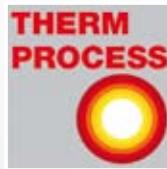




OTTO JUNKER News^v

Volume 19 | June 2011



Our presence at the
Düsseldorf trade fair



www.otto-junker.de

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Dear Reader!

The eyes of all experts and professionals in our field are currently fixed expectantly on Düsseldorf where our industry's key trade fairs, GIFA/THERMPROCESS/METEC/NEWCAST, are due to take place in late June 2011. Needless to say that we, too, are deep in preparations for this event. At our 300 sq.m. stand in Hall 10, we shall be presenting interesting exhibits and will give you a taste of innovations and recent developments achieved by OTTO JUNKER, all in the aim of showcasing our company's capabilities and performance.

Satisfying our customers and supplying cost-efficient, reliable plant and equipment are the cornerstones of our work. Optimizing the energy efficiency of industrial furnaces and hence, achieving a further reduction in their environmental impact, are key target criteria.

With this in mind, we are looking forward to the sharing of technical information and the personal discussions with customers and visitors and we are sure that these exchanges will inspire significant new input for our work.

In an effort to tune you in on this upcoming event, we have put together some select information on our trade show highlights on the following pages. Furthermore, we would like to inform you of some major investments made at OTTO

JUNKER GmbH's headquarters site in Lammersdorf. Our aim is to effectively underscore our basic strategy, i.e., to keep on strengthening and expanding operations at the company's main production plant. With the modernization of one of our

largest shop buildings, the provision of modern assembly stations and the installation of a new sintering facility for furnaces used in low-pressure casting applications, we have created optimum conditions in Lammersdorf for the fabrication and assembly of INDUGA systems.



Striving to meet environmental protection and occupational safety and health requirements for the benefit of our employees, we have installed a sophisticated ventilation system in our high-grade steel foundry. Our mechanical machining capabilities are being continuously expanded with the installation of another 5-axis milling and boring centre.

In presenting you with this latest issue of OTTO JUNKER News, I trust that you find it interesting reading and would be glad to welcome you at our trade fair stand in Düsseldorf.

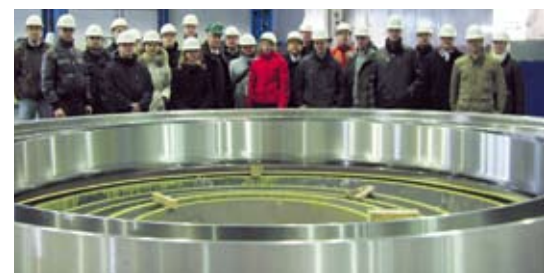
Yours sincerely,

Dr. Hans Rinnhofer, Chairman of the Board of OTTO JUNKER GmbH

Foundry seminar for graduate and doctorate students

The third inter-university seminar on foundry technology for graduate and doctorate students took place in Aachen on December 1 – 2, 2010. The aim of the event was to provide a contact platform for young foundry engineers and to promote an exchange of technical expertise between them. The seminar was conducted under the joint auspices of the Aachen-based Foundry Institute, OTTO JUNKER GmbH and MAGMA Gießereitechnik GmbH. It was attended by 30 participants from various German university institutes. The programme started out at OTTO JUNKER headquarters site with a series of lectures describing our company's history and the special relationship between the Technical

University of Aachen and the OTTO JUNKER Foundation. This part was followed by a presentation and discussion of new developments in induction furnace technology, and of select options and challenges in casting high-alloy steels. The visit ended with an interesting tour of the steel foundry and of our induction furnace assembly workshops. The next morning, the seminar continued at the Technical University of Aachen with papers and lectures addressing various foundry-related issues.



Inauguration ceremony marks the launch of a new sintering plant for melting furnaces

OTTO JUNKER GmbH
Innovation

In the context of several new investments made at its Lammersdorf headquarters site, OTTO JUNKER and INDUGA is celebrating on 18.02.2011 the start-up of a new sintering plant for electric melting furnaces.

The new facility is housed in a recently modernized and thermally insulated shop reactivated to accommodate the operations of INDUGA GmbH & Co. KG, the subsidiary company relocated to Lammersdorf in 2010 as part of a strategic consolidation drive.

The plant is dedicated mainly to the rebuild of furnaces successfully marketed around the globe for the manufacture of household faucetry by low-pressure die casting.

