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INDUSTRIAL SISTEM TEKNIK ISSUE
FURNACES
TECHNOLOGY NEWS

Grand Holder: **Mehmet Özdeşlik** - Editorial Office Manager: **Gökhan Lale** - Issue Time: **Once Every Four Months** - Issue Name: **INDUSTRIAL FURNACES TECHNOLOGY NEWS** - Publishing Place: **Dinamik Basım Matbaacılık Promosyon İnş. Tur. San ve Tic. Ltd. Şti.** - Osman Yılmaz Mah. Kızılay Cad. No: 49/A Gebze / KOCAELİ Tel: 0262 611 00 30 - Managament Center: **Sistem Teknik Sanayi Fırınları A.Ş. TOSB – Otomotiv Yan Sanayi İhtisas OSB 1. Cad. 15 Yol No: 1 - 41420 Çayırova / Kocaeli / TURKEY - Tel: +90 262 658 29 14 - Fax: +90 262 658 18 19**

NADCA TEST AND BGH DIECAST ONE STEEL PERFORMANCE INVESTIGATION IN VF-1D-A-696 SERIES VACUUM HARDENING FURNACES

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Tool steels are described as the basic material group involved in the shaping and manufacturing of all material groups. In the heat treatment of tool steels, the physical and metallographic properties of the workpiece, such as strength, hardness, toughness and microstructure, are the only qualities underlying its suitability for service. Obtaining the desired physical and metallographic properties on a properly designed mold is possible with a heat treatment furnace where controlled heating and cooling can be carried out. Nowadays, vacuum furnaces are frequently preferred for the heat treatment of tool steels in order to prevent intergranular corrosion. In this article; within the scope of the NADCA#207-2018 standard published by the North American Die Casting Association (NADCA), the performance of 1.2344 (H13) hot work tool steel, one of the most used steel types, was examined in the VF-1D-A-696 type vacuum quenching furnace manufactured by System Technical Industrial Furnaces. According to the results obtained, it was observed that the furnace met the desired performance criteria and reached the desired hardness values on the material.

MATERIAL AND METHOD

NADCA#207-2018 standard includes acceptance criteria created as a result of joint decisions taken by NADCA member organizations within the scope of material, heat treatment and special quality requirements of mold steels. It is stated that the test procedure specified in the standard is valid for vacuum furnace with high pressure gas cooling capability. In this context, it is emphasized that the cooling rate in the vacuum furnace should be controlled fast enough to provide the desired metallurgical properties in the material, but at a level that does not pose a risk of distortion and cracking. It is emphasized that vacuum austenitizing and quenching under high pressure gas are critical, especially for A series Premium H13 hot work tool steel. In this context, it is emphasized that the cooling rate should be at least 28°C/min from the determined austenitizing temperature [1]. The mold dimensions to be considered as test samples within the scope of the standard are not clearly expressed according to the useful volume of the furnace. However, as a result of the test, it was stated that one aspect of the expected quality requirements may not be valid for parts larger than 400 mm. In this context, within the scope of the NADCA test, H13 quality hot work tool steel with a mass of 500 kg and dimensions of 400 mm x 400 mm x 400 mm, which can be placed within the useful volume of the VF-1D-A-696 type vacuum furnace and based on the maximum length within the scope of the standard, was used. The placement of the test material in the furnace is given in Figure 1, and the applied NADCA test recipe is given in Table 1.

Figure 1. Placement of NADCA Test Sample in the Furnace

	STEP							
PARAMETER	1	2	3	4	5	6	7	8
TEMPERATURE	20	630	630	830	830	1030	1030	70
RAMP	6.67	3.66	0	3.66	0	8	0	0
TIME	3	169.4	5	54.59	5	28.75	30	30

Table 1. NADCA Test Recipe

A total of 5 test thermocouples, including 4 Ø3 mm N type surfaces and 1 core on the front surface, were deployed on the upper surface of the block shown in Figure 1, in accordance with the NADCA standard. As seen in Table 1, in the test recipe, the first preheating temperature was 630°C, the second preheating temperature was 830°C, and the austenitizing temperature was 1030°C, which is the value specified in the NADCA standard for A1885. In addition, in accordance with the NADCA standard, the heating ramp is below 220°C/h at preheating temperatures, much faster when reaching the austenitizing temperature, the maximum difference between the surface and core thermocouple (GSoak value) is 110°C until the first preheating temperature, the second preheating and the austenitizing temperature is reflected in the recipe as 14°C. According to the standard, transition to the cooling phase can occur if any of two different conditions occur first. The first of these is 90 minutes after the surface thermocouples reach the specified GSoak value at the austenitizing temperature, and the second is after waiting 30 minutes for the core thermocouple to reach the specified GSoak value at the austenitizing temperature. The 7th step given in Table 1 has been added for this purpose. Finally, during the cooling phase, the furnace was cooled under 8 bar nitrogen pressure with a fan speed of 2700 rpm.

FINDINGS AND DISCUSSION

The SCADA screenshot where the furnace control and load thermocouples and the furnace internal pressure were recorded during the NADCA test is given in Figure 2. In the figure, test thermocouple 1, 2, 3 and 4 show the values of the surface thermocouple, and thermocouple 5 shows the values of the core thermocouple. As seen in the figure, after the NADCA test block was loaded into the furnace, the furnace was first put under vacuum and when the vacuum level reached below 0.5 mbar, the resistances were powered and the heating process was started. It was observed that the furnace reached 9x10-2 mbar value after 3 minutes, the time value entered in the recipe during vacuuming. It has been determined that the furnace set and control thermocouples carry out the heating process at the specified ramp in harmony with each other, and the internal temperature of the furnace can be kept stable according to GSoak values. When the waiting step at 830°C ended, the furnace was under vacuum and the austenitizing temperature was reached under 2 mbar partial pressure, which is the value entered in the recipe. In accordance with the NADCA test during austenitizing, after the austenitizing temperature of the core thermocouple reached the specified GSoak value, it was waited for 30 minutes and the cooling phase was started. The trend screen of the cooling phase is given in Figure 3.

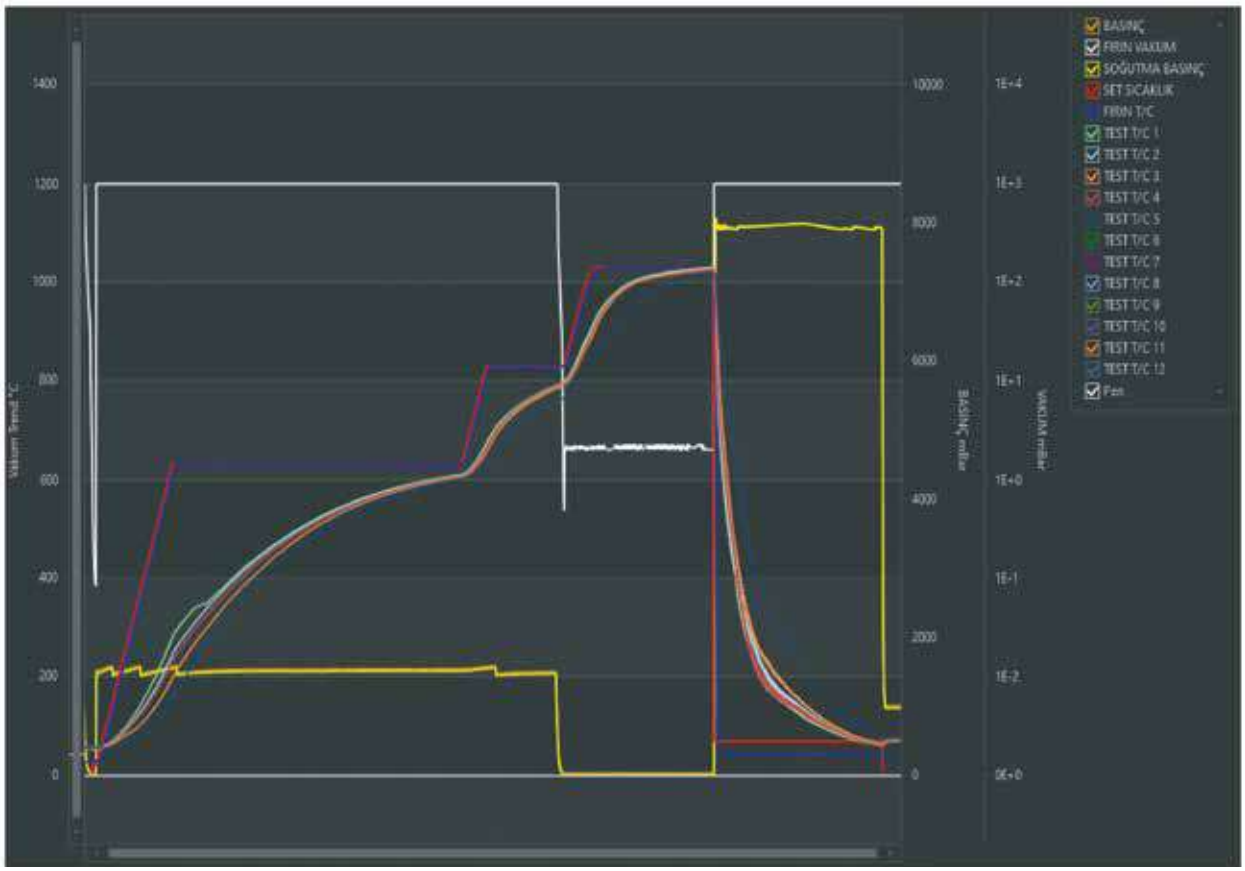

Figure 2. SCADA Trend Monitor During NADCA Test

In Figure 3, it is observed that the surface thermocouple curves have a zigzag-like increasing and decreasing character due to the core temperature being higher than the surface temperature, depending on the direction changing time of the diverter caps that enable the nitrogen, which is the refrigerant gas, to be directed from top to bottom or bottom to up during the cooling phase. It is known that the zigzag character can be minimized by reducing the direction change time to less than 30 seconds. During cooling, the value displayed by the furnace control thermocouple dropped below 70°C in approximately 8 minutes. Surface thermocouples reached temperatures from 1030°C to 540°C at different times. In calculating the cooling rate value in the NADCA test result, surface thermocouple number 3, which reached 540°C the slowest, was taken into consideration. Accordingly, the cooling rate was calculated to be 33.5 °C/min.

