you think this period affects you and your sector?

We are providing a wide pallet of services of different nature. Some activities, such as field inspections are of course very affected, whilst other activities, such as research, in particular based on desktop analysis can still be sustained. As for the sector, the covid-19 situation has certainly made all testing arrangements more difficult due to travel restrictions. It can also be seen that the market of testing is a bit unstable in terms of less clear timing in the development and testing of new products. But generally the activities are still there. However it takes more effort to coordinate.

In this period, where digitalization is increasing day by day, analysis and reporting systems are also gaining importance, especially in businesses that perform high-ability tests like ZAG. Can we get information about the software you use in your furnaces?

The software for running fire laboratory furnaces is custom built software. It is based on data acquisition and analysis, however furnace control is currently done manually, even if the software allows for (some) control. We find fire testing extremely difficult to control, at least in some test samples. No doubt, the software solutions are getting more and more AI integrated and eventually software will be able to react as human operators. But it will require additional sensors. I don't think we are there yet. Therefor all software, be it our own, existing one, or the new one still need a power user option, enabling instant override of automatic controls. At least for now.

Which feature of Sistem Teknik do you think demonstrates the difference in the sector?

Well, this is a broad question. What I like in the ST furnaces is its modularity, built on pieces just small enough to provide high level of flexibility, and big enough not to require a huge amount of work every time when reconfigured. Also the experience I had with the ST design team was very good, because we were always able to find a solution in design, but also in the furnaces assembly.

Can you briefly summarize the contributions of periodic maintenance to your company?

Periodic maintenance is an important action in the quality level maintaining. One needs working equipment to focus on analysis of the tested sample. I do believe, however that monitoring the status of furnaces closely, i.e. daily inspection is the best strategy for the maintenance – do it immediately when needed. By doing that, periodic maintenance can be loosened a bit. Of course, not too much... Finding the ideal balance between the two is the core of our strategy here.

How did you decide to renovate your old laboratory and test furnaces that you have been using for a long time? What were the factors that led you to prefer Sistem Teknik furnaces?

The old facilities were long due to be upgraded, however issues with the land and building permission complicated any serious intervention. Finally, in 2012 already we have decided to go for the new laboratory. It started to happen about 6 years after the decision and now we are finally there. Main cause of the lengthy process is the fact that ZAG is a public institution, which means we have to involve state in decision and of course make a call for tenders. Nonetheless, we have established contacts long before the tender and we have discussed often about what is new, what is possible etc. Then specifying our expectations in the tender was relatively simple. We did not a-priori prefer ST in the process. However, in the end, only ST was truly able to respond to our request for the flexibility in furnaces.

How would you evaluate the installation phase of Sistem Teknik furnaces, the installation of which has just been completed? Is it possible to say that it meets your expectations in terms of image, quality, installation speed, compliance with the schedule?

Honestly the installation was smoother than expected. We expected difficulties and delays as well as coordination issues. However, these were surprisingly minor. The team was very cooperative and working hard. The manager always had a grip on timing and small delays, that were inevitable to happen, were recuperated rather quickly. Overall, I can only find positive experience in the installation, even if the building was not yet fully operational at start of the assembly.

Lastly, what would you like to say?

I am really looking forward to explore what the furnaces will provide for us. We have had tough technical requests but all have been answered by both the ST design team as well as the assembly team. I expect the furnaces to generate new knowledge and ultimately improve fire safety across Europe.

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SUPERIOR ENGINEERING WORK FROM KARTAL BOMBE: EAGLE EXPANSION AND BOOSTER TANKS

Kartal Bombe, which has been growing, developing, researching and investing by shaping metal since 1945, continues its production in the expansion and booster tank sector with the Eagle brand.

Kartal Bombe is one of the successful companies of our country with a deep-rooted history. There are many brands within the body of the company, which has been serving by shaping metal since 1945. One of these brands is the expansion and booster tanks named Eagle. Eagle, which started to serve under the umbrella of Kartal Group with its innovative perspective and superior technological infrastructure, set out with the principle of high-quality service and production. Kartal Bombe authorities describe Eagle's success and its values with these words: "We laid the foundation for this success about 20 years ago. However, we stopped our production for various reasons and focused our production only on dish production by deep drawing method. At the point we have reached today, we see that the break we have given is sufficient, and we successfully deliver the expansion and booster tanks to our customers."

Full support from Eagle

Emphasizing that Eagle, like other group companies, carries out the entire production process within its own structure, with superior engineering studies, the officials said, "Our success in customer satisfaction in both pre-sales and after-sales support services is fed by our perspective and the investment that provides this. Our completely domestic products, developed by Turkish engineers with years of experience, have the necessary quality documents and international accreditations.

Produced in accordance with CE regulations

Eagle Expansion and Booster Tanks, which provide high efficiency in economic terms and have an innovative perspective thanks to R&D continuity, are produced at 6-10-16 and 25 BAR pressures, in the volume range of 2 lt and 10.000 lt. Authorities said, "We produce our products at high standards and in accordance with CE regulations, and we successfully manufacture the demands in this direction with the ASME certificates we have. In addition to carbon steel, we can produce expansion and booster tanks from stainless steel, and we can perform all the necessary tests of the tanks within our company.

SCHNEIDER ELECTRIC FOCUSES ON DIGITALIZATION IN SUPPLY CHAINS FOR RELIABILITY AND TRANSPARENCY IN THE FOOD INDUSTRY

With end-to-end digitalization, ensuring food safety, high quality and sustainability becomes more and more important every day. In this sense, Schneider Electric makes major achievements on a global scale and helps ensure transparency of products beginning with the raw material phase with new-generation technologies.