In this segment, INDUGA and OTTO JUNKER offer a full furnace support service to their customers.

A furnace with a worn refractory lining can be returned in exchange for a prepared, relined and sintered unit available from stock. The faucet maker is thus relieved of the need to worry about furnace repairs and can focus on his core business instead.

Renowned faucet manufacturers such as Grohe AG, hansgrohe, Hansa, KWC, Roca, Oras, Toto and American Standard are using this service on a regular basis.

OTTO JUNKER is a global market leader in induction furnace technology.



Commissioning of the new sintering and heat-up system

Through its INDUGA subsidiary, the company caters mainly to the needs of the nonferrous metals industry, such as copper and brass foundries.

Monika Mertgens (+49 2473 601 525)

OTTO JUNKER Awards 2010 prizegiving ceremony

Prizes of € 2,500 for outstanding diploma degree theses.

In 2010, OTTO JUNKER awards were conferred for the 18th time. The distinctions are intended to honour students of the Technical University of Aachen (RWTH) for outstanding academic achievements at the Faculty of Geo Resources and Materials Technology – Metallurgy and Materials Engineering Group – and at the Faculty of Electrical Engineering & Information Technology. This year, the € 2,500 prizes went to Philipp Masmeier, Dipl.-Ing., Marius Rainer Oligschläger, Dipl.-Ing., and Christian Wuppermann, Dipl.-Ing.

Since the start of its sponsorship programme in the mid-80s, the Foundation has made available more than € 15 million to the University of Aachen for over

100 research projects. Consistent with its charter mandate, the Foundation has also done much to promote the work and careers of young scientists.

Every year, an average € 10,000 are spent on scholarships. The OTTO JUNKER foundation thus ranks among RWTH's leading sponsors today.



From left to right: Attorney-at-law Werner Stegemann, president of Foundations board of trustees; University Prof. Wolfgang Bleck; Dipl.-Ing. Philipp Masmeier; University Prof. Dr. Ing. Ernst Schmachtenberg, Rector of the Technical University of Aachen; Dipl.-Ing. Marius Werner Oligschläger; Dr. Hans Rinnhofer, Managing Director of OTTO JUNKER, Dipl.-Ing. Christian Wuppermann

OTTO JUNKER and its subsidiary, INDUGA, will be showcasing the following key exhibits and innovations from their extensive range of furnaces:

High-power medium-frequency coreless induction furnace with a capacity of 10 tonnes and a power rating of 8,000 kW

Designed for use in a DUOMELT plant, this unit will be shipped to a renowned Chinese foundry. It delivers an output of 15 tonnes gray iron/h at a melting temperature of 1,550°C.

The furnace on exhibit supports a multi-frequency operating regime – switching the frequency from 250 to 125 Hz to promote intense stirring down of alloying elements and carburizing agents.

In order to facilitate slag skimming while also reducing operator fatigue, the furnace can be steplessly tilted backwards by up to 20°.

The system features an extraction hood of innovative design, successfully optimized on the basis of practical experience gained with prior technology. The new hood is characterized by its lower height and improved, reliable protection of the hydraulic components.

Low-pressure die casting line for brass

The entire system consists of a 90 kW induction melting and pouring furnace, die manipulator unit, blackwash bath, electronic control system and operator control desk.

Intended for a Chinese customer, the installation is designed for a cycle time of 45 seconds and permits an automatic production of approx. 500 brass castings in one shift. The complex system covers all operating steps, from fitting the die to removal of the casting with subsequent die cleaning and re-coating. The die is advanced to the individual stations by a manipulator fitted on a linear motion gantry.

This low-pressure casting process ensures a smooth, low-turbulence die filling operation as the melt is forced into the die from below with a controlled pressure increase.

Presentation of an innovative magnesium melting process

State-of-the-art magnesium melting and pouring technology typically relies on protecting the melt from undesirable chemical reactions by means of climate-relevant and/or corrosive gases.

To reduce the use of such gases in magnesium melting and pouring applications, a new process principle has been developed and tested successfully on a laboratory scale. Especially in a quasi-continuous operating mode, the new process has been found to yield advantages.

In cooperation with the Foundry Institute of the Technical University of Aachen (RWTH) and the Kahn engineering firm based in Ehringshausen/Germany, the new process was then researched and analysed on a scaled-up prototype installation in a series of systematic basic technology validation and screening trials. The aim now is to progress this innovative melting furnace design from its laboratory scale to volume production viability.