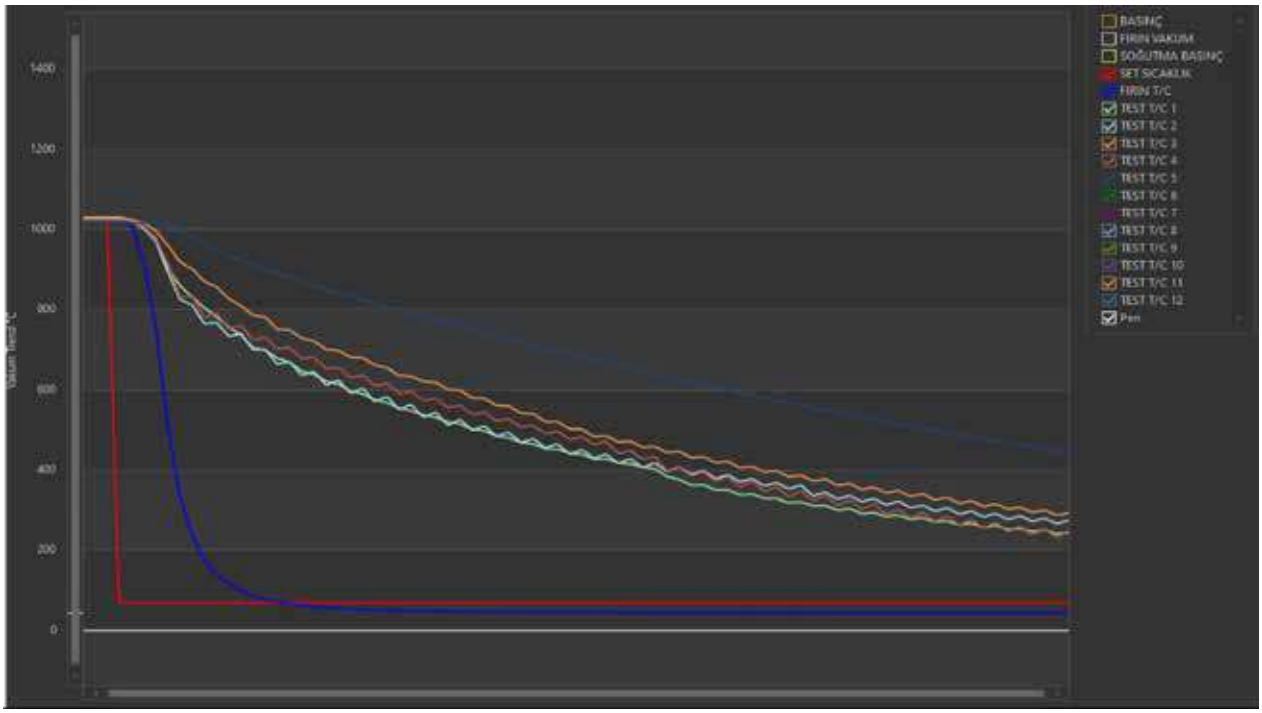

Figure 3. SCADA Temperature Trend Monitor During NADCA Test Cooling Phase

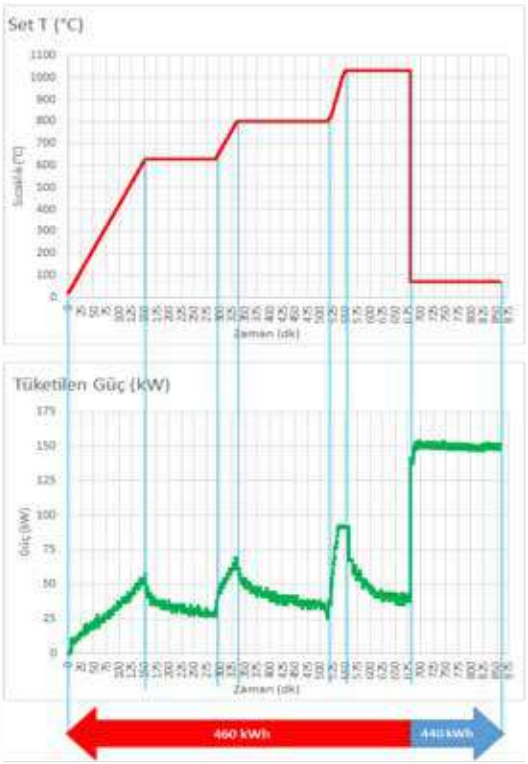

Figure 4. Energy Consumption Graphic of NADCA Test

Comparative graphs of the electrical power drawn from the network during heating and cooling of the NADCA test sample are given in Figure 4. As can be seen from the figure, it has been observed that the power requirement drawn from the network increases while the furnace is on the heating ramp, but decreases during the waiting step as the interior of the furnace begins to saturate and the material temperature approaches the predetermined GSoak values. It has been observed that as the set temperature value increases during the heating of the furnace, the current drawn at peak load also increases. It has been determined that the cooling fan draws balanced current during cooling. During the NADCA test, it was calculated that a total of 460 kWh and 440 kWh energy were consumed in heating and cooling, respectively. It was determined that a total of 900 kWh of energy was consumed. When the electrical energy absorbed by the vacuum pumps and other electrical equipment is included on top of this value, it was determined that the energy consumption was 1007 kWh by the energy meter built into the furnace. Considering that the NADCA test block is 500 kg and the loading grid is 67.5 kg, the energy consumption during the NADCA test is calculated to be 1.77 kWh per unit mass. The visual of the test block after opening the furnace door as a result of the test is given in Figure 5.

Figure 5. Test Block After NADCA Test

As can be seen from the figure, the NADCA test block was brighter and cleaner compared to the image when it was first loaded into the furnace. In addition, no cracks or deformations were found on the block, and a homogeneous distribution of 51-53 HRC was observed in the hardness measurements taken from the four corners and the center on the block surfaces.

TEST RESULTS WITH BGH DIECAST ONE STEEL

After the furnace commissioning and trial charging, the following results were obtained in the charging trials carried out within the scope of NADCA #207-2018 standards, with BGH Diecast One material measuring 400 x 350 x 200 mm, at maximum cooling speeds where distortion and cracking risks and material phase transformation speed were optimized. .

• As a result of the determined cooling pressure, the cooling rate was found to be 47.2°C/min.

• Charpy-V notched impact test results applied according to ASTM E23 standards are as follows;

• 28J 30J 29J (45HRC)

• Residual austenite amount after 3 tempering processes: < 2%

• Grain size no G: 8

• The examined material microstructures are given in Figure 6, Figure 7 and Figure 8.

Figure 6. Microstructure (50x Zoom)

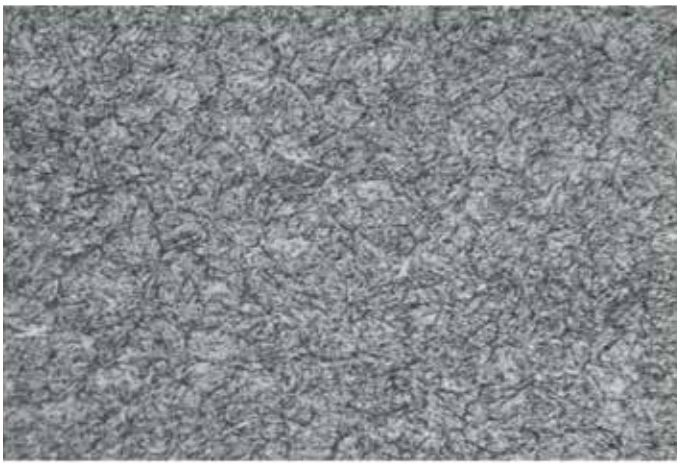

Figure 7. Microstructure (500x Zoom)

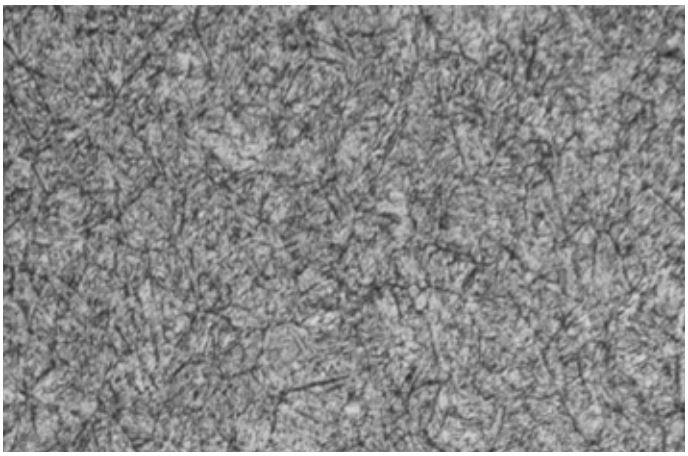

Figure 8. Microstructure of NADCA (500x Zoom)

RESULTS AND COMMENTS

It has been observed that the performance of the VF-1D-A-696 type vacuum irrigation furnace is sufficient within the scope of the NADCA#207-2018 standard. The energy consumption of the furnace is calculated to be 1.77 kWh/kg. It is obvious that the 28.5°C/min cooling rate obtained in the NADCA test performed under 8 bar pressure and 2700 rpm fan speed will be higher if it is carried out at 10 bar pressure and 3000 rpm, which are the maximum operating conditions of the furnace. However, since the desired minimum cooling rate was achieved under 8 bar pressure, savings were made in nitrogen and energy consumption. In addition, as a result of the trial conducted with BGH Diecast One, it was observed that the material quality met the desired parameters.

REFERENCES

[1]- NADCA#207-2018 Standard, North American Die Casting Association.