Schneider Electric, the global leader in the digital transformation of energy management and automa-tion and ranked as the World's Most Sustainable Company in 2021 by Corporate Knights, stresses on the increasing importance of a visible and transparent product journey in the eyes of consumers in the food industry. Consumers demand to learn about the food safety practices and the environmen-tal impacts of food manufacturers beginning with the raw materials and prefer companies which pro-vide accurate and reliable information. A 2019 research by Label Insight reveals that 75% of con-sumers prefer a brand which offers detailed product information in addition to the data on a standard label. This was at 39% in 2016. To meet this increasing demand and ensure a transparent communication with the consumers, brands should know where their raw materials come from. This is possible only by an effective use of data. In this aspect, digitalization functions as a major catalyst and increases the use of blockchain and other technologies which provide an unchangeable log.

Mike Jamieson, Consumer Packaged Goods (CPG) Segment President at Schneider Electric, com-mented as follows: "End-to-end traceability is now a basic factor in trust, transparency and sustaina-bility. A major part of our daily lives is shaped by data and the same applies for the food industry. We should log and verify each and every incident so that we can display a non-changeable digital pass-word throughout the whole ecosystem. Contents, origin, manufacturing data, packaging, distribution and destination should be instantly accessible and available for analysis in real time. This integrated approach is of critical importance to improve risk management and operational efficiency."

Traceability for food safety and operational efficiency

Tracing the products using digital technologies is of key importance in relation with the management of food safety risks. Schneider Electric offers traceability technologies to help companies improve their processes and operations using reliable end-to-end systems. The Company offers comprehen-sive solutions with diagnosis, maintenance, traceability and quality monitoring functions. These tech-nologies offer a number of benefits from diagnosis to quality monitoring throughout the product cycle on a single platform. Integrated systems allow real-time data access and consequently, instant actions. This ensures instant detection of any product contamination or packaging failure and swift re-medial action. Traceability also reduces the negative environmental impacts of production and creates a major ad-vantage for the food industry. It becomes possible to minimize waste throughout the supply chain. Data on all elements taking part in the processing of materials ensures access to accurate and relia-ble data. Digitalization of the supply chain helps companies evaluate and report the sustainability impact of their suppliers on people and the environment and increase the standards to support UN Sustainable Development Goals. In this sense, Schneider Electric technologies promote responsible manufacturing as well as overall efficiency and circular economy and create the foundation for an uninterrupted end-to-end improvement.

Major achievements based on sustainability, transparency and reliability in supply chains

Schneider Electric is a solution partner in many achievements around the globe with its supply chain traceability technologies. The Company's partners include water manufacturer Nestlé Perrier, additive supplier Cargill and chocolate producer Beyond Good. By partnering with Schneider Electric, Nestlé Perrier continually improves its processes and opera-tions with an end-to-end system. Cargill, on the other hand, says that the demands of its consumers to be sure that the raw materials are procured in a sustainable and eco-friendly manner, in line with social and ethical standards are on the rise. The company says that the consumers are especially demanding about transparency in the supply chains of product which are closely associated with deforestation, specifically cacao, soy-bean and palm oil. In this sense, Cargill developed a digital portal called 'Wise', an industry-leading application on a global scale. This portal allows Cargill instant access to details on cacao, soybean and palm planta-tions as well as how they are processed. The system has a specific platform for each product and offers sustainable agriculture education for farmers, entrepreneurship education for women and nutri-tion programs for families as well as visibility on the financial impact of investments. Another major achievement is by Beyond Good which purchases materials in a sustainable and ethi-cal manner. Data acquired through digital tracing and monitoring of the processes help improve them and offer detailed information on the company's supply chain for the consumers using the QR code on the inner part of the package. Tim McCollum, CEO at Beyond Good, commented as follows: "We are at the final stage of building an interactive, open web site which connects consumers with the farmers in our supply chain. Con-sumers of Beyond Good products will have direct 'connection' with the farmers we work with in Mada-gascar, see where cocoa beans are farmed and chocolate is produced. We have been focused on transparency for a long time and designed our business model in this fashion, with no intermediaries. New-generation technologies help us increase visibility in our product processes."

SCHNEIDER ELECTRIC'S ECOSTRUXURE SOLUTIONS WILL IMPROVE OPERATIONAL EFFICIENCY AT SASA

Schneider Electric extends its partnership with SASA Polyester A.Ş., a leading global organization, with new projects. SASA improves its efficiency and outputs at design, manufacturing and distribution phases with EcoStruxure solutions.

Schneider Electric, the global leader in the digital transformation of energy management and automation and ranked as the World's Most Sustainable Company in 2021 by Corporate Knights, offers EcoStruxure architecture solutions to SASA Polyester A.Ş., a leading global manufacturer of polyester, fibers, filament yarn, polyester polymers, specialty polymers and intermediate products. These solutions help SASA manage the design, manufacturing and distribution phases efficiently. A long-time user of Schneider Electric's Foxboro DCS solutions, SASA Polyester A.Ş. decided to use the package in its latest PTA projects and made significant progress in digitalization with AVEVA software solutions. Aveva Asset Information Management included in the EcoStruxure Service Plan defines all interactions between equipment, documentation, schemes and data formats and converts data from multiple sources and systems into trusted actionable insights through cross references. AVEVA AIM solution was also designed to create digital twins of current facilities in addition to the PTA plant. AVEVA Unified Operations Center solution, the foundation providing real-time operational performance management for infrastructure and process industry organizations using organization-wide closed-loop visibility to optimize assets and operations, will function as a unified operations center for PTA facilities. SASA will use AVEVA Predictive Analytic at PTA and other facilities for predictive analytics and predictive maintenance through AI and machine learning.