At the present project state, an operational-scale system is being designed and



JUNKER powerful coreless induction furnace



Hall 10, E20

OTTO JUNKER GmbH

Technology



INDUGA-KWC-Low-pressure die casting line

built for use in a leading German automotive manufacturer's magnesium die casting plant.

Developments aimed at reducing coil losses and providing improved crucible monitoring

Reducing ohmic coil losses is the decisive step towards achieving further energy efficiency improvements in inductive melting.

The solution approach is aimed at reducing the current density and hence, ohmic losses, by enlarging the current-carrying surface area. Ideally, the current density should be distributed as homogeneously as possible throughout the coil. Simple though this may sound, implementation of this principle is difficult to achieve since the current will not distribute evenly over the entire cross-section.

A special coil design has now been developed which results in a wider current distribution.

Industrial applications of this new coil design have clearly confirmed the savings computed in theory. Based on these results, work is now ongoing to further refine and optimize this innovative coil design.

Another example of a successful development for widespread industrial use is the OCP crucible monitoring technology. The **OCP (Optical Coil Protection)** system constitutes a latest-generation temperature measuring and monitoring system which relies on the use of fibre-optical sensors. Such sensors are particularly well suited for interference-free monitoring of induction melting furnaces as they provide direct and independent temperature field data.

A sensor cable embedded in the permanent lining of the furnace provides full-area measurement of the temperature field across the inside of the coil. Unlike earth leakage monitoring devices, this technology allows a very accurate selective localization of potential crucible defects.

Demonstration of a new overhead single-billet heater

The basic principle of this innovative gas-fired billet heater lies in the fact that the billets are raised individually into the hot overhead furnace chamber from below, using a charging car with a lifting device, and then heated to the requisite temperature inside the furnace.

While the billet is being heated, the charging car proceeds to load other overhead furnaces which are designed as modular units.

Key benefits of this new concept include:

- short heat-up cycles
- high flexibility for temperature changes
- low gas consumption due to the use of recuperative burners
- low power consumption due to elimination of recirculation fans
- low scaling of copper billets due to low oxygen levels in the closed furnace chamber
- no surface marks and no sticking together of billets
- low maintenance cost

Moreover, the use of pre-assembled units shortens the installation and start-up time.

At our trade fair stand the operation of this system will be illustrated in a computer simulation.



JUNKER single-billet heater for Copper

Test bed for recirculation fans

In all heat treatment furnaces relying on an energy transfer to the charge by forced convection, proper dimensioning of the recirculation fans is key to optimizing this heat transfer.

At the same time, the need to minimize electrical power needs is more acute than ever today.

Optimum results can only be attained by testing the recirculating fan and atmosphere flow ducting together. Otto Junker's design experts, in cooperation with renowned fan manufacturers, address this need by conducting the necessary test series for a large number of applications in the company's own technology centre.

The test rig presents a true-to-scale model of a fuel-fired heat treatment furnace, comprising the recirculation fan, the flow guide ducts with built-in baffles, and the nozzle system. Characteristic performance curves can be determined by restricting the flow on the suction and/or delivery sides. Moreover, pressure sensors are provided to obtain reliable flow distribution data. It can thus be ensured that, apart from the electric power consumption, fuel demand will be reduced by optimizing the characteristic forced convective heat transfer on both the heating system and the charge.

Projects aimed at optimizing the atmosphere flow management in fuel-fired or electric heat-treatment furnaces

For close to 10 years, OTTO JUNKER GmbH has been cooperating successfully with the Technical University of Aachen's Institute of Industrial Furnace Engineering (IOB). One speciality of IOB lies in its use of computer-assisted calculation methods. Exhibits will include a number of simulations performed with the aid of CFD (computational fluid dynamics) and FSI (fluid-structure interaction) programmes.

While a CFD simulation provides insights into fluid flow conditions as resolved in space and time, coupling it with FSI simulation will yield information on the mechanical-thermal load exposure of components. Both methods are beneficial when a process can no longer be correctly mapped with the engineer's conventional calculating toolkit.