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HIZLI ISINMA HIZLI SOĞUMA

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Model Numarası	Ebatlar	Şarj Kapasitesi (kg)	Isıtma Gücü (kWh)
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VF-T-E-DC-9129	900x1200x900	1500	220
VF-T-E-DC-101510	1000x1500x1000	2000	260

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5S APPLICATION IN PROJECT BASED PRODUCTION COMPANIES

Ozan Yılmaz – Mekanik Tasarım Müdürü
Ahmet Can Yar – Mekanik Tasarım Mühendisi

5S is a five-word quality management technique in Japanese. This technique is used to maintain order in the workplace, increase productivity and reduce the error rate. 5S is accomplished in the following five steps:

1. Seiri: Sorting and discarding unnecessary items
2. Seiton: Arrangement of things in accordance with their intended use
3. Seiso: Keeping the workplace clean
4. Seiketsu: Setting and implementing standards
5. Shitsuke: Making these standards permanent

The 5S application is of great importance in companies working on a project basis, as it is in every company. Because at these companies, things can change frequently and these changes can be difficult to manage. 5S enables to manage these changes easily and maintains order in the workplace. In this way, employees can work more efficiently and the error rate decreases. It also increases the safety and quality of the workplace by reducing the error rate. For this reason, it may be beneficial for companies working on a project basis to consider 5S implementation. Each application also has aspects that will cause negative aspects arising from its characteristic features or incorrect application.

First of all, 5S application requires investment in the workplace, and the cost of this investment can put a heavy burden on the workplace as a result of misapplications. In addition, employees must fully comply with this system in order to establish and maintain the 5S application. However, it can be difficult for everyone to adapt to this system, which can affect the success of the application. Regular storage of materials in the workplace reduces material loss, but material stocks need to be checked frequently. This can cause an additional workload and waste of time. Thanks to standardization, everyone in the workplace can do the same work, but this can limit the creativity and initiative of employees in doing their work. When the 5S application is applied consciously, it makes a positive contribution to the working efficiency of every company. It needs to be planned and implemented properly. From the definition of current needs and problems to the final product, the design of a concept, the design verification process, optimization applications and prototype production are among the strongest capabilities within the scope of 5S logic and interdisciplinary engineering approaches. By evaluating all the needs of the customer, special design solutions that fully meet their needs should be created. Projects should prioritize details including characteristics of components, such as raw materials, dimensions and tolerances, to validate variables such as critical loads, deflections, movements and strength requirements. Considering these levels of detail and precision, applicable engineering solutions should be developed and presented to the customer by preventing the wasteful loss of 5S.

MECHANICAL DESIGN STAGES

Preliminary Design

In order to complete the preliminary design with the 5S logic, the problem must be defined, the requirements researched, concept models created, a feasibility assessment conducted and the design requirements listed. During the research phase, it is of great importance for the engineer to obtain the necessary information, including possible problems, solutions, costs and market requirements, and to collect the desired data by conducting research in this direction. During the problem identification and design requirements analysis phase, all the design requirements of the project should be defined until the end of the engineering design process. This phase should include an assessment of the end user's needs, system features and functions. A project's feasibility study should support the decision-making process by analyzing and summarizing the various alternatives or techniques for the project, narrowing the options to include only the most relevant scenarios. This phase allows the engineering team to start creating project schedules, planning resource requirements, determining whether the project is achievable and producing the design within a certain budget. The next step is to identify the concept phase to evaluate possible solutions using cost management, risk assessment and conceptual design techniques. Within the framework of these concepts, the desired design should be defined in accordance with the requirements and conditions. Design verification

tools should be used to identify weaknesses in the design. If deemed necessary, this situation should be evaluated with a team work carried out by the design and analysis engineers and the necessary solution proposals should be decided.

Conceptual Design

Conceptual design is the first step in the multiphase process involved in producing a new product. Product cost and innovative design solutions should be clarified at this stage. In this context, conceptual design is the stage that should be given importance in the engineering design process. In the conceptual design process of each project, there are basic principles to be considered depending on the competencies of the project. Conceptual design is of great importance in original and innovative products. A design solution found at this stage directly affects quality, cost, time, creativity and innovation. The biggest contribution to the innovative aspect of the project is provided at this stage. It is therefore of paramount importance to include creative solution-finding techniques. The innovation process starts with the production of creative ideas suitable for needs or problems. Innovation aims to commercialize a product or process with a high innovation aspect and to achieve high added value. At this stage, it is very important to support the creativity level of the project with a commercial function.

Design Verification Studies

Verification of the design can be thought of as providing the targeted qualifications and conforming to the criteria. The ISO 9001:2015 form is a document that organizations use for design planning and verification by adapting them. More than one method can be used during the verification phase. In this step, if there is an alternative calculation method, some results can be obtained with this alternative method and the data can be compared. In another method, results can be obtained by comparing the design with similar designs. During validation, tests, experiments and reverse engineering methods can be used. At this stage, it is necessary to review the documents, reports, minutes and specifications created during the design process. The general outline of the planning at the design verification stage should be the mechanical design controls, the controls of the technical drawings created, the controls of the manufacturability and applicability of the design. At this verification stage, it should be aimed to meet the desired standards and customer satisfaction.

Technical Drawing

Great care should be taken from the preparation of technical drawing letterheads to line thicknesses and font criteria. If there is an assembled structure in the design, the ordering of the fasteners should be done by considering the production methodologies suitable for the assembly order. Appropriate geometric tolerances, shape, position tolerances and surface roughness values of the parts to be produced should be specified, and technical drawings should be created by adding details of processes such as coating and paint suitable for the materials. Technical drawings should be prepared by showing all the information to be used in the production processes of three-dimensional models.

Assembly Documentation

2D and 3D contents are prepared by the mechanical design/engineering team to bring together the designed products, present them in detail and market them. The documents created should contain information necessary to explain processes and procedures such as technical drawings of 3D engineering models, assembly instructions, product manuals, installation instructions, service manuals, training guides, marketing brochures, and sales offer kits. Thus, the intelligibility of the projects is improved and the visualized details should ensure that user errors that may arise during the installation phase are eliminated. While creating assembly documentation, studies should be carried out within the scope of international standards and company standards.

OUR ERP INTEGRATION IS COMPLETED!

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What?
Where?
When?

Why?
How?
Who?

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We approached the ERP installation process like a problem!

Because we had to manage many processes together, and we had to make these processes work with a human-dependent discipline, save them from a structure that continues with individual workloads and human self-sacrifice, and collect them under a system of applicable processes.

Can't solve big problems?

Then you can use the divide and conquer method. This method is currently used in many sequential operations in computer science, from generating algorithms to sorting/searching algorithms, from tree data modeling to some matrix operations. The most important basic condition here is "Are you sure you divided the problem correctly ? We approached the ERP integration process like a problem to make sure we split it right, and at every point we got stuck, we proceeded by running the 5W 1H method a little backwards.

We started with the question "Who ?". Starting from the Divide and Conquer method we used, we first examined the processes of the departments that interact the most in the Process Interaction Table and analyzed department-based requirements accordingly. With the question "How ?", we tried to understand the internal workings of the departments. This was a very important step for the integrator company that will carry out the installation. The modules that should be used were revealed in this step. By asking the question "Why ?", we actually made a necessary / unnecessary job analysis. For each module, we have improved our internal processes towards

standardization by evaluating them with following questions:
- Why it is necessary ?
- What is in the internal process of the department and what are the correct inputs and possible outputs of the process ?
- What are the over- or under-done jobs ?
- What happens if it is not used continuously ?
- What do we want to use it for ?
- What's the purpose ?

By asking the question "Where ?", we determined the source and user of the data to be processed. For each data set, we identified the critical points in efficient data flow with these questions:
- Where is the data collected from ?
- Does it expect data from other processes ?
- If any department does not enter data, does the system come to a standstill ?
- If it comes, where does it come from ?

With the question "When ?", we decided at what moment the processes should trigger each other and direct the next stage in the most productive way. By making a correct needs analysis with these questions, we have determined our expectations from the system.

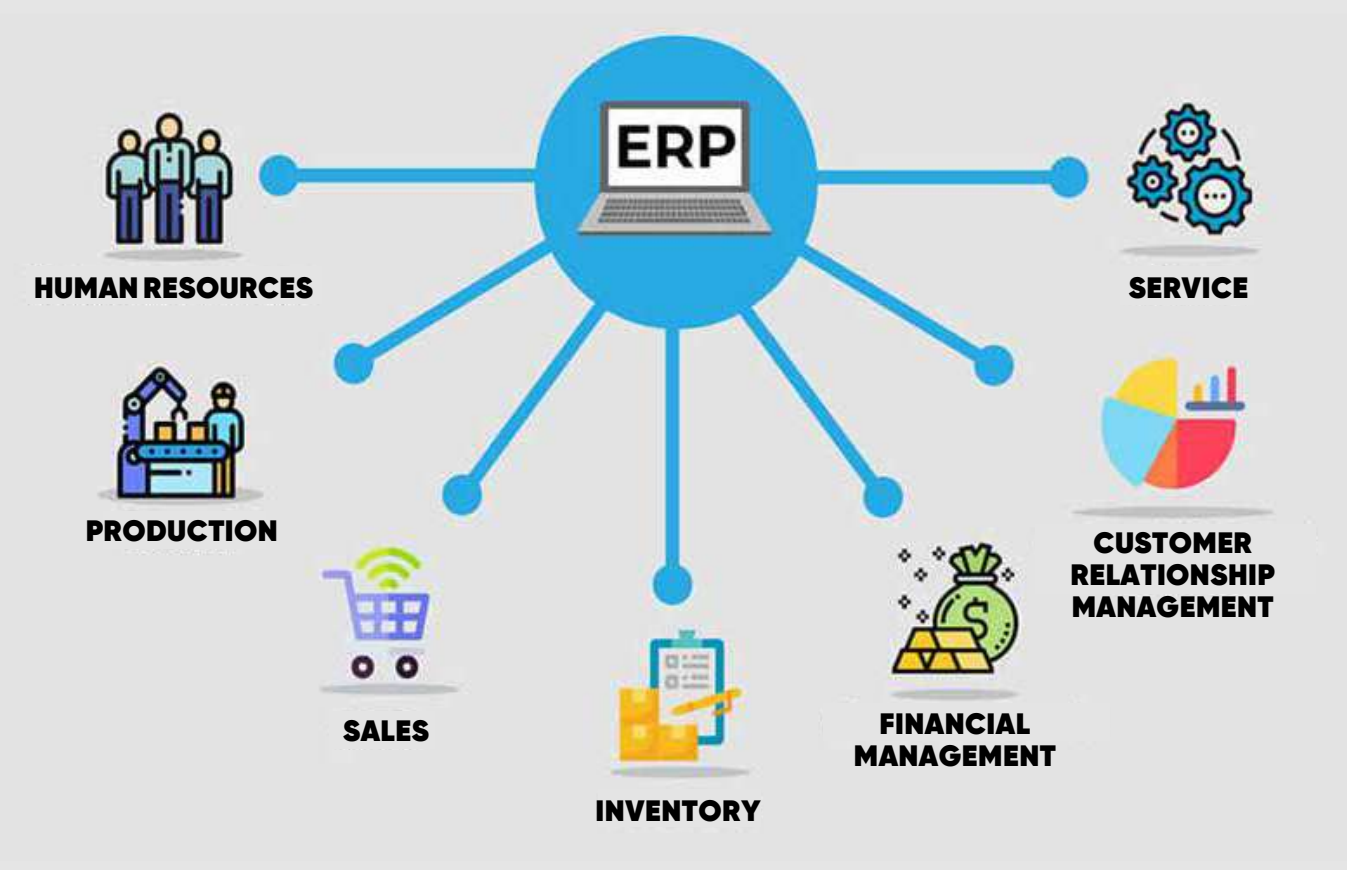
ERP is a set of systems !

