

What will your foundry look like in 2030?

Gemco Cast Metal Technology was established in 1978. Since then, our mission, to develop and realize projects that enable our clients to reach their goals, has remained unchanged.

Today, the Gemco group of companies is at the forefront of technology and know-how with more than a thousand projects completed for clients in practically every country in the world.

The continuity and achievements of Gemco can be traced back to our mission and the core-values that we strongly believe in such as *respect all people, act professional, reward performance* and especially *'say what you do and do what you say'*.

Recently, Gemco strategically looked ahead at what foundries will look like in 2030 ...

Gemco will continue to develop solutions that are required for the cast metal industry of the future and that will strengthen the industry. Gemco is anticipating and already integrating new technology in the next generation of foundries. Starting with virtual reality in foundry and casting designs, and enabling flexible production in mass manufacturing facilities that are connected real-time to customers and suppliers.

In the future foundry, additive manufacturing (3D-printing) will enable to create tools, patterns and cores direct from digital files, as well as low volume 3D-printed part production. It will also allow for greater design freedom and possibilities in shape complexity.

The standard shall be zero scrap-rate, the OEE between 97-98%, and health and safety will be valued in ppm levels. Robots will carry out most activities. Energy will be provided by renewable resources. Preventive maintenance and spare-parts inventory will be linked, and order and delivery will be supported by advanced-analytics and -computing.

When you look to the future, there are lots of interesting developments. Gemco is ready to assist those who are ready to step into that future. Let's create it together!

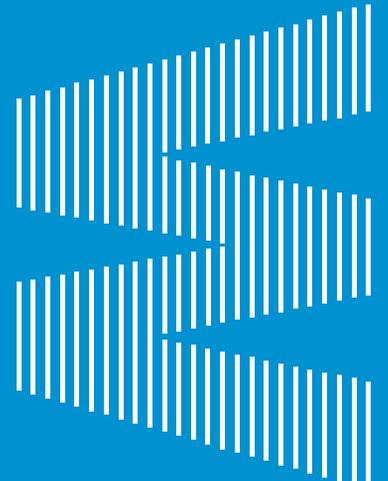
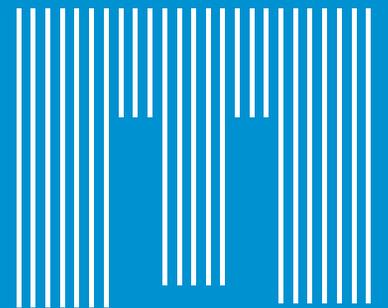
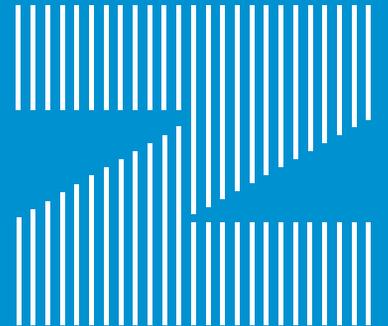
Ir. Bas van Gemert
Managing Director



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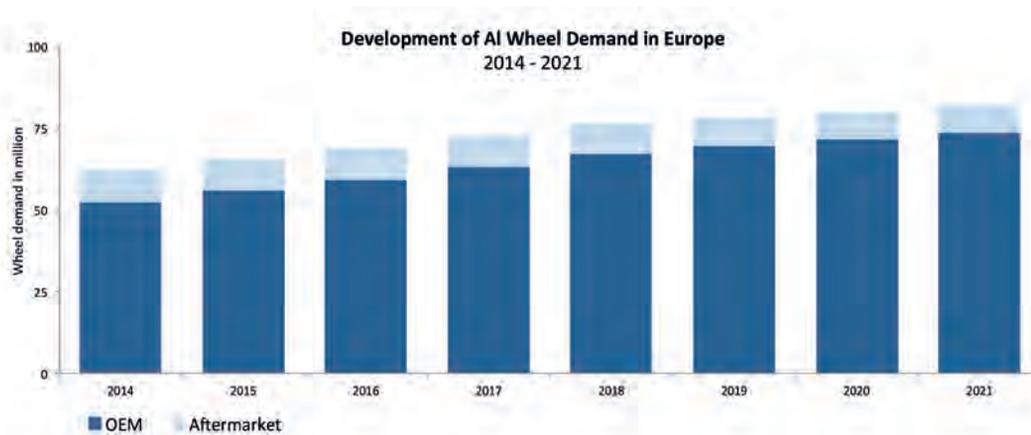
FOUNDRY



... eye on the market, ALUMINIUM WHEELS

Within the worldwide casting market, Aluminium has shown the biggest and steadiest growth since 2008. According last published numbers the compound annual growth rate for Aluminium was 6%, and within the aluminium market, the light vehicle production and especially aluminium wheels significantly contribute to this growth and will likely continue to do so in the future.