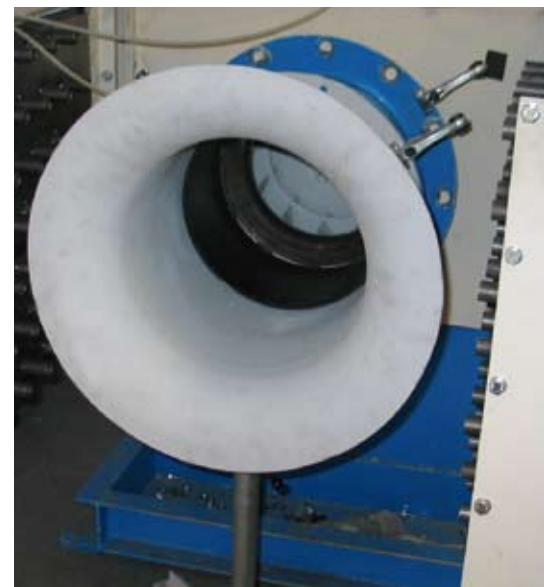
It thus becomes possible, on the one hand, to make exact statements on the temperature distribution in the fluid and in the charge. On the other, the influence of diverse boundary conditions can be described fairly easily. Equipment planning and engineering times and costs can be significantly reduced in this way

when compared, e.g., to those associated with an experimental investigation.

The latter method is used in the OTTO JUNKER technology centre in exceptional cases for the purpose of verifying theoretical predictions and of further refining the computer models.

The special benefit of FSI, as a fairly recent simulation discipline, lies in its ability to provide assessments of the thermal load situation for the first time so that parts can be designed with the appropriate withstand capability.

The usefulness of the joint projects pursued to date is confirmed by the fact that they have yielded a number of equipment designs which define the "state of the art" today. Cases in point are the energy-efficient flow management and heating systems now employed in the heat treatment of aluminium semi-finished products and in high-temperature copper strip processing.



Fan testing rig

New current orders

High-power melting system, including a new pouring furnace, for a leading German technology group

This DUOMELT coreless induction furnace system comprises two 12-tonne furnaces powered via a 10,000 kW frequency converter. The 12-pulse converter is designed to operate at a frequency of 250 Hz and enables the system to deliver up to 20.2 tonnes of molten cast iron per hour. Also included in the scope of this complete melting installation are a filter to minimize mains pollution as well as two charging chutes.

The pouring furnace has a capacity of 10 tonnes and is equipped with a 350 kW inductor. Laser systems control the bath level in the pouring spout and the automatic transverse and longitudinal positioning operation to ensure an accurate pouring of metal into the individual mould boxes.

Installations for the Polish foundry industry

One of these contracts involves the supply of a 12-tonne Monomelt furnace system for melting cast iron. A 24-pulse converter rated at 4,500 kW ensures a metal throughput of 9.3 tonnes/h. The furnace will feature a stepless back-tilting device with a 30-degree maximum tilt angle. The extensive software package for the JOKS melt processor includes full interfacing with the charge make-up system and with the spectrometer.

Another system to be shipped to a Polish customer is of the DuoControl type, comprising two 4-tonne furnaces and an IGBT frequency converter with an output rating of 2,400 kW.

Control and monitoring of the entire melting process will be ensured by a M2F TouchControl system. This furnace in-

stallation is designed to yield a melting rate of 4.7 tonnes/h.

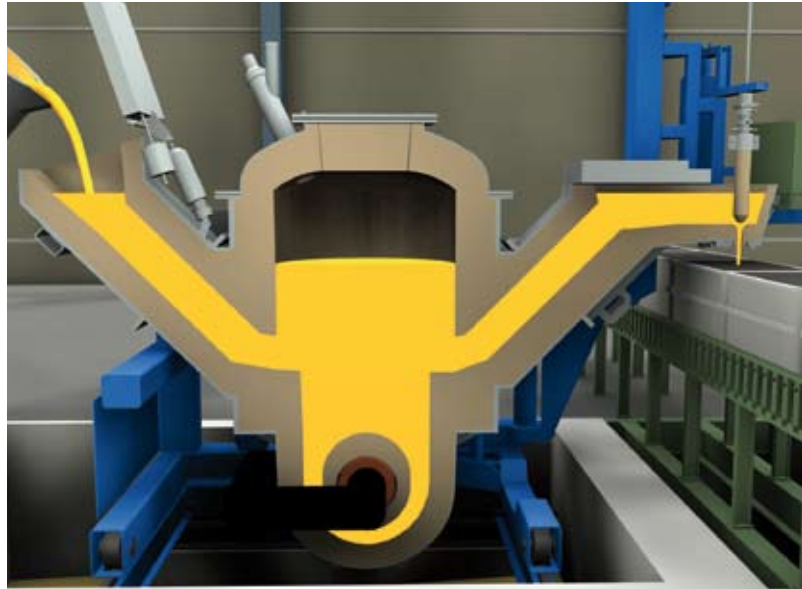
Cast iron and steel melting furnace for an Ukrainian customer