In line with our goal of standardization, we embarked on this journey with a single motto: "ERP System will not be integrated with our processes, we will integrate with the ERP System". We have made Sistem Teknik internal processes more efficient, more productive and "suitable to ERP logic" and we have linked all chains with the question of when 5W 1H, we focused on open-ended chains or chains whose output affects many departments. Methods are of course debatable. There are many methods that are proven in the world yet still under dicussion. However, we think that we have been successfully implemented the system with fully-integrated accounting system. We talked to many companies that have started this journey before us, that have succeeded and/or failed, and we understood that the common problem in all their feedbacks is the irregularities and disconnections in the internal processes. We asked the integrator company to guide us with a focus on standardization, and we stayed away from special screen designs as much as possible.

How many modules have we commissioned ?

At the beginning of our article, we mentioned that we considered the installation as 3 phases. We started our business process, which started with the customer in Phase 1, with sales:
• The order must be taken correctly,
• The plan should be made by planning all resources simultaneously,
• By increasing the stock turnover rate of product-specific raw materials and semi-finished products.
must be managed, purchasing and warehouse processes must be fully managed,
• Assembly, testing and on-site installation processes should be followed hourly,
• Human resources and service should be planned daily,
• It should be presented to the customer with the highest quality without quality leakage,

And we must strive to manage all of these with the logic of total quality, to manage Sistem Teknik correctly. Resource planning, start-end with work orders and project management, including e-portals and finance screens to accurately account for all this process, follo-



wing modules have been commissioned:
1. Basic Data Management
2. Bill of Materials Management
3. Business Process Management
4. TROIA Development Tool
5. Sales Management
6. Purchasing Management
7. Human Resources Management
8. Project Management
9. Inventory Management (Stock Module)
10. Accounting Management (Financial Applications Management)
11. Financial Management
12. Service Management
13. Quality Control Management
14. Document Management
15. E-Portals (E-Archive - E-Invoice - E-Delivery Note etc.)
16. Legal Reporting Management
17. Billing Controls Module
18. Route Management Module
19. Maintenance & Calibration Module
20. Supplier management

Next is Phase 2 !
In this process, which we need to keep under control in order to provide ease of use to our customers by realizing the most variable modular design, it is now the 2nd Phase. In other words, we have started to work on improving the installed process so that it can work at a fully automatic level. We aim to reach the product in the most productive and efficient way with Standard BOMs, Product Cards, BPM and Routes. The trigger point that starts the manufacturing and quality control processes, the formation of a special mechanical and electrical design for the customer. By communicating the PDM system we use to manage the drawings and the ERP, we will launch 3 more modules at the level of automatic work distribution to the manufacturing and quality units and the creation of design-specific production methods, quality inspection and test plans.
*BOM (Bill of Materials - Manufacturing BOM)
*ROU (Route - Reaching the final product in the most efficient way by creating routes to the drawn picture)
*PRD (Production - ensuring the production of the relevant picture with the right materials, the right human resources and the right time)

Then Phase 3 !
We will now become fully automated by integrating MRP and IOT modules, by adding kiosks in production to our system, which is now completely standardized, where all human resources (white collar and blue collar) are accustomed to using ERP, where all the wheels that rotate the system work simultaneously. As a final word, we learned in this long-term process that there are no bad ERPs, there are teams that are not in communication, there are teams that cannot be a team, there are standards that are not ready for integration, processes that cannot be followed. 69 different people and 11 different departments had to work together in constant interaction with different variations. We have become teams that can stay in constant communication, first with the support of the top management and then with the participation of the managers. We need to thank both the senior management for their support and the devoted work of all our human resources as a full team, shoulder to shoulder.

OUR LATEST ACCOMPLISHMENT: TURQUM CERTIFICATE!

We accomplished our TURQUM Certificate, whose inspection and certification processes are carried out by TRTest Testing and Certification Inc., at the ceremony held at the SAHA Expo Fair. This certification activity which is a common Manufacturer Competency and Conformity Assesment Mark initiated by the Machinery Manufacturers Association (MAİB), aims to ensure the image of a “reliable supplier” in both local and global markets, where the manufacturing system, quality management system, product safety and quality adequacy, sales and after-sales services of companies operating in the machinery sector and giving importance to exports are audited. We will continue to work with our philosophy of continuous improvement and our determination to achieve better.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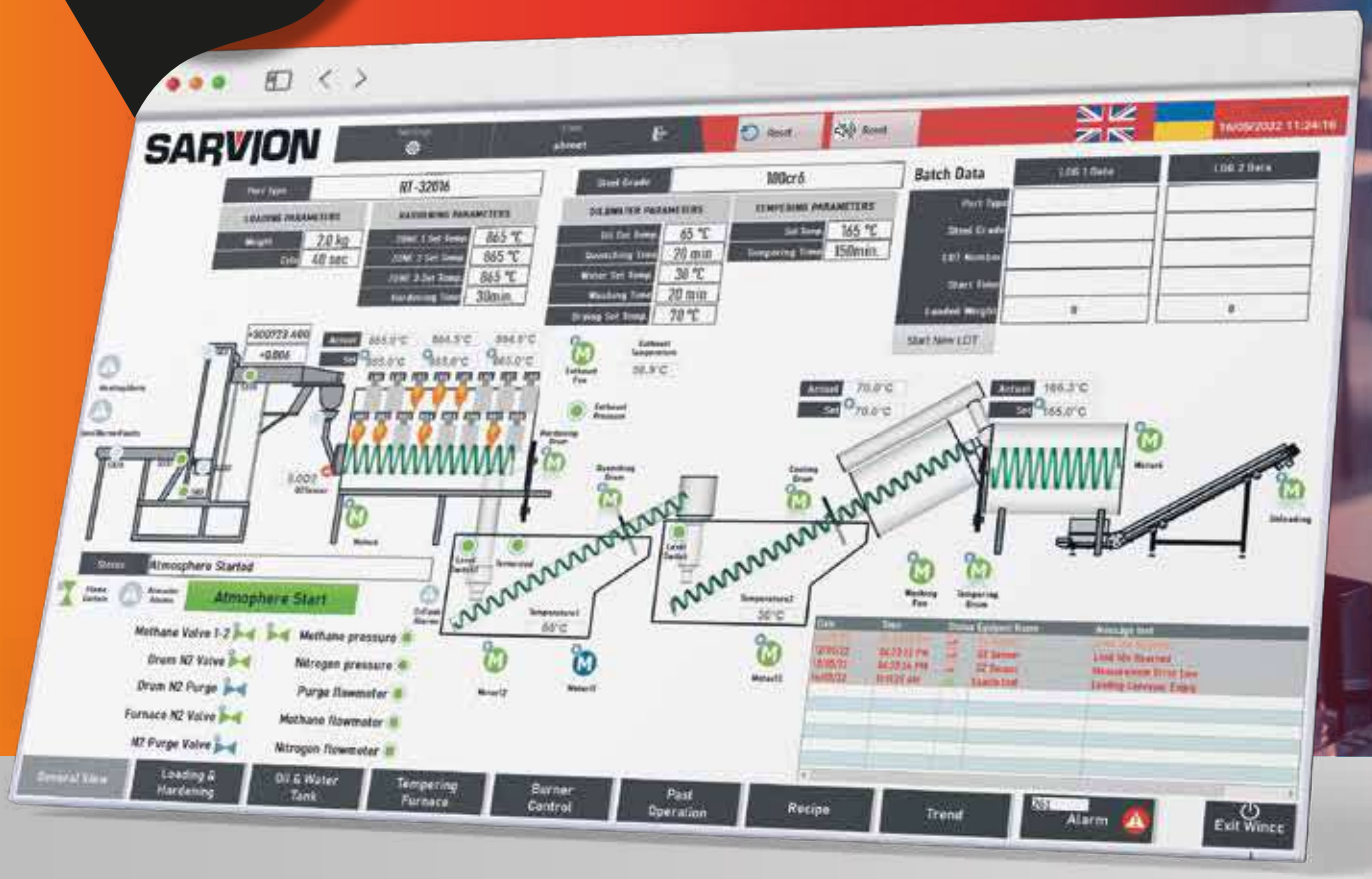

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THE TARGET IS GREAT, STEP BY STEP TOWARDS THE TOP

Norm Holding, which invests in new generation production technologies and never compromises on quality, has a big target. Norm Tooling, one of the holding companies, is moving towards the future with sure and solid steps. The first industrial furnace investment of the successful company was signed by Sistem Teknik.