"We are confident that the operational efficiency will increase"

Naci Yurdakul, EMEA CPG & WWW Business Development Manager at Schneider Electric, commented as follows: "Schneider Electric's local expertise helped SASA simplify its architecture and collaborate with a single technology partner for process automation and operations. We are confident that the AVEVA software solutions included in EcoStruxure Service Plans will help improve operational efficiency at the plant and at other facilities." Schneider Electric solutions will result with a better performance in real-time central monitoring system and documentation management, minimize downtime and improve system reliability and output.

BAYKAL REZISTANS OFFERS ENGINEERING SOLUTIONS WITH ITS BOUTIQUE PRODUCTION

Industrial Heating Elements Most Preferred Producer of Turkey

Since 1970, Baykal Rezistans is serving unlimited and excellent to its customers. Now, our company is only producing industrial heating element for its special customers. Baykal Rezistans presents high level engineering services to approximately ten thousand customers all around the world, with boutique and customer based exclusive service philosopy. Finally, the company Baykal Rezistans, with its excellent customer service understanding, will continue to serve its good quality products in next years, to its customers from all over the world.

Industrial Furnace Heater

"Industrial Furnace Heaters are types of heaters used in the heat treatment furnace, which allows to increase the internal environments of the ovens to the desired temperature values. Production is carried out in Baykal quality according to different types and usage dimensions, as well as the furnace interior temperature."

Types of Heaters According to Maximum Temperatures in the Oven

›› Tubular Heaters (Maximum 700°C)
›› Spiral Wound Heaters (Maximum 1100°C)
›› Metal Sheathed Ceramic Carrier Supported Heaters (Maximum 1200°C)
›› Silicon Carbide Heaters (Maximum 1400°C)

Industrial Furnace Heater

You can work with Baykal Rezistans, our team that provides expert solutions in terms of customer experience, together with its expert personnel in these types, which you can choose as a tool to meet a wide range of customer needs in all your processes that require heat treatment, and which you can use as one of the best manufactured products. With its focused approach, you, too, always benefit from the right furnace heating element types in the manufacturing processes of industrial furnaces and equipment.The heat treatment furnace resistances, also known as high-temperature heaters, are today made of special ceramic materials up to 1400 degrees Celsius and a high-temperature structure made of resistance wire. "As Baykal Resistance, we provide the production in accordance with the desired projects and in the dimensions you want according to the furnace types. You can reach the special production point at any time you want, and you can stay in touch for information and support.

Baykal Rezistans
1970

İkitelli Org. San. Bölg. Eskoop San. Sit.
C.1-2 Blok No: 16-18-20 Başakşehir
İstanbul / TURKEY

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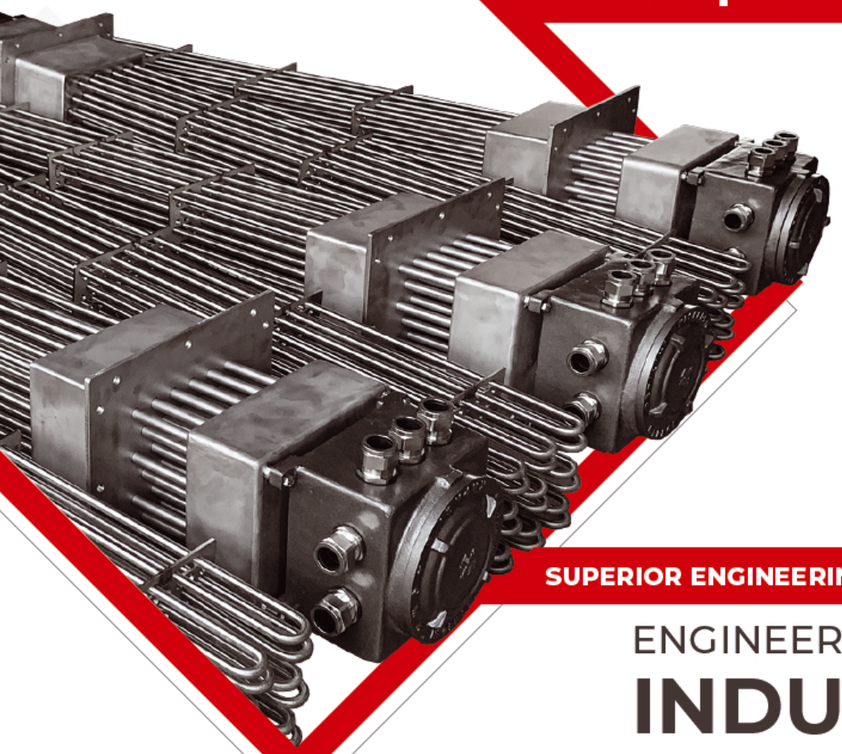
export@baykalrezistans.com
www.baykalrezistans.com

Exproof Heaters



Atex Certified Industrial Heaters

- In flammable and explosive areas safe use
- Atex Certified
- Industrial Design
- Engineering Solutions

SUPERIOR ENGINEERING

ENGINEERING SOLUTIONS IN

INDUSTRIAL HEATERS

50 YEARS OF EXPERIANCE

BAYKAL REZISTANS MORE THAN 10.000 CONTINUES TO GROW WITH IT'S CUSTOMER

Since 1970, Baykal Rezistans is serving unlimited and excellent services to his customers. Now, our company is just producing industrial heating element for his special customers.
Baykal Rezistans presents high level engineering services to approximately ten thousand customers all around the world, with boutique and customer based exclusive service philosopy.