The contract specification calls for the supply of a 500-kg furnace, plus an IGBT-type frequency converter rated at 350 kW. Designed for operation with a nominal frequency of 250 Hz, the system will deliver 550 kg of molten metal per hour at a tapping temperature of 1,500 °C. Melt processor functions will be provided by an advanced M2F TouchControl system.

Holding furnace system for a French foundry

This customer intends to improve the iron supply to their moulding machine by installing a suitable holding furnace. Following extensive technical discussions, a coreless furnace was selected to ensure flexibility in superheating and holding the molten metal. The base iron is melted in an existing medium-frequency furnace system and transferred to the new holding unit.

The selected holding furnace has a capacity of 15 tonnes and is powered via a 1,000 kW converter system. This is enough to raise the temperature of 20 tonnes of molten metal by 100 °C every hour. Again, the frequency converter system embodies advanced IGBT technology. Thanks to the efficient furnace design, a low energy consumption of only 275 kWh/h can be guaranteed



Pouring furnace for grey iron

for holding the entire furnace contents at the specified temperature. An evaporative cooling tower and a Siemens compact-type controller are likewise included in our contract scope.

Steel melting system for Thailand

Following our earlier successful supply of a 6-tonne medium-frequency furnace, a customer from Thailand ordered another furnace system early this year. The new equipment is intended for melting steel alloys for abrasion and wear-resistant castings. It consists of one 6-tonne and one 12-tonne furnace, both powered via a single converter. The converter system embodies DuoControl technology; it is rated for 5,500 kW and operates at a frequency of 500 Hz.

At a tapping temperature of 1,550 °C, the system will deliver a throughput of 9 tonnes/hour. Due to the different furnace sizes, each unit is to be equipped with its own hydraulic powerpack.

Equipment Technology

Cast iron & steel

A Brazilian customer extends his melting operation

Supplementing an earlier investment, a customer from Brazil has now ordered a complete melting installation consisting of a 12-tonne furnace and an advanced 24-pulse frequency converter system. The system has a power rating of 9,000 kW and runs at a frequency of 250 Hz. It supplies 18.3 tonnes of molten metal per hour.

The contract is to be performed in close collaboration with Servtherm Ltda., our

cooperation and distribution partner for melting equipment in Brazil.

Servtherm will be responsible for manufacturing and making available key assemblies and component units locally.

Dietmar Trauzeddel (+49 2473 601 342)

IGBT module of a frequency converter system



Powerful OTTO JUNKER coreless induction furnace at GIFA special show focussing on energy efficiency

The special show of the Institut für Gießereitechnik (Institute of Foundry Engineering) in hall 13 takes the example of a high-power melting furnace with advanced process control by OTTO JUNKER GmbH

to highlight the potentials of energy savings in induction melting.

The furnace on show has a capacity of 10 tonnes and a nominal power rating of 8,000 kW. The system features a multi-

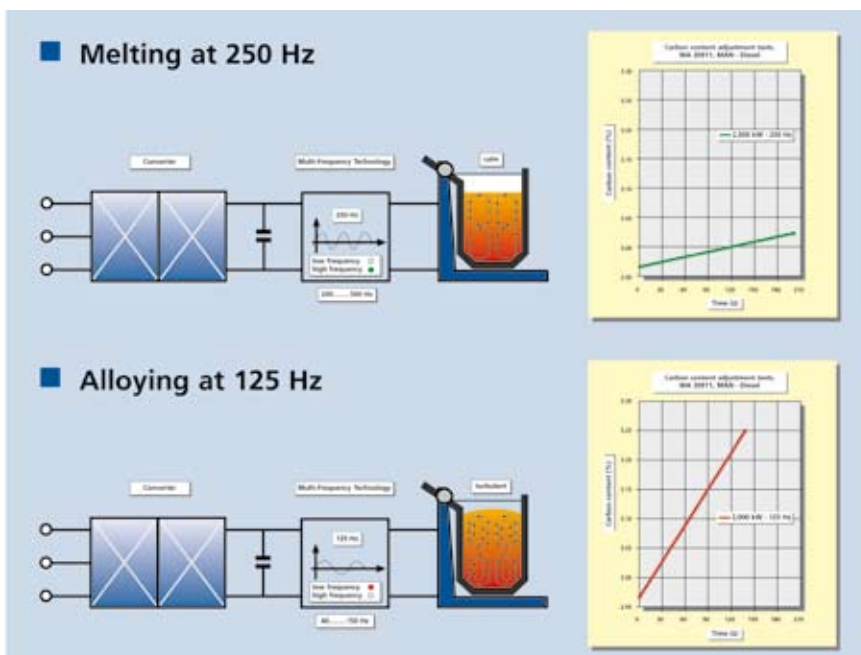
frequency operating regime – switching the frequency from 250 to 125 Hz to promote intense stirring down of alloying elements and carburizing agents.