Operating in various sectors, especially in the automotive main and sub-industry, and its reputation exceeding the borders, Norm Holding has a big goal. The company, which is progressing to the top step by step, exports to more than 50 countries. Behind this success of Norm Holding, which is the first in Europe and among the top 12 in the world in the fastener sector, there are employees who are passionate about their work. One of these employees is Sadık Erdem Özdemir. Özdemir talked about Norm Tooling, which was established as a subsidiary of Norm Holding in 2003, and the cooperation that we are proud to realize together as Sistem Teknik. Within the framework of this cooperation, he expressed the reason why Sistem Teknik gave us the first industrial furnace investment within Norm Holding as follows: "Both the references and quality of Sistem Teknik were the most important factors for us to choose them."

First of all, can you briefly describe your company ?
Our Norm Tooling company has 2 main tasks. First, our factory manufactures cold forming dies. The main specialization of our factory is machining hard metal. It is the largest mold factory in Europe in its field. While machining from raw materials or cold-formed materials in our factory, quality controls are carried out with automatic imaging benches according to customer expectations. Our area of expertise is based on the principle of designing and defecting the process with project-based 100% automated benches for our customers.

As Norm Holding, you operate in many industrial sectors. Could you tell us about the sectors you serve and your role in these sectors ?
Norm Holding is a company that has become a leader in its field by designing end-to-end processes for fasteners. It operates with more than 3,500 employees, a total of 20 companies, 7 of which are abroad, and 12 production centers, in national and international markets, mainly in the automotive main and sub-industry, spare parts, white goods, electronics, technology, furniture, construction and machinery sectors. As Norm Holding, we export to more than 50 countries, and we are among the top 5 in Europe and the top 12 in the world in the fastener sector.

The first industrial furnace investment within Norm Holding was realized with the cooperation of Norm Tooling and Sistem Teknik. What were the reasons behind this investment decision and what were the factors in your preference for Sistem Teknik ?
Our goal in our company, which grows with an average of 50% every year, is to become an integrated mold facility. For this purpose, the inclusion of outsourced services is a critical issue for us. This activity has very important effects on both time and cost. As Norm Tooling and especially as a local company, local companies are always ahead for us. Both the references and the quality of Sistem Teknik were the most important factors for us to choose

them.

So, what has changed with the furnaces you have added to your production track? Can you talk about what these furnaces have brought you in terms of return on investment ?

Frankly, this area is quite new for us, we are still in the learning phase. However, due to the support given by Sistem Teknik, we have taken the heat treatment process inside. As this process became an internal process, it had a positive effect on the delivery times of our products. At the same time, since we were able to determine our own recipes, it paved the way for special studies for our products with different trials.

How would you evaluate the process from meeting with Sistem Teknik to the commissioning of the furnaces ?

In fact, the acquaintance of Sistem Teknik and Norm Holding dates back to earlier than the meeting for furnaces. So, it was easy for us to meet. In all processes, the support of Ms. Gökçen who was our Project responsible, Mr. Andaç, Mr. Gökhan and the entire technical team was quite high. From time to time we had to check the same things over and over. They listened to us very patiently and helped us. They gave us continuous feedback with up-to-date information throughout the entire process. I think we tired of the whole team a little.

What do you think are the main advantages of Sistem Teknik Furnaces in use ?

Especially since it is a local company, service and support is the most important advantage. The heat treatment quality is indisputable. Its quality is quite high compared to its competitors.

Finally, can you tell our readers about your goals for 2023 ?

We have a growth target of 50% in the field of machining and mold manufacturing in 2023. We aim to increase our export activities that we have already started in the field of mold manufacturing and to clinch that we are the largest mold manufacturing factory in Europe in its field. We aim to add more customers to our portfolio by expanding our sliding head machines and CNC lathe areas in our existing track in the field of machining. As always, our goals as Norm Tooling are quite ambitious, but as a member of Norm Holding, it is quite normal.

Sadık Erdem Özdemir
Norm Tooling Production Manager

Let's Get to Know Sadık Erdem Özdemir

Production Manager Sadık Erdem Özdemir explains himself as follows: "Our paths crossed with Norm Tooling (Nedu) in 2018. I have been working as a Production Manager since 2021 in the company where I worked as a machining manager. I am responsible for production and maintenance processes. We work with enthusiasm with our team of 300 people in our company, which has 220 equipment."

"SİSTEM TEKNIK WAS ALWAYS WITH US"

Turkey's first and only Double Deck Isothermic Annealing Plant bears the signature of Sistem Teknik. The facility, which was built for Kaçmazlar Automotive company in Gebze and transferred to Konya, was equipped with the latest technology. We talked to the company's Heat Treatment Manager Taci Çetin about the successful cooperation and the achievements of Kaçmazlar Automotive company with the facility.

In our new issue, we hosted a successful company that has made a name for itself not only in our country but also around the world. We are talking about Kaçmazlar Automotive, one of the well-established companies of the automotive industry sector, which was established in Konya in 1987. Taci Çetin, Heat Treatment Manager of Kaçmazlar Automotive, which includes state-of-the-art machinery and experienced names in their team, was the person who sincerely answered our questions. We were very happy with Çetin's words about Turkey's first and only Double Deck Isothermic Annealing Plant, which we designed and produced for Kaçmazlar Automotive as Sistem Teknik. Stating that their work has become much easier with the facility, the experienced name said, "Of course, everything was not easy after the facility was established and started to work. Some nights we woke up, we continued without sleeping. We had occasional failures. But Sistem Teknik has always been behind his work and was with us in every problem." There is much more. We would like to thank him once again and share the details of our interview with you, our esteemed readers.

First of all, welcome. We would like to start our interview by listening to the importance of industrial furnaces in your production track and your story of meeting with Sistem Teknik.
Sure. Kaçmazlar Automotive Company mainly works on the production of transmission gears. These gears have precision. Heat treatment hardness and depth sensitivities are very important. It carries a serious risk of distortion. Kaçmazlar Automotive

established its own heat treatment facilities when the external heat treatment companies could not adequately meet these expectations. Later, the forging facility is also implemented. For some material types that harden a lot after forging, "Isothermic Annealing Facility" was required when "normalization" or "stress relief" annealing processes were not sufficient. Kaçmazlar Automotive had this furnace built by Sistem Teknik.

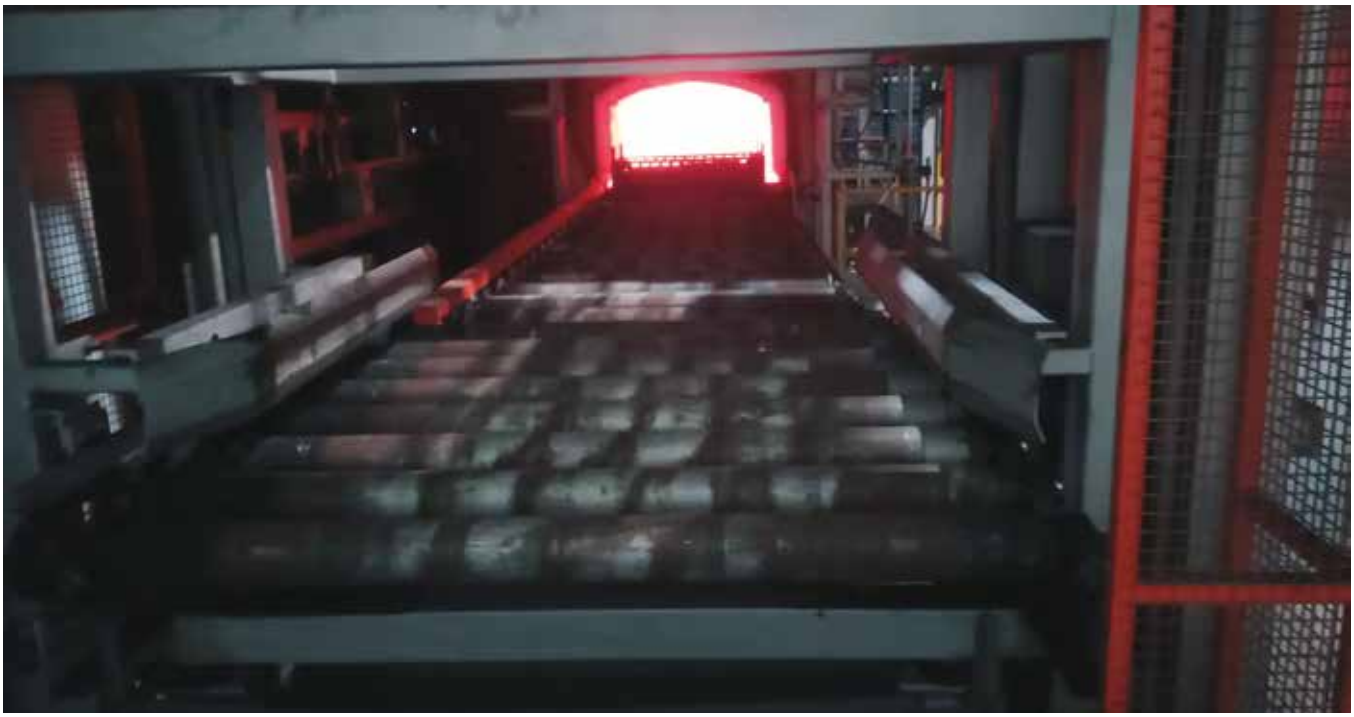
The first and only Double Deck Isotemic Annealing Plant in Turkey was designed, manufactured and commissioned by Sistem Teknik, specially for Kaçmazlar Automotive. If you were to make a general assessment from the beginning of the process, what would you say ?
Isothermic Annealing Plant was an important need for Kaçmazlar Automotive. It was decided to make the lower floor of this furnace as annealing and the upper floor as tempering furnace. During the process, domestic and foreign offers were evaluated. Finally, it was approved that to be manufactured by Sistem Teknik. The facility was built and operated in Gebze. Then it was brought to Konya and assembled.

What has changed with the Isothermal Annealing Facility that we have established in your production line ? In this context, we would like to hear the importance of the service you have received from Sistem Teknik in your processes.
The Isothermic Annealing Facility has made our job much easier. It provided a lot of convenience especially in machining. It provided savings in diamond and pocketknife consumption. Of course, everything was not easy after the Isothermic Annealing Plant was established and started to work. Some nights we continued to work without sleeping. We had occasional failures. But Sistem Teknik has always been behind his work and was with us in every problem. We learned by solving the problems we faced together. Now we can happily say that things are working out.