Baykal Rezistans, which has become an international trade and representation company by being the representative, distributor and authorized dealer of many European companies, besides the production realized, offers the imported materials to the market by evaluating them in its own production process. It continues to serve its customers with all its high quality products, of which it is a manufacturer and importer, with customer satisfaction-oriented studies and on time delivery principles.

ATEX CERTIFIED HEATERS MANUFACTURING IN TURKEY WE EXPERIENCE THE JUSTIFIED PRIDE OF BEING THE FIRST AND ONLY

Exproof Heaters Exproof Tubular Heaters can be used for a wide variety of purposes. It is used safely in the chemical and petrochemical industry, in industrial processes, oil platforms, military facilities and many other places, in areas where an explosive atmosphere may occur, in environments where substances are stored, processed or produced.
As Baykal Resistance, we are the pioneer and only company in Turkey in the production of Atex-certified industrial heaters.

Baykalrezistans
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1970

50 YEARS EXPERIENCE

Turkey's First And Only **ATEX CERTIFIED** Exproof Heater Manufacturer

IEP | ENERGY PETROLEUM INSTITUTE — IEP ATEX

(1) EU-Type Examination Certificate

(2) Equipment or Protective Systems Intended for use in Potentially Explosive Atmospheres
Directive 2014/34/EU

(3) EU – Type Examination Certificate Number: IEP 21 ATEX 1006X

(4) Equipment: BEX-X type Heaters

(5) Manufacturer: BAYKAL REZİSTANS SAN. TİC. LTD. ŞTİ.

(6) Firm Address: İkitelli O.S.B. Eskoop San. Sit. C1/2 Blok No:16-18-20 Başakşehir/ İstanbul, TURKEY

(7) This equipment or protective system and any of acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.

(8) The IEP Uluslararası Enerji Petrol Gözetim, Sertifikasyon ve Teknik Hizmetler Organizasyonu Tic. Ltd. Sti., notified body number 2284 in accordance with Article 17 of the Directive 2014/34/EU of Europens Parliament and of the Council, dated 26 February 2014, certifies that this product has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of products intended for use in potentially explosive atmospheres, given in Annex II to the Directive. The examination and test results are recorded in confidential Report Nr: IEP.Rp.Ex.10-2054 date 25.10.2021.

(9) Compliance with Essential Health and safety requirements has been assured by compliance with;
EN IEC 60079-0:2018 , EN 60079-1:2014, EN 60079-31:2014

(10) If the sign " X " is placed after the certificate number, it indicates that the product is subject to Specified Conditions of Safe Use specified in the schedule to this certificate.

(11) This EU-Type Examination Certificate relates only to the design and construction of the specified product in accordance to the directive 2014/34/EU. Further requirements of the directive apply to the manufacturing process and supply of this product. These are not covered by this certificate.

(12) The marking of the equipment or protective system shall include the following:
Ex II 2G Ex db IIB T1...T6 Gb
II 2D Ex tb IIIC T440°C...T80°C Db

Responsible Person:
Nurettin Terzioglu
Head of Certification Body

Date of Issue: 05.11.2021

IEP Uluslararası Enerji Petrol Göz., Sertifikasyon ve Teknik His. Org. Tic. Ltd. Sti. 57461 Sok. No:9 K:2 Bornova - İZMİR / TURKEY
Tel: +90 232 431 17 45 - 46 Fax: +90 232 431 17 30 E-mail: iep@iep.com.tr Fr: 45
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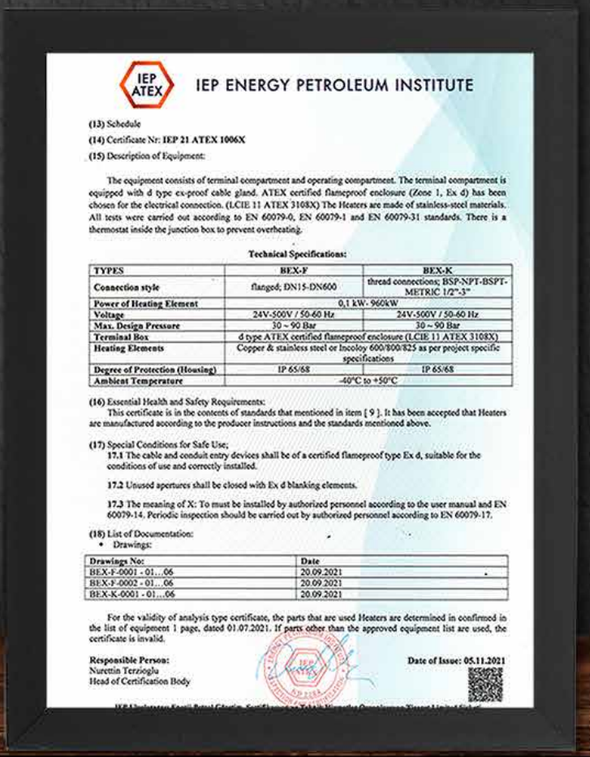
Page:1 / 2



IEP ATEX — IEP ENERGY PETROLEUM INSTITUTE

(13) Schedule
(14) Certificate Nr: IEP 21 ATEX 1006X
(15) Description of Equipment:

The equipment consists of terminal compartment and operating compartment. The terminal compartment is equipped with d type ex-proof cable gland. ATEX certified flameproof enclosure (Zone 1, Ex d) has been chosen for the electrical connection. (LCIE 11 ATEX 3108X) The Heaters are made of stainless-steel materials. All tests were carried out according to EN 60079-0, EN 60079-1 and EN 60079-31 standards. There is a thermostat inside the junction box to prevent overheating.