Since the early days of industrial use of induction furnaces for melting metals in the 1950s, the energy consumption could be reduced and melting rates increased substantially thanks to technical progress and innovation.

For the melting of grey cast iron the energy consumption dropped by about 25 % and melting rate increased to as much as 485 %.

And this development is going on: Optimized induction coils set the overall efficiency target at approx. 85 %.

Dietmar Trauzeddel (+49 2473 601 342)



Operating principle of multi-frequency system

New pusher furnace system for EGYPTALUM

Following its successful acceptance by the customer and the launch of production in November 2010, a pusher furnace for aluminium slabs has proven itself in service at the site of EGYPTALUM in Egypt. While OTTO JUNKER pusher furnaces are normally gas-fired all over the world, a technical innovation and challenge of this contract lay in building a system with fuel oil heating.

EGYPTALUM is situated 100 km north of Luxor and was founded in 1972 in the aim of utilizing cheap electric power from the Aswan High Dam hydro power station for industrial aluminium production. Today, the aluminium plant located near the town of Nag Hammadi comprises a smelter, a foundry, a rolling mill and an anode rodding shop. An entire town, complete with infrastructure, social services and sports facilities, was built for the site's personnel. Since the two existing pusher furnaces,

now 30 years old, had ceased to meet the customer's demands regarding throughput and product quality, EGYPTALUM opted for a new OTTO JUNKER pusher furnace system.

One major challenge, apart from the logistics, lay in installing the furnace system (which had been disassembled into its component parts for shipment) at the customer's site in ambient temperatures exceeding 40 °C. The two OTTO JUNKER supervisors, Z. Koren and H. Nievalstein, had to use patience and rely on their improvising skills.



Acceptance team at Nag Hammadi

The new furnace can process 20 aluminium ingots weighing up to 20 tonnes each, whether in reheating or homogenizing mode, i.e., at 530 °C or 610 °C.

Georg Born (+49 2473 601 186)

More JUNKER chamber furnaces ordered by long-standing customers

Purchase orders for additional chamber furnaces intended to supplement and expand existing facilities were awarded to OTTO JUNKER by an Austrian and a Greek customer.

The chamber furnace system for the Austrian company is intended to carry out heat treatment of coiled strip, rings and sheet metal cuttings, as well as reheating of slabs prior to hot rolling. Consistent with these specifications, an indirectly gas-fired furnace was selected which provides annealing either in a protective gas atmosphere or in air. The unit is rated for a throughput of up to 3.5 tonnes/hour with a maximum batch weight of 44 tonnes. In order to ensure homogeneous heating of the

metal, the proven tubular nozzle heating system is employed. The system will feature both recooling and preheating of the protective atmosphere, with waste heat being recovered to boost the energy efficiency.

A mathematical model with online and offline capabilities provides an accurate determination and management of process parameters while helping to control and monitor the entire furnace system.

The equipment ordered by our Greek customer is intended exclusively for heat treating coiled strip in a protective gas atmosphere. However, the strip material consists of diverse aluminium alloys and varies in thickness between 0.2 and 12.7 mm in this application.

This indirectly gas-fired furnace is rated for a maximum product temperature of 580 °C and can accommodate 3 to 4 coils at a time. The specified maximum batch weight is 90 tonnes. The system provides a throughput of 4.4 tonnes/hour at a product temperature of 345 °C.

Low energy consumption is ensured by the use of auto-recuperative burners and the recovery of waste heat for preheating the protective gas supply.

This new chamber-type annealing furnace is likewise equipped with a protective gas preheating system utilizing the waste heat of the furnace.

Bernd Deimann (+49 2473 601 241)

Strip processing line for OCM KIROV (Russian) customer – successful start-up of the certified system

On January 21, 2011, a strip processing line supplied by OTTO JUNKER was officially commissioned in the presence of political officials and business representatives at the OCM Kirov Non-ferrous Metal Processing Plant. OCM is a subsidiary of the UGMK Group, an organization with activities spanning all of Russia. OTTO JUNKER is the first manufacturer worldwide to receive certification as a provider of copper, bronze and brass alloy strip annealing lines for the Russian market. This distinction underscores OTTO JUNKER's position as a leading supplier of heat treatment lines for copper and copper alloy strip.

The strip heat-treatment system supplied by OTTO JUNKER had been ordered for the OCM Kirov Non-ferrous Metal Processing Plant, a facility situated some 900 km east of Moscow. This customer can now process copper alloy strip down to a minimum gauge of 0.05 mm, which is roughly equivalent to the thickness of a human hair. For the heat treatment of high-performance copper alloys, the fur-

nace is capable of operating under protective atmosphere and at temperatures up to 850 °C.

The system comprises two decoilers, one recoiler, a strip flotation furnace and the associated de-greasing, pickling and finishing equipment. It also includes strip accumulators embodying a new design approach to improve the control of the strip tension, especially with very thin strip. Here the customer benefits from the fact that all system components are developed and designed by OTTO JUNKER. The user can thus be sure to receive a tailor-made technical solution aligned with his specific production needs.

The material produced at OCM is used in automotive radiator / heat exchanger manufacturing, among other applications. Thanks to the technology provided by OTTO JUNKER, the company is able to meet the increased standards of the local Russian market while also staying abreast of requirements in the competitive international automotive supplier industry. After a brief ramp-up phase, the

system now runs in 3-shift production operation.

The strip processing line was the fourth and last step in a 30 million Euro investment project comprising, furthermore, a new foundry, a rolling mill and a shear line. All equipment was sourced from German manufacturers.

One major challenge in performing this contract lay in completing the GOST-R and ROSTECHNADZOR certifications which are necessary prerequisite for operation in the Russian market. Without these certifications, technical plant and equipment cannot be exported to Russia. The certificate confirms that the systems supplied meet Russian quality demands and standards, and that the equipment is officially approved to be taken into service in Russia.

OTTO JUNKER thus became the first manufacturer of strip heat-treatment systems worldwide to receive the Russian certification for both gas-fired and electrically heated strip processing lines.

Georg Born (+49 2473 601 186)



Strip processing line in the Kirov plant

Major investments in the foundry in Lammersdorf on the point of completion

High grade steel foundry
Production

New workshop ventilation system with integrated heat recovery plus expansion of mechanical machining capabilities

As reported in our last News issue, a major investment programme was launched last year with a view to meeting environmental protection and labour safety targets while improving the company's production flexibility and efficiency at the same time.

This extensive investment package essentially comprised the installation of a new workshop ventilation system with heat recovery and an outdoor exhaust stack, and a range of measures aimed at restoring and modernizing our workshop roofs and the building front.

The new ventilation system will not only supply shop operators with fresh and heated ambient air from outdoors while extracting and filtering spent air from the building. A further priority objective was its heat recovery capability – more than 85 % of the thermal energy contained in the exhaust airflow will be recovered via rotary heat exchangers.

Meanwhile, the 36-m-high stainless steel outdoor stack and the heat recovery system is installed. The assembly of the new ventilation system in Shop 1 is shot down, so that in May could be the start. Similarly, the completion of installation work for Shop 3 has been firmly scheduled so that the new ventilation system will be up and running this summer. For years we have been investing in the expansion of our mechanical machining operations in order to strengthen our technological resource base as a system supplier of sophisticated ready-for-installation components. The installation of another air-conditioned 5-axis machining centre sourced from Waldrich Coburg will bring a substantial capacity increase and further improvement of our machining capabilities.

The assembly work on this (our third) machining centre is now in full swing, concurrently with ongoing manufacturing operations, to ensure that the scheduled July 2011 commissioning date can be met.

Elmar Westhoff (Tel. +49 2473 601 400)



The stainless steel outdoor stack and the heat recovery system



Foundation work for the new machining centre