What are your thoughts on Sistem Teknik ?
Sistem Teknik is an experienced company in furnace manufacturing. They prefer the best in the materials they use. They always stand behind their work. At first we called every hour of the 24 hours and were always able to reach them. For example, they serviced the plane even for a single piece. They responded quickly to our problems. This was very important to us.

Finally, what would you like to share with our readers about your 2023 goals and plans ?
In fact, market demands determine our targets and plans for 2023. Türkiye is developing. Production is increasing. Demand continues to increase. This naturally leads you to new investments.

> Taci Çetin, Heat Treatment Manager of Kaçmazlar Gear Industry, is a graduate of Istanbul Technical University, Department of Metallurgical Engineering. "Sistem Teknik is an experienced company in furnace manufacturing. They always stand behind their work."



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SISTEM TEKNIK WIND BLOWN IN ANKIROS!

The 15th International Iron-Steel, Casting, Non-Ferrous Metallurgy Technologies, Machinery and Products Trade Fair, held for the 15th time at TÜYAP Fair and Congress Center on October 6-8, blew the System Technic wind in Ankiros.

Sistem Teknik, on the other hand, left its mark on the fair with the forums and panels it held with the participation of valuable speakers for 3 days at its own stand.

On the first day of the fair, with the explanation of Esra Bayır, one of the Engineers of Sistem Teknik Technology Development and Innovation Department, it was learned about “What is the Carbon Footprint? How to Measure?". The participation and the interest of the listeners in the forum, where everything that needs to be known about this topic, which has been very popular recently and which needs to be prepared for the future, is discussed, once again revealed the importance and seriousness of this issue for the future.
Secondly, Daniel Kortvelyessy, CEO of German Thermo-Control company, whose Turkish partner is Sarvion, shared the latest trends in "Temperature Measurement and Control Technology".
Finally, Murtaza Kılıç, who works as a Senior Customer Relations Manager and Sales Channel Regional Manager at Honeywell Thermal Solutions, the Turkey Distributor of Sistem Teknik Heating Engineering, talked about their work on "Combustion-with Hydrogen", the results of these studies and the technologies they developed. It is aimed that this technology, which provides zero carbon

emission, will play a role in establishing a cleaner future by reducing its carbon footprint.

On the second day of the fair, Geralf Beeg, Business Development Manager of the German burner and heating technologies manufacturer Noxmat, which is also in a representative relationship with Sarvion, took his place on the Industrial Furnace Technologies stage with his informative lecture on "Efficiency in Burner Technologies".
The last session of this day was held with a panel. In the panel moderated by Sistem Teknik Board Member Beste Özdeşlik; HKTM CEO Tunç Atıl, Sistem Teknik CEO Mehmet Özdeşlik and Dr. Lütfi Apillioğulları was hosted. In the panel where "Competitive Strategies in the Project Based Manufacturing Industries" were discussed, lean production and digitalization were especially emphasized.

On October 8, the last day of the fair, 2 more forums were held. The first of these was carried out by Prof. Dr. Ziya Söğüt, who works on Energy Efficiency in Industrial Furnaces, and the answer to the question of "how and in which ways energy efficiency can be achieved in the manufacturing industry" was sought.
The second and last forum of the fair was held by Prof. Dr. Ahmet Arif Ergin. There was a great interest in the session where experiences on "Microwave Technology in Industrial Furnaces" were shared, and the studies and results of the Microwave Drying Furnace, which was produced together with Sistem Teknik, were shared. Microwave Technology, which enables "Green Production" and provides many advantages compared to traditional methods, seems to become widespread in the industrial field in the future.

We once again express the importance of the sharing of all our esteemed speakers and thank them again for their participation through our magazine.

> The fair, which was aimed to be held in 2020, was postponed for 2 consecutive years due to the Covid-19 pandemic and was held in 2022. The fair, which also hosts the 21st International Metallurgy and Materials Congress and the 11th International Casting Congress, attracted great interest from both domestic and foreign countries.

OUR MODULAR DESIGNED LPG CYLINDER ANNEALING FURNACE HAS BEEN SHIPPED TO BANGLADESH!

The shipment of our 16-meter LPG Cylinder Annealing Furnace, which we designed and produced for our customer, who is one of the biggest players in the energy sector in the world, has been made.

LPG Cylinder Annealing Furnaces are used for post-weld stress relief and normalization processes. The process starts with the Cylinder Pushing System feeding the furnace with the material, from which the materials are pushed into the Loading Zone. Then the material, coming to the Preheating Zone, is heated up to a certain degree. From here, the material transported to the Hot Zone, reaches a temperature of 960˚C and is then transferred to the Warm Keeping Zone, where it is kept at a constant temperature of 960˚C. Before the start of the cooling process, the material transported to the Cooling Intermediate Zone that reaches the Direct Cooling Zone after passing this phase and is cooled down to 100˚C. The process ends when the material reaches the Outlet Conveyor. This process cycle is completed in 23 minutes in total.

So, what distinguishes this project from other LPG Cylinder Annealing Furnaces?

Being modular...

In recent years, when the importance and awareness of standardization in design has increased, one of the projects designed in this context at Sistem Teknik was realized with this furnace. After examining all previous projects and carrying out detailed engineering studies, the optimum values were determined and the Modular Structure was emerged for these furnaces.

The main objectives in the creation of the Modular Structure; standardization in design, use of waste-free products, and facilitation of loading, transportation and production. However, the benefits of this new Modular Design were not limited to these: cost advantage was achieved, consumption was reduced, rigidity was achieved, and the overall design of the furnace was improved.

Another standardization brought to life with this furnace, but not limited to this type of furnaces, was achieved in the Gas Line. With the modularized Gas Line design; reduction in labor time, ease of installation and transportation, and reduction in costs were achieved.

NEW COOPERATION BETWEEN BODYCOTE ISTAŞ AND SISTEM TEKNİK: VACUUM TEMPRERING FURNACE

As System Teknik Industrial Ovens, as a result of our cooperation with Bodycote İstaş, we produced the environmentally friendly, ergonomic and energy-saving Vacuum Tempr Oven.

In partnership between Istaş Heat Treatment Company, which has a customer network from more than 180 countries, continues its activities in Asia, Europe and America, and has an important place in the Turkish industry since 1979, and Bodycote, one of the leading brand in its sector in areas such as heat treatment, hot isostatic press and surface technologies, Bodycote Istaş was established. As Sistem Teknik Industrial Furnaces, we designed and produced Vacuum Tempering Furnace for Bodycote Istaş factory located in Bursa.

Our Vacuum Tempering Furnace, which was ready within 7 months after going through the simultaneously 3-month project design, 3.5-month manufacturing and 2-week quality control phases, is being prepared to set out in January to serve the heat treatment needs of Bodycote Istaş company with its energy-saving, environmentally friendly, compact and ergonomic structure.

We are confident that our furnace, which is manufactured with the finest detail and meticulous original design work, quality manufacturing phase and detailed quality controls, will show its difference in the heat treatment industry in a short time, and we are also pleased with this cooperation.

We would like to congratulate Bodycote Istaş company in advance and hope to continue our partnership in new projects.

AWARD, TO OUR PATENTED TECHNOLOGY FROM RDCONF!

Once again, we felt justified pride in the technologies we acquired as Syster echnical. This time, at the International Design, Research and Development Conference, our award-winning patented technology "Conveyor Tension System in Industrial Ovens" was awarded.

At the 2nd International Design, Research and Development Conference organized by OR Clever Science & Research Group in 2022, our patented technology named "Conveyor Tension System in Industrial Furnaces" was awarded the 2nd Best Project in the Machinery Production Sector.

We would like to thank Alper Keleşoğlu, our Technology Development and Innovation Manager, and all our colleagues who contributed to the project, once again through our magazine; We wish you continued success.

A NEW ADDED TO OUR DESIGN REGISTRATIONS: CURTAIN HOOD

Our Curtain Hood design, which we developed to ensure that the gas is directed directly to the chimney, has been registered by the Turkish Patent Office. As the Sistem Teknik family, we would like to thank all our friends who contributed to this process!

Although we are not aware of it, the issue of fire and fire safety is actually crucial and in a very important position in our daily life. Columns, beams, elevator doors, floor coverings, etc. materials used especially in the building and construction industry have to be tested and documented by laboratories in terms of fire safety and fire resistance. These testing and certification processes are carried out in Fire Test Furnaces, of which we are the manufacturer, by simulating an exact possible fire. During this "fire simulation", gas emissions can be experienced, just as in reality. Our Curtain Hood design, which we developed with the aim of minimizing the effects of this emission and canalizing the gas directly to the chimney, has been registered by the Turkish Patent Institute. As Sistem Teknik family, we would like to thank all our colleagues who contributed to this process and wish them continued success.

TO THE JOURNEY OF SİSTEM TEKNİK INSTITUTIONALIZATION CONTINUES WITH THE NEW BOARD OF DIRECTORS

We are happy to inform you, our esteemed readers, that two important names have joined our family as we take ~~firm and~~ firm steps towards our goals.

Sistem Teknik is advancing with firm steps towards the goals it has set globally on the way to institutionalization and added strength to its power by agreeing with two Independent Board Members for the purpose of diversity and specialization in the Board of Directors. The names included in the Board of Directors as Independent Members are Betül BİNGÖL, Fevzi Gandur Logistics Group CFO and Tuğrul FADILLIOĞLU, Arçelik Global Board Member. Apart from this, we have entered a new era by rearranging the distribution of duties of our Executive Board members working in the organization. While there is no change in the duties of Mehmet ÖZDEŞLİK, who maintains the CEO position, and Gökhan LALE, who continues the CCO position; Beste ÖZDEŞLİK was appointed as COO and Levent SINDEL was appointed as CTO.

We express our happiness for the participation of the respected Betül BİNGÖL and Tuğrul FADILLIOĞLU to the Sistem Teknik family, and we hope to leave behind many successful years together.