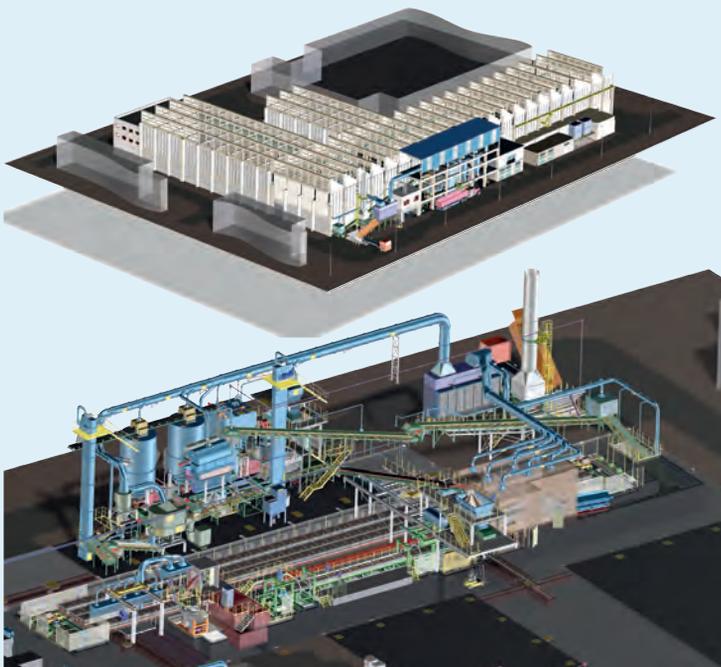
A considerable force behind that growth rate is that car manufacturers constantly seek to reduce weight, and logically where it is least intricate and most economical. Little doubt that it is less costly to reduce weight in the wheels than for example in the motor head. Experts foresee that the positive growth prospect of light vehicle production in the coming years will entail an over-proportional growth of aluminium wheels. If two decades ago a set of aluminium wheels in itself was a token of exclusivity or a luxury statement, it has over the last 15 years evolved into standard streetscape. Within the OEM demand the share of aluminium wheels is growing at the expense of steel wheels and the aftermarket for aluminium wheels will consequently decrease. The aftermarket however is already diversifying towards a more exclusive and individualized assortment, a trend that will continue in the coming years.



TRENDS

The sizes of automotive wheels range from 15" to 21". Most common and widely used sizes are 16" to 18" but the trend is heading towards continuously increasing sizes. At present, OEM's are working on designs for 23" wheels. Car manufacturers have started to equip even the smaller models with aluminium wheels, meaning that the market will not only grow from increase of produced cars but also win market share from steel rims.

COMPLETE GREENFIELD MODERN FOUNDRY FOR 20.000 TONS IN EGYPT



Helwan Iron Foundries (HIF) is a foundry-group in Egypt, located in the vicinity of Cairo. The current operations of Helwan are more than 30 years old and Helwan thus decided to build a greenfield foundry with state of the art technology. Gemco has been working with HIF to develop this new greenfield foundry, and resulted in the turnkey realization of this foundry by Gemco.

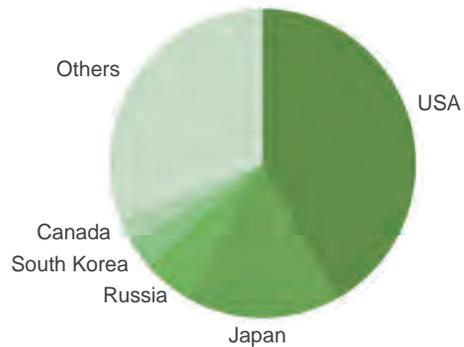
The foundry will produce around 20.000 tons of good quality castings produced with the latest greensand-technology. The supporting departments involve medium frequency induction melting, cold box core-making and steel-shotblasting cleaning technologies for the products.