Technical Specifications:

TYPES	BEX-F	BEX-K
Connection style	flanged; DN15-DN600	thread connections; BSP-NPT-BSPT-METRIC 1/2"-3"
Power of Heating Element	0,1 kW- 960kW	
Voltage	24V-500V / 50-60 Hz	24V-500V / 50-60 Hz
Max. Design Pressure	30 – 90 Bar	30 – 90 Bar
Terminal Box	d type ATEX certified flameproof enclosure (LCIE 11 ATEX 3108X)	
Heating Elements	Copper & stainless steel or Incoloy 600/800/825 as per project specific specifications	
Degree of Protection (Housing)	IP 65/68	IP 65/68
Ambient Temperature	-40°C to +50°C	

(16) Essential Health and Safety Requirements:
This certificate is in the contents of standards that mentioned in item [9]. It has been accepted that Heaters are manufactured according to the producer instructions and the standards mentioned above.

(17) Special Conditions for Safe Use;
17.1 The cable and conduit entry devices shall be of a certified flameproof type Ex d, suitable for the conditions of use and correctly installed.

17.2 Unused apertures shall be closed with Ex d blanking elements.

17.3 The meaning of X: To must be installed by authorized personnel according to the user manual and EN 60079-14. Periodic inspection should be carried out by authorized personnel according to EN 60079-17.

(18) List of Documentation:
• Drawings:

Drawings No:	Date
BEX-F-0001 - 01....06	20.09.2021
BEX-F-0002 - 01....06	20.09.2021
BEX-K-0001 - 01....06	20.09.2021

For the validity of analysis type certificate, the parts that are used Heaters are determined in confirmed in the list of equipment 1 page, dated 01.07.2021. If parts other than the approved equipment list are used, the certificate is invalid.

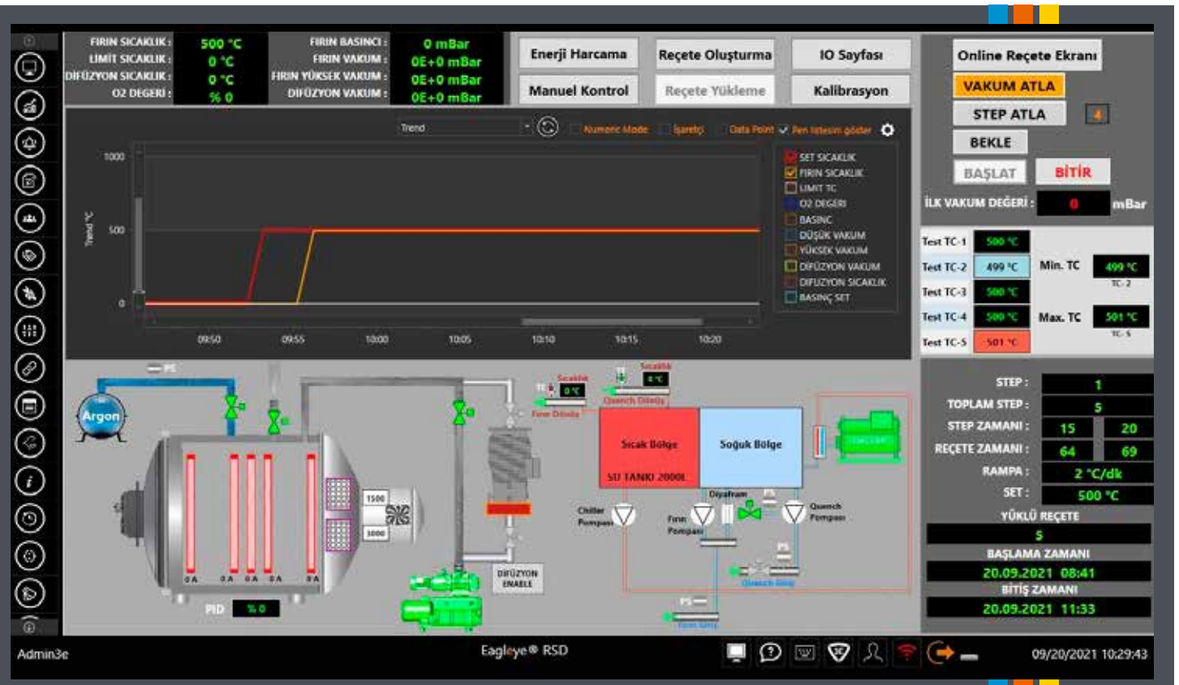
Responsible Person:
Nurettin Terzioglu
Head of Certification Body

Date of Issue: 05.11.2021

export@baykalrezistans.com www.baykalrezistans.com +90 212 244 52 13

KEEP UNDER CONTROL

The Visualization and Control of Industrial Heat Treatment Process



Eagleye Runtime Scada Designer
makes you Better&Faster

- Vacuum Furnaces
- Nitriding Furnaces (Kn&Kc&Ko)
- Autoclaves
- Atmosphere Furnaces
- Fire Testing Furnaces
- ... much more