Betül BİNGÖL
Group CFO, Fevzi Gandur Logistics

Betül Bingöl, who completed her undergraduate education at METU Industrial Engineering and her graduate education at Boğaziçi Industrial Engineering, started her career in 1995 as a Budget and Finance Specialist at Aksa Akrilik Kimya, a subsidiary of Akkök Holding. She was appointed as Budget and Finance Manager in 1997. After working as the Financial Affairs Director at Aksa between 2003 and 2012, she was appointed as the CFO of DowAksa, a partnership of Aksa with Dow Chemical. In addition to her CFO role, she also managed Human Resources and Strategic Planning duties. Between 2015-2019, she took on the management of factory operations management, then carbon fiber commercial sales and infrastructure reinforcement & defense industry business units as the Deputy General Manager. While working at DowAksa, she gained significant experience especially in M&A and incentives. Between 2019-2022, she served as the CFO responsible for the Eurasia region and the Global Complete Elevator System Business Unit at the Istanbul-based affiliate of Germany-based Wittur Holding, one of the leading Tier 1 companies in the elevator industry. She has been working as Group CFO at Fevzi Gandur Logistics since February 2023. In the 2018/2019 period, she received the Coaching certificate from CTI. She had voluntarily mentoring and coaching experiences within the Akkök Group and afterwards.

Tuğrul FADILLIOĞLU
Board Member, Arçelik Global

Tuğrul Fadıllıoğlu graduated from Boğaziçi University, Department of Mechanical Engineering in 1982. Between 1982 and 2002, at Arçelik Inc., he served respectively as Product Development Engineer, Production Engineer, Mold Workshop Chief, Washing Machine Plant Technical Manager, Washing Machine Plant Quality Assurance Manager, Vacuum Cleaner Operations Manager of İzmir facility, Deputy General Manager for Small Home Appliances and the Founding Director of Çerkezköy Vacuum Cleaner and Motor Business. Then, he worked as the Assistant General Manager in charge of Operations and Technology at Tanı Marketing Services Inc. between 2002-2004, and then as the General Manager in the same company between 2004-2009. Appointed as the General Manager of Zer Inc. in 2009, Fadıllıoğlu continued this duty until he retired in 2014, and also served as a Member of the Board of Directors at Tanı Marketing Services Inc. Tuğrul Fadıllıoğlu was the Founding President of the İzmir Branch of the Turkish Quality Association between the years of 1995-2000, when he was in İzmir, and in 2000, which was his last year here, he assumed the duties of the Assembly Member of the Aegean Region Chamber of Industry. After his retirement, Fadıllıoğlu who served as the General Manager of Hidrotam LTD, Board Member of ISM Inc., affiliated to İnci Holding, General Coordinator of KalDer, Advisory Board Member of Doğa OSGB company and Founding Vice Chairman of CCA Institutional Change Academy Consultancy and Training Services in between 2015-2019, is currently Member of the Board of Directors of Arçelik Global.

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- Furnace energy and exergy balance detail calculations,
- Simulations made to ensure temperature homogeneity,
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INDUSTRIAL FURNACES

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CAPACITY INCREASE WITH INDIVIDUAL DRIVE IN ROLL BASED FURNACE FROM SARVION

Erdemir, that produces plate, hot and cold rolled sheet and tin, chrome and zinc coated sheet at international quality standards, continues to provide fundamental inputs to sectors such as automotive, white goods, pipe profiles, rolling, general manufacturing, electrical-electronics, machinery, energy, heating appliances, shipbuilding, defense and packaging.

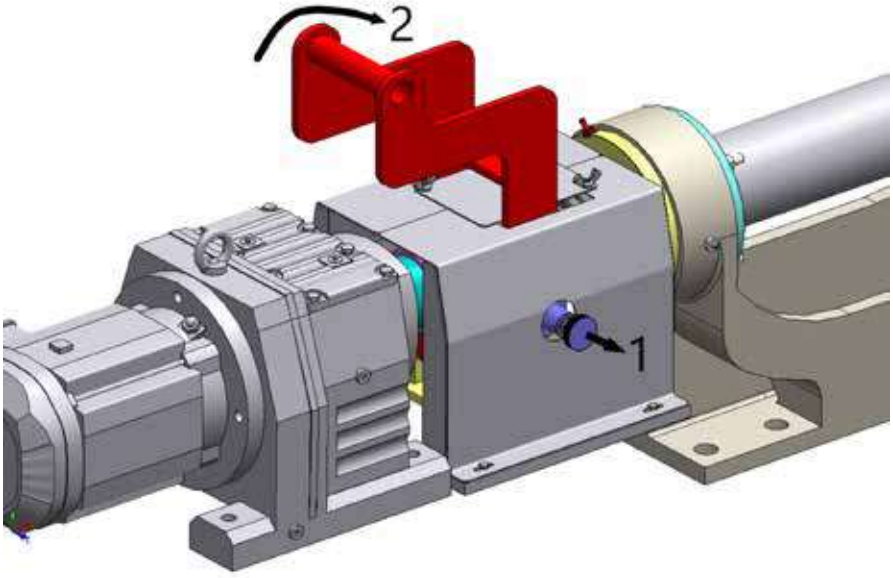
Great success in a short time

Creating value for the Turkish and world economy by producing quality domestic steel since 1965, Erdemir has made investments in order to meet the country's ever-increasing flat steel need, to pave the way for the industry, to increase the product and service diversity, the production and efficiency of high value-added products, and to constantly renew its technology. It increased its crude steel capacity, which was 0.5 million tons at its establishment, to 4 million tons, and its finished product capacity, which was 0.4 million tons, to over 5 million tons. Sarvion has completed many successful projects with Erdemir on furnace revisions over the years. As a good example, I would like to mention the revision of the in-furnace roller drive system of the existing Normalizing Furnace in the Plate Rolling Mill.

Energy savings achieved

In the current system, 38 rolls were driven by a single motor-reducer group and a single row chain. This situation causes breaks in the chain during production; it would come out of its place and stop the rotation of the rollers, causing the product to deform inside and cause serious damage to the furnace. Considering that in such a case, the intervention took a serious time, it would cause loss of production for the company. In order to prevent this situation, in the project realized with Sarvion, 36 rolls were driven by individual AC motors and an AC motor with a cardan shaft was added to the input and output rolls. For the motors to which each roller is connected, chassis with ease of positioning and conforming to the new ergonomics standard were produced in groups of 6. Taking into account the failures that may occur in the engines over time, coupling disconnecting levers specially designed for each engine drive system were manufactured in order to prevent the entire system from stopping in the event of a single or more than one engine failure. In this way, in the event of an engine failure, the coupling separating arms, which can be easily separated by a single person, were separated from the system and the engine was made to be included in the system again after maintenance/fault removal operations were carried out. This design pre-

vents disruptions in production and maintenance and enables us to achieve the target of significant energy savings and minimum disruption in production. For each group of 6, a braking resistor driver has been added to their motors. These six groups were selected in a jumping (for example, 1.5..) way. In this way, the entire system was prevented from stopping as a consequence of a failure in a drive, and energy savings and minimum loss in production were achieved.

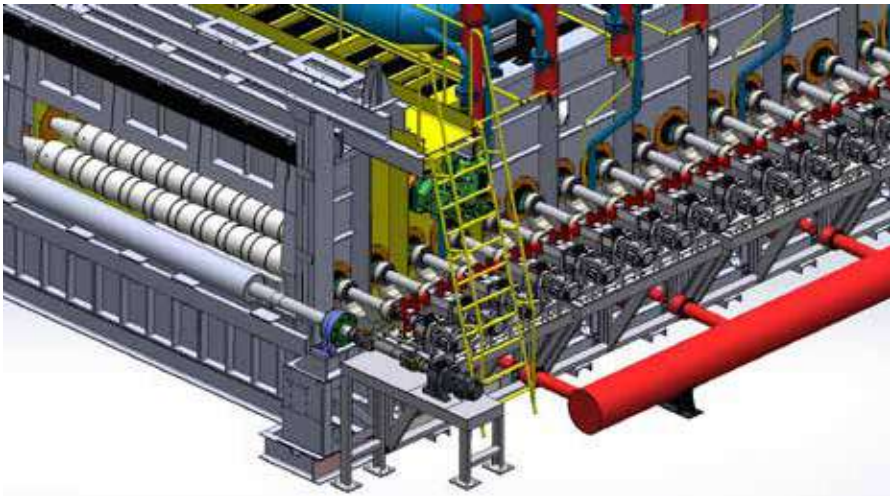


Special solutions developed

In the current system, during the operation of the kiln, the rollers sometimes damage the refractory and caps by leaning on the side wall, the rollers sometimes fall into the furnace, the rollers break and excessively curve, and it is difficult to lay ceramic fiber insulation between the trunnion furnace wall. A new roll design has been made to prevent all these problems. As we can see in the results of the analysis, breakages and cambers are prevented in the new design. The accuracy of our calculations and analyzes has also been confirmed in the performance tests. At Erdemir, revision means stopping production. If you cannot successfully complete and commission the works within the specified project period, it will cause loss of production and you may affect the operation of the entire facility. Being aware of this, we have done many scenario studies and developed special solutions to speed things up and stay on the safe side. Since the separation of the roles from the beds and motors during the field works that we have carried out the revision will cause a lot of work force and a serious loss of time, we have designed a system that is installed inside the furnace, which we call the role suspension system. Thanks to the system we designed, the platform that we would work on was easily taken into the furnace by running rollers inside the furnace. The plates were fixed in the furnace and the roller hangers were attached, and the rollers were lifted to be separated from the bed with the jack system, and maintenance was easily done. The role to be replaced was easily removed from a single cover in this way that we achieved our goal of minimizing maintenance times by ensuring that the beds are separated in a much shorter time than normal.