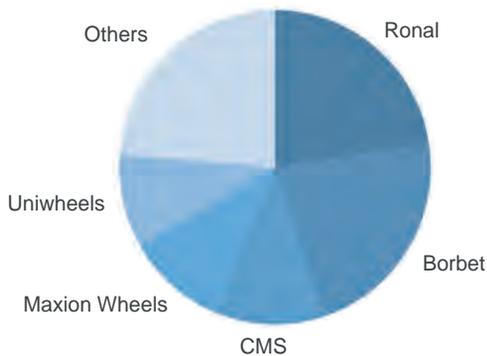
China has the biggest wheel production worldwide. In 2014 China produced 115 mio aluminium wheels against 62 mio casted aluminum wheels in Europe. It is to be noted that, unlike European manufacturers, China's wheel manufacturers do not only produce for the domestic market. An estimated 60% of China's wheel production is destined for export of which 40% is sold to North America. Europe is a far less accessible market for China's wheel production due to stricter specifications and the anti-dumping regulations which puts punitive tariff duties on wheels from China.

Knight Wendling GmbH

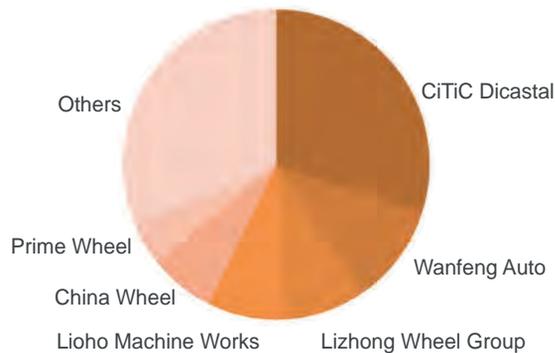
Export destinations for Aluminium Wheels from China 2014



EUROPE Key Players Aluminium Casted Wheel Market 2014



CHINA Key Players Aluminium Casted Wheel Market 2014



Furthermore Gemco also supplies the Low and Medium Voltage systems, the compressed air system, the safety system, overhead cranes and dust-collection.

After the installation and commissioning, Gemco provides the first tooling for parts including training, know-how transfer and ramp-up of the plant.



Gemco team



Contact:
Oktay Kurutas
eng@gemco.nl



Capacity Expansion for GF Kunshan, China

Engineering, project management and project realization

In 2009 GEMCO completed the Georg Fischer greenfield foundry facility in Kunshan. At the time, the realization of the +GF+ Kunshan foundry facility was part of a strategic plan to enable GF to supply its global customers, active in China, with quality castings and to further strengthen its market position. Three years later GF asked GEMCO to assist them in their exploration for possibilities of a capacity expansion of the plant. The target: a 50% capacity increase.

The original foundry lay-out and certain equipment in the foundry already offered perspective for production expansion. GEMCO thus proceeded with the pre-engineering /feasibility study for the intended capacity extension. The analyses of the equipment and respective capacity already in place as well as the existing available space, quickly learned that by re-positioning certain departments such as Dispatch area, R&D office and Raw Material warehouse, relatively little physical plant expansion would be required.

To determine where and to what extent equipment modification would be required in order to achieve the targeted capacity increase, a bottleneck analyses was conducted for each foundry department.

Furthermore, since the objective was to realize the expansion works within a live environment and interrupt production only when really inevitable, a risk analyses was made so as to perfectly gear the planning of the works to GF's full production planning and [preventive] measures to maintain the company's delivery performance.



Working within a live environment and continuous production



Again GF and GEMCO combined their effort and expertise to reach maximum result within shortest possible time, within budget and minimum production interference!



Aleksander Rzepka, eng@gemco.nl



The aerial view shows that very limited building expansion was required to realize the 50% capacity increase. The additions to the building are illustrated in red.

Artist impression, courtesy +GF+



Royal Lovink Industries B.V., was founded in 1911 and is a growing independent industrial corporation operating worldwide. The corporation's most important markets are home appliances, industrial applications, electrical products, heating systems, and automotive parts. Overall the corporation exports to more than 20 countries worldwide and is a valued supplier to many renowned international corporations.



Courtesy Linde Material Handling GmbH



Linde

Linde Material Handling GmbH, a member of the KION Group, ranks among the world's leading manufacturers of forklift and warehouse trucks and is market leader in Europe. Linde operates production and assembly plants in all important regions worldwide, and has a global sales and service network with offices in over 100 countries.

Foundry optimization, a work in progress ...

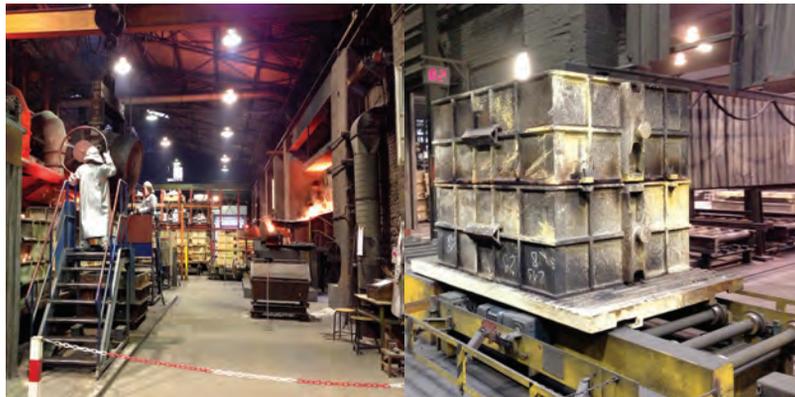
Linde Material Handling GmbH – Werk / Plant IV in Weilbach, one of the production plants, is a captive foundry for counterweights. At the Weilbach facility the products are casted, machined and painted and ready to assemble. It is a highly efficient foundry for these specific products.

As with its products, The **Linde** Weilbach facility continuously strives for efficiency improvement and is now focusing on the various steps in the after-cast production: cooling, product take-out, sand return handling, mould plate and flask transport, and casting storage before shot blasting. GEMCO already assisted **Linde** Weilbach with optimizing other production area's and was now asked to engineer a concept for the after-cast area. For all of the improvements, special attention is drawn to the [working] environment as well as a reduction of manual operated transport.

As a result of this concept engineering a significant logistic improvement can be achieved by automated transport of moulds and mould plates over roller conveyors and shuttles, thus reducing operational handling. Floor space is very effectively used and the remaining manual operations can now be done in an optimized environment. The implementation of the first of 3 phases of the optimization works is now in progres.



Maurits Brandt, eng@gemco.nl



LOVINK TECHNOCAST, the foundry division of the corporation, requested GEMCO's assistance for an efficiency study. LOVINK TECHNOCAST recently set itself a few objectives: increase the number of pouring positions to optimize the tact time of its Lost Foam production line and reduce the cycle time for vacuum connections during and after casting.

The study encompassed:

- Design a new more flexible, faster and safer vacuum connection system to the flasks.
- Make an investment budget for the implementation of the project realization.

The study resulted in a solution with 30% more pouring positions and the ability to connect a double vacuum system that is designed with a single flask connection.

TECHNOCAST also rewarded GEMCO with the order for the implementation of the new vacuum system. The realization works have been completed and the installation is now in production.



Jeroen Geraedts, eng@gemco.nl



... move with the times

Wescast is a foundry group and largest global manufacturer of cast exhaust manifolds and turbocharger housings for passenger cars and light trucks. With a European market share of 38%, **Wescast** is a key player in this industry.



Wescast, Oroszlány, as built in 2001. Foundry and machining facility, produces: Exhaust Manifolds, Turbocharger Housings, Integrated Turbo-Manifolds

When GEMCO engineered and built the **Wescast Hungary Autoipari Zrt** foundry in 2000/2001, in Oroszlány, Hungary, the facility with greensand moulding line and a capacity of 73.000 MT/Y was destined to produce larger series of CGI and SiMo metal castings. However, under [often] changing market demands, **Wescast**' customers also need to be served with smaller series and -very subject to trend- customers also ask for special steels/alloys. Their focus on continuous improvement includes researching new materials in order to achieve higher standards in product quality. At present the portion of special alloys is increasing in overall production and is being produced on a secondary line for smaller series. However, it is expected that in the future the demand for special steels will further increase up to 40-50%.

The changing market conditions imply that **Wescast** take the required measures so to optimize its production facilities and to reinforce its strong reputation. **Wescast** asked GEMCO not only because it built the foundry and would therefore be very familiar with the plant and because of its broad experience in the field of material traceability and handling but also, and maybe foremost, because GEMCO approached the subject with a very open mind and presented new idea's for this line.

Due to the increasing level of special alloys being produced in the foundry there is a growing necessity for optimization of separation of the different [return] metals -in order to avoid contamination- and its traceability. Also, since the secondary line was not originally designed for higher production speeds and capacity - it was originally designed as a sample line- it is now subject to review the line's shake-out, the casting cooling system, the shotblaster and de-gating, tramp- and return material handling, all in order to fulfill the sought after increased speed and capacity on that line.

After Gemco - always in close cooperation with Wescast - defined and evaluated the solution for the After-Cast Process, the "separation of tramps and return", resulted in:

- 2 sand flows (one for special steels and one for iron)
- 2 casting flows with gentle shakeout, sand screening and casting cooling/ shotblasting (iron and steel)
- 2 specific tramp metal separating systems (iron and steel)
- separate steel return handling system, including traceability of returns in scrap storage

The optimization works are [to be] performed in a live environment. The realization is done in phases. Project "GEMCO 1" of this transition has been completed, encompassing: new shakeout, sand- and tramp-transport, and a new separation system.



Zsolt Farago, eng@gemco.nl



Rassini Frenos is a leading designer and producer of advance-engineered, hi-tech brake discs, rotors and assemblies. **Rassini** is the largest fully integrated brake rotor producer in the Americas, including casting of gray and ductile iron, machining, coating, anticorrosive treatment and assembly in its production processes.



Picture, courtesy Rassini

In the city of San Martín Texmelucan, Puebla in México, **Rassini Frenos** runs its brake-system manufacturing facility that encompasses 3 foundry plants. In their Plant 2 and Plant 3 **Rassini** already operates various flaskless moulding lines to produce the castings while Plant 1 was selected for a new foundry project. The existing plant 1 would be converted, entirely renovated and adjusted so to accommodate brand new foundry operations destined to larger series of rotors in grey cast iron. The foundry project would be realized in 2 phases.

Rassini Frenos and GEMCO go back a long time since GEMCO built both plants 2 and 3 together with **Rassini**. For the new foundry project GEMCO produced the Concept for the lay-out, Equipment Specification, provided Procurement assistance, and worked with **Rassini** as engineering and supervision partner for and during the realization of the project. The new foundry includes charging-, melt-, pouring-department, vertical flaskless moulding line, cooling drum, shotblaster, core-shop, sand-plant and dust extraction.

This newest state of the art foundry operation in plant 1 is equipped with the latest technologies for high automation, high efficiency and environmental friendliness. With the realization of phase 1 of this foundry project, **Rassini** now runs six moulding lines in Puebla.



New foundations for state of the art foundry operations



Rassini-Gemco team on site



view inside new foundry works, cooling drum



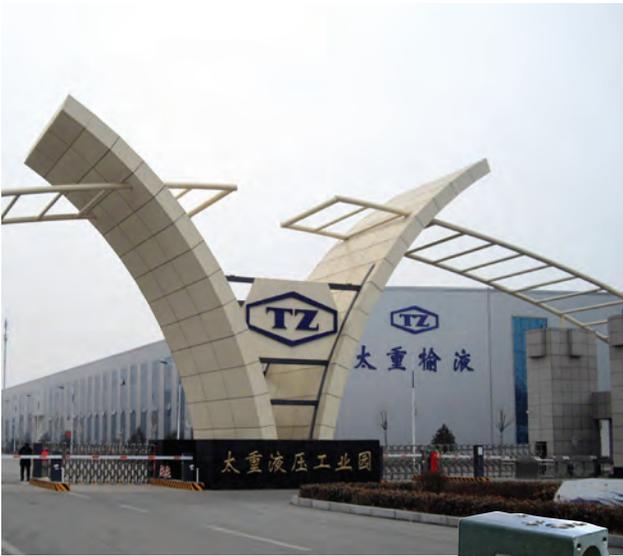
First melt



view outside new foundry works, sand-plant

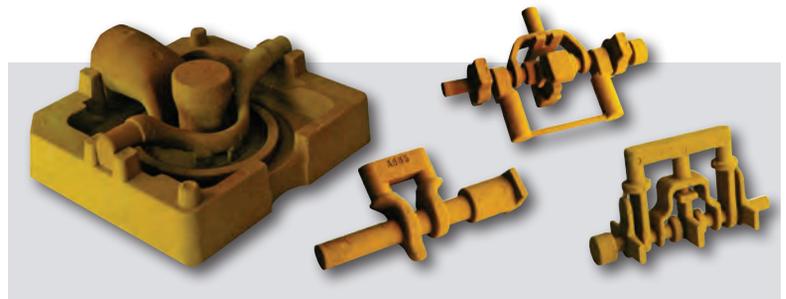


Casting Technology and Operational Training to maintain continuous improvement philosophy ...



In 2013, **Yuci Hydraulic Industry Company** (subsidiary to **Taiyuan Heavy Machinery Group**) completed the realization of their new foundry facility. **Taiyuan Heavy Machinery Group's** aim is to consolidate their position as China's top manufacturer of high-end hydraulic products. The new foundry facility, with the capacity of 30.000 ton/y ductile grey iron hydraulic castings, will enable the company to meet the required global standard and to furnish their customer's requirements for the high-level hydraulic parts. GEMCO was first selected to advise on the foundry layout and equipment selection. Also within the projects' scope of supply, is the optimization of the process technology, the set-up of a high-level quality system for their foundry operations as well as intensive training of **Yuci** staff, both management and operational.

Several of **Yuci** top technicians came to Europe to take intensive training [by Gemco] on the advanced design of hydraulic castings. During this stay, the technical designs of 16 key parts were agreed and finalized. One [difficult] key part was fully designed by Gemco.

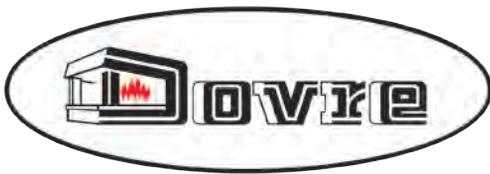


A first cast was successfully poured in the 4th quarter of 2013, after which GEMCO specialists went on site and gave specific training to **Yuci** technicians and operators. Training covered a wide range of foundry technology and management aspects, specifically metallurgical quality control, sand technologies and relevant quality control systems. A quality management system is implemented including Production Part Approval Process (PPAP), Failure Mode Effects Analysis (FMEA) and Maintenance Management System (MMS). During the ramp up PPAP and FMEA were immediately applied on the trialing of new products under the supervision of GEMCO specialists. A key aspect of the assignment is to implement a continuous improvement philosophy. With the GEMCO engineers' assistance, the metallurgical properties of castings were improved to meet the various requirements of hydraulics products mainly used in engineering machinery, metallurgy, mining, marine, petrochemical, military industry and other fields. A significant component in producing top quality hydraulic parts, are good quality cores. This process was given special attention to ensure the required quality was achieved and the dimension accuracy of the parts was controlled and maintained.

In the coming months, GEMCO specialists will continue to assist **Yuci** and address operational matters like scrap cost analysis and producing high-performance castings, also to ensure **Yuci** will control the process within its quality management system parameters etc. Meanwhile, **Yuci** is dedicated to integrate the new techniques and systems in the production ramp up phase, and to maintain its continuous improvement philosophy through its staff and employees.



Contact: Zhipeng Liu, eng@gemco.nl



To hundreds of thousands households **Dovre** is known for their stoves and fireplaces. While the company takes its name from a range of Norwegian mountains as a reference for harsh arctic winters, **Dovre** is actually a Belgian company with more than 80 years of experience in the design and manufacture of fireplaces and stoves.



Dovre products are designed, engineered and manufactured in their own state-of-the-art production facility which includes a foundry. As an internationally renowned player in its field the company continuously strives for performance as well as cost efficiency improvements. Dovre also provides OEM cast iron parts. To reinforce and consolidate their strong and competitive position in the market, Dovre makes sure that their foundry technology and equipment is always up to the required task.

When Dovre decided to replace one of their DISA moulding lines, Gemco was asked to Engineer, Manage and Supervise the project. Gemco has been involved and has assisted Dovre