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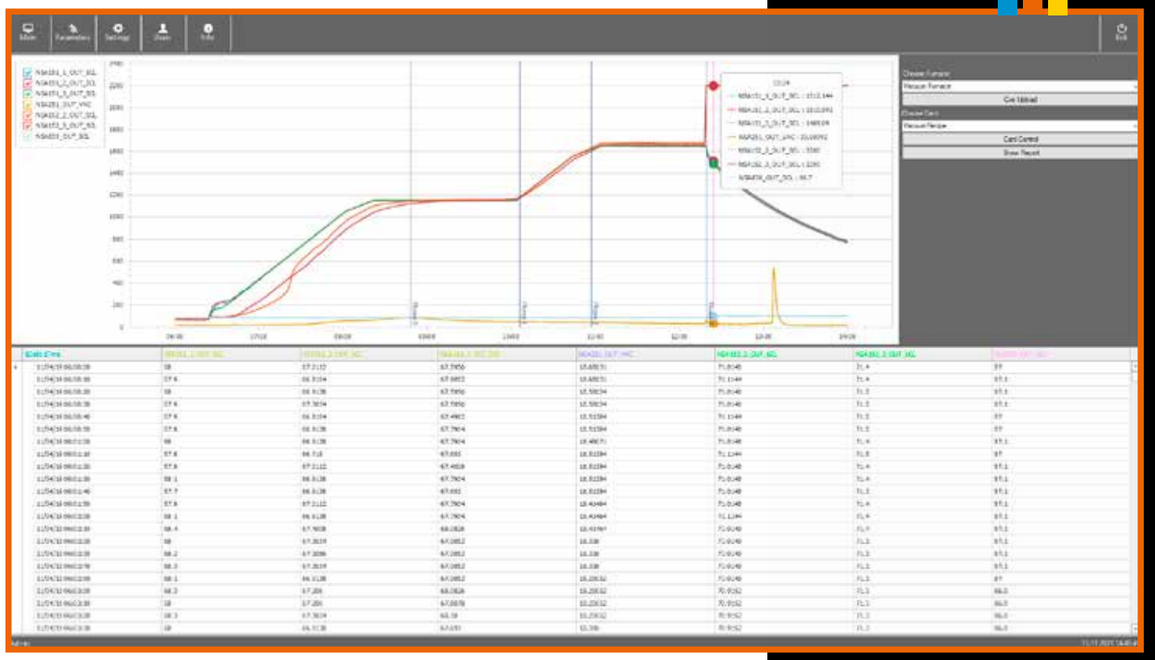
Eagleye® RSD

Eagleye® QRD

(Quality Report Designer)



No Error Risk in AMS 2750 and **CQI-9 Compliance**

Standards such as AMS 2750 and CQI-9 are used for the control of heat treatment processes of high quality materials in the automotive, aerospace and aviation industries. After the determination of these standards, sector-specific requirements for heat treatment were defined and processes were subjected to stricter rules. In summary, these standards describe in detail the requirements applicable to heat treatment plants.

Eagleye QRD automatically checks and reports whether the data received from the furnaces meet the relevant standards according to the desired quality cards. Process data can be loaded from a table or obtained directly from the field or by connecting to an ERP system. In this way, you can perform your controls that may take hours in seconds and evaluate your process. After checking dozens of machines working in your facility from a single point at the same time, the quality reports and results are shared with you by e-mail. In addition to shortening the process, your risk of making mistakes is eliminated.

With its flexible structure, different process controls, system integrations, unlimited quality card definition and many more features, Eagleye QRD is with you...

- AMS 2750 and CQI-9 compatibility
- Easy management and use
- The most effective and fastest solution
- ERP integration
- Paperless use
- Reliable and accurate quality control
- Automatic data transfer
- User-defined reference cards

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COMBUSTION CONTROL SOLUTIONS FOR YOUR INDUSTRIAL HEAT TREATMENT PLANTS

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- Complete combustion system solutions for industrial applications
- Engineering support and system design
- Technical application support
- Product selection and calculation
- After sales service support
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TECHNICAL ENGINEERING SERVICES

- Unique solutions for applications requiring expertise; like **“pulse firing”** system applications
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PHD-4 PORTABLE LEAK DETECTOR FOR TESTING UNDERGROUND STORAGE TANKS

Leak Testing for Underground Storage
of Hazardous Materials

Leaks in underground gasoline and fuel oil tanks are a danger to the environment especially if leaking fuel enters local water supplies. To avoid environmental damage, countries worldwide are instituting legislation restricting the level of leaks allowed to emanate from underground tanks.

To protect the environment and to avoid the liability costs associated with non-compliance with environmental legislation, it is very important to find and repair leaks quickly.

The average cost to clean up a simple tank leak is very high and increases with the size of the leak. One way to minimize the danger and expense of leaks is to find them when they are very small. This requires a high degree of sensitivity and reliability in the leak detection method, one that both identifies and locates leaks precisely. The PHD-4 does both. This eliminates the need to excavate the area around an entire tank to fix a leak that may only be in the piping.

What Is PHD-4?

The PHD-4 is a self-contained, ready-to-use portable leak detector capable of detecting helium concentration as small as 2 parts-per-million.

• Why Helium?

Due to the low concentration of helium in the atmosphere (only 5 ppm), very small leaks can be detected.

Helium is non-reactive with other chemicals.

Helium as a tracer gas is advantageous because it is non-toxic, non-flammable, inexpensive, and quickly diffuses through small leaks.

• Easily permeates earth and asphalt.

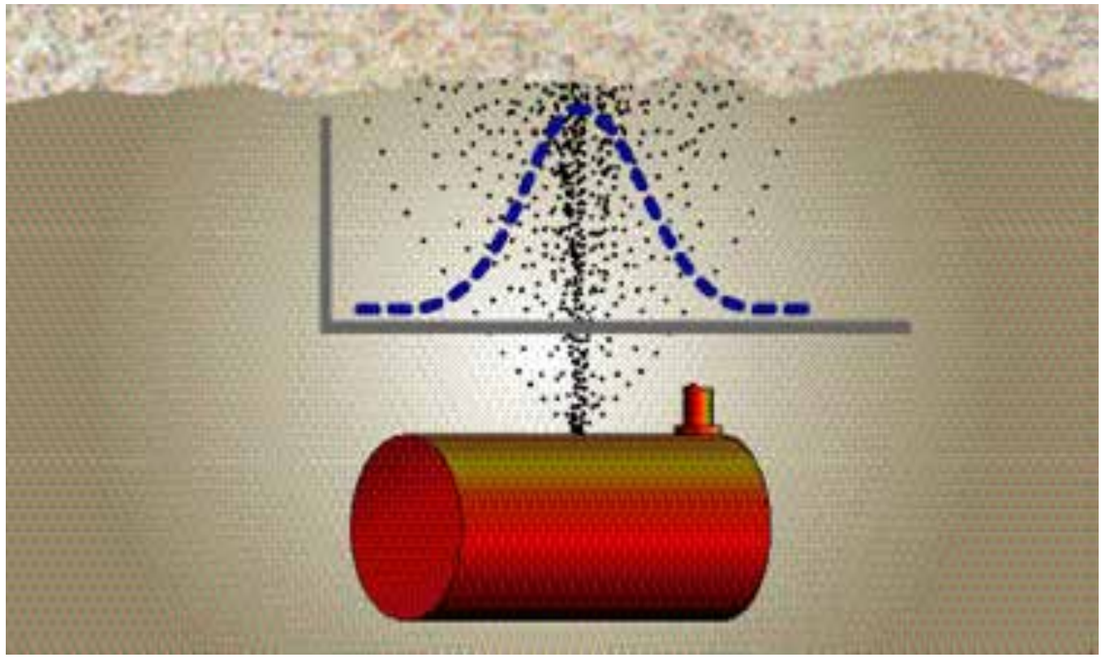
1- Leak Detection At Initial Installation

2- Post Installation Leak Detection

• Leak Detection At Initial Installation

Leak detection during initial installation is usually easier to accomplish because most or all components of the UST are readily accessible. Today, most new installations consist of primary and secondary containment systems. Tanks are typically double-walled and piping runs consist of an inner primary pipe and outer secondary pipe. Product leaking from the

> One way to minimize the danger and expense of leaks is to find them when they are very small. This requires a high degree of precision and reliability in the leak detection method that both pinpoints and detects leaks.



primary pipe is caught by the secondary pipe. Since piping runs are pitched back toward the sump area, any captured product flows in that direction to help insure containment.
Generally, testing of the tank top and piping in a new installation proceeds as follows:
• Adequately seal all tank and piping penetrations.
• Apply helium flow to one end of the system and monitor helium flow at the opposite and farthest end of the system to insure flushing of the ambient air within and to make sure that helium has reached all components.
• Seal the downstream penetration and pressurize the system with welding grade helium.
Although higher total pressures will increase the flow rate at leak sites and make smaller leaks easier to detect, one hundred percent helium is not necessarily required. Once the system is flushed and helium is added, the total pressure can be increased with air or nitrogen. When testing the primary piping using the PHD-4 helium "sniffer", the secondary piping can often be used to help contain any leaking helium. An accumulation effect occurs, making detection easier. In these cases, once the primary system is found to be leak free, the secondary piping can be sealed. Then, using a similar process, this secondary containment area, the interstitial space between pipes, can be flushed, pressurized with helium, and checked for potential leaks.

• Post Installation Leak Detection

Leak detection of a previously installed UST can be much more challenging since the tank and most of the piping are less accessible. These sites also typically have a layer of concrete or asphalt at the surface. The system must be flushed of air and pressurized with helium as described earlier, and leak detection must be performed through the layers of dirt, sand, gravel, concrete, etc.
Helium will pass through all substrates but will not always follow a straight-line path to the surface. To aid in finding the precise location of the leak site, holes may be drilled through the concrete at regular intervals along and directly over the piping runs. Once pressurization and a short dwell time are accomplished, the PHD-4 probe is placed at each of these holes to determine the approximate location of the leak.
Tape or some other material is placed over the hole during the dwell period to permit an accumulation effect and make the detection method more sensitive. Proper execution of this method can significantly reduce the amount of excavation required to repair leaks at an existing UST site.

• Why PHD-4 ?

High Selectivity PHD-4 is sensitive only to helium. There are no false signals due to the presence of any other gases.
High Sensitivity PHD-4 is nearly as sensitive to small leaks as a more expensive mass spectrometer leak detector used in the sniffing mode. This allows precise location of the leak which helps minimize excavation costs.
Battery Operated PHD-4 can be operated without a main power supply or power generator. Up to 4 hours on a single charge.
Simple Operation PHD-4 is very easy to use and does not require any special operator training. All the active menus of the PHD-4 are available in four languages. Specifically designed for underground testing (see sampling probe in photo on page 3).
Very Low Maintenance Replacement of sampling line filters is straightforward and requires only a screwdriver.
Portable PHD-4 is lightweight, portable and easy to carry, even to the most difficult leak check locations. It weighs only 2.6 kg.

Torrvac Mühendislik A.Ş
T : +902166064067

Oil and Gas Industry Leak Test for

Precise, powerful, easy-to-use

HLD Helium Leak Detector

- High sensitivity
- Application-specific configurations
- It can detect even a few cc leaks per year.

Portable Sniff Detector

PHD-4 Portable Helium Det.

- Easy to carry simple
- Versatile and absolutely reliable.
- It can detect even a few cc leaks per month.

Solution for vacuum or pressure distribution Pipes containing steam and chemicals

Harsh Environment (HE) Probe for Leak Detectors

- Allows testing on hot and wet surfaces.
- It is not clogged and only allows the passage of helium.
- It absolutely protects the vacuum system and the spectrometer.

Solution for underground pipes and storage tanks

PHD-4 PRO Leak Detector

- Up to 4 hours of battery life.
- Portable, easy to use and operator friendly.

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Trusted Answers

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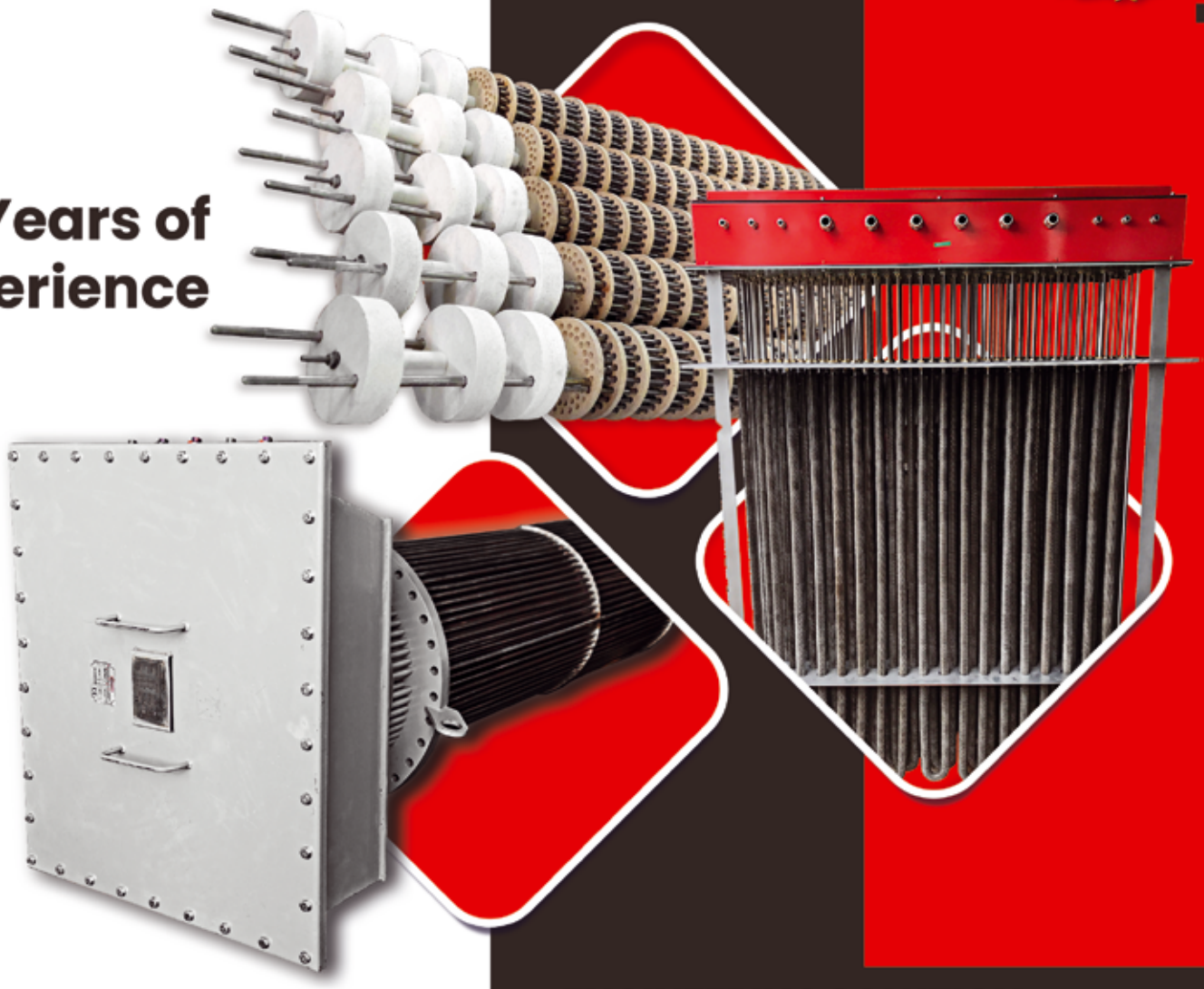
50 YEARS EXPERIENCE



50 Years of Experience

Turkey's First And Only Atex Certified Exproof Heater Manufacturer

ENGINEERING SOLUTION IN ELECTRICAL HEATING

We continue to serve our customers with the principles of customer satisfaction-oriented work and on-time delivery of all our high-quality products, of which we are manufacturers and importers.

ABOUT US

Industrial Heating Elements Most Preferred Producer of Turkey

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Baykal Rezistans, which has become an international trade and representation company by being the representative, distributor and authorized dealer of many European companies, besides the production realized, offers the imported materials to the market by evaluating it in its own production process.
It continues to serve its customers with all its high quality products, of which it is a manufacturer and importer, with customer satisfaction-oriented studies and on time delivery principles.

As Baykal Rezistans, we are the pioneer and only company in Turkey in the production of Atex-certified heating elements. Exproof Heating Elements can be used for a wide variety of purposes. It is used safely in the chemical and petrochemical industry, in industrial processes, oil platforms, military facilities and many other places, in areas where an explosive atmosphere may occur, in environments where substances are stored, processed or produced.