25% increase in production capacity

As a result of the performance tests (without any manual intervention), its operation was completed without any problems. During this period, single and multiple different charging trials in different plate sizes (not exceeding the reference sizes) were successfully completed. It was ensured that the new drive system works in full synchronization with the input table and the output table. A motor and driver operation is provided that can provide the required torque at low speeds during oscillation. The current propulsion and oscillation speed was reached in the minimum available time. It has been tested that the bearing temperatures do not exceed 70°C. After the new trunnion/roll design and mechanical drive system worked without any problems in the specified period, the final approval was received and the project was successfully completed for both Sarvion and Erdemir. Erdemir and Sarvion worked in great cooperation as a team in the field works, continuing the revision of the entire system for 24 hours as 2 teams, completing the revision in 11 days, which was planned to be 15 days, and production started. After the performance tests, it has been reported that the increase in the operating performance and production capacity of the system is approximately 25%.



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All the components you need in industrial oven control panels are in ELF Automation.

With 18 years of experience, expert staff and Omron partnership, all the products and solutions you are looking for in industrial furnace panels, from relays to power supplies, from temperature controllers to energy monitoring devices, from time relays to measurement and monitoring relays, are at ELF Automation.

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SSR Solutions

In addition to Omron's rail type and panel type SSR models, solutions can be offered to your needs from 100mA to 150 Amps with 1 and 3 phase input options.

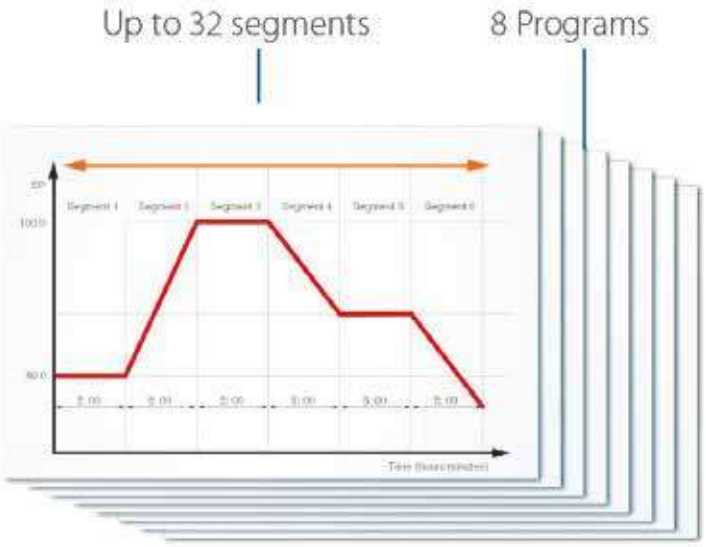
- Models without zero cross feature
- Improved shock wave dielectric strength for output circuits
- Finger-proof terminal cover
- Models with both Push-in Plus and screw input terminals
- RoHS compliance

Temperature Controllers

The new generation E5_C process and temperature controller sets a new standard in terms of precision and user-friendly design.
E5_C-T Ramp/Soak temperature controllers extend the E5_C family to realize process applications. Able to manage up to 6 event inputs and 4 auxiliary outputs in a compact 60mm deep enclosure, this controller series is among Omron's most powerful and versatile temperature controllers.

With its patented algorithm and easy use, it offers solutions to all your needs, including packaging machines.

- Fast and precise editing: 50 ms input sampling cycle
- Eliminates the need for PLC by providing usability with time relay and logic operation functions
- With the CX-Thermo software, 8 programs can be installed with 32 segments, up to 256 program segments in total.
- Users can easily and directly switch to the designated segment thanks to "Segment Jump". Thus, the programming time is reduced and the throughput increases.



FOR ENGINEERING SOLUTIONS AND BOUTIQUE PRODUCTION PREFER **BAYKAL REZISTANS**

Industrial Heating Elements Most Preferred Producer of Turkey

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. Finally, the company Baykal Rezistans, with his excellent customer service understanding, will continue to serve his good quality products in next years, to his customers from all over the World.

*Industrial Furnace Heater

Industrial Furnace Heating Elements are heat treatment systems that enable the internal environments of the furnaces to reach the desired temperature values. are the types of heaters used in the oven. Oven interior use at the same time in different types and usage sizes Production is carried out in the quality of Baykal Rezistans, according to the temperatures.

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

A wide range of customer needs in all your processes that require heat treatment from the best manufactured products that you will prefer as a welcome tool.
You can use it as one of these types of customers together with its expert personnel. You can work with Baykal Rezistans, our team that offers expert solutions in terms of experience. A strong infrastructure and With its 100% solution-oriented approach, you can always manufacture industrial furnaces and equipment. Take advantage of the right furnace heater types in your processes. A heat treatment furnace, also known as a high-temperature heater Today, the heaters are up to 1400 degrees Celsius with a special ceramic material and high degree structure. It is produced by being manufactured from resistance wire together. Today, according to the types of furnaces, suitable for the desired projects As Baykal Rezistans, we provide the production in the dimensions you want. Anything you want at the special production point you can reach anytime, you can also stay in touch for information and support.

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1970

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Special Design

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They are specially developed electrical heater used in high temperature oven applications in ali branches of heavy industry.

OUR EXPERIENCE

- Cast-in Heaters
- Furnace Heaters
- Finned Heaters
- Tubular Heaters
- Explosion Proof Heaters
- Quartz Tube Heaters

ENGINEERING SOLUTION IN ELECTRICAL HEATING ELEMENTS

Finned Heaters

Cast-In Heaters

Tubular Heaters

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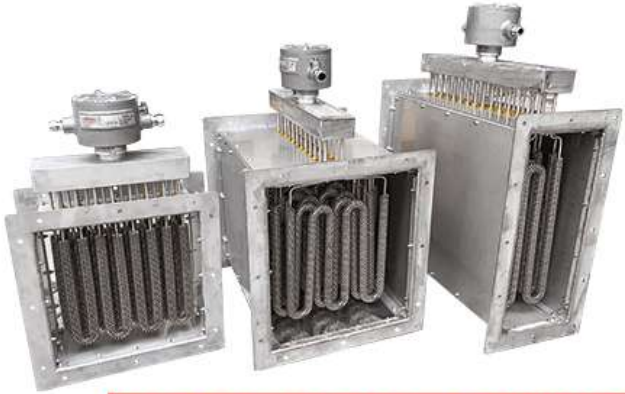
INDUSTRIAL HEATERS

50 YEARS OF EXPERIENCE

BAYKAL REZISTANS CONTINUES TO GROW WITH MORE THAN 10.000 CUSTOMERS



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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 his excellent customer service understanding, will continue to serve his good quality products in next years, to his customers from all over the World.

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.
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IN ELECTRICAL HEATING

50 Years Of Experiance
In All Industrial
In Electrical Heating Projects

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- *Finned Heaters*
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- *Explosion Proof Heaters*

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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.

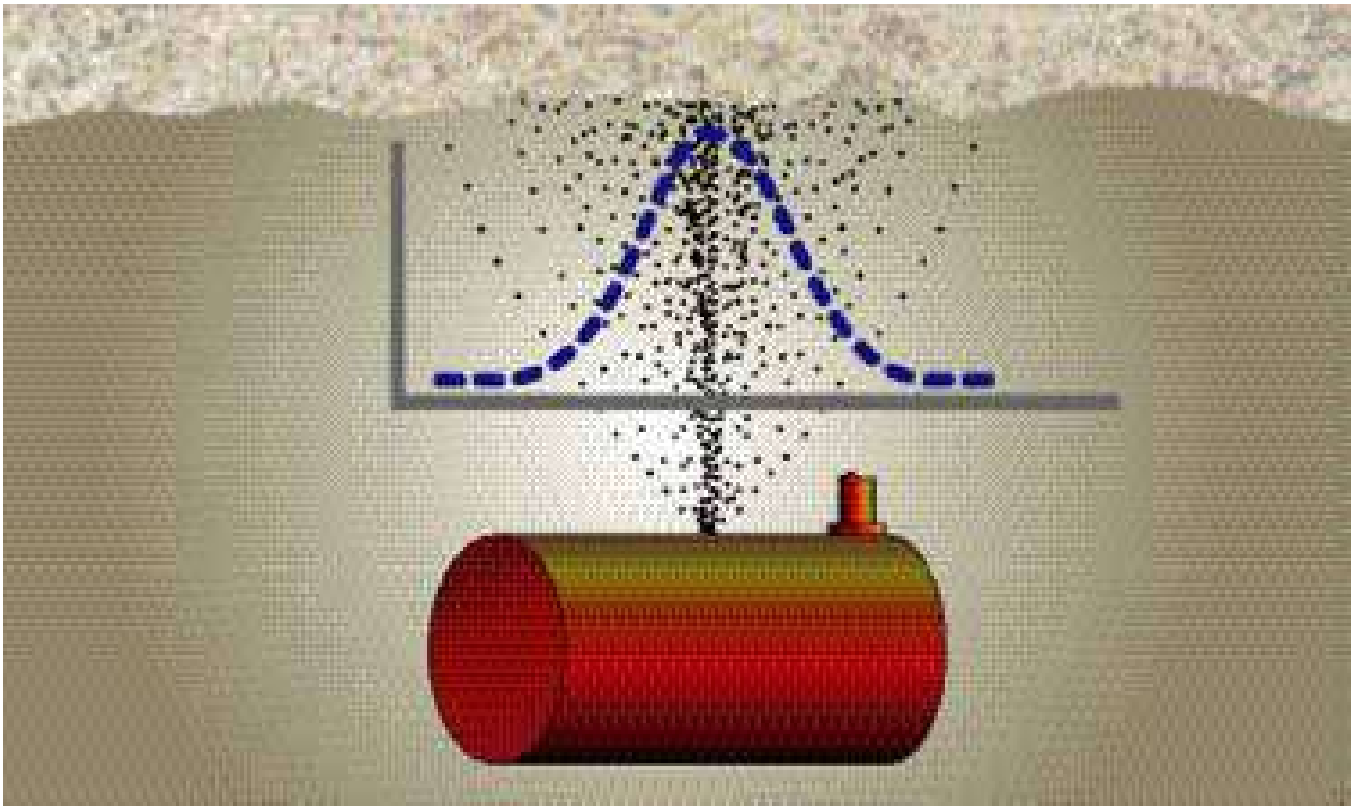
• Easily permeates earth and asphalt.

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.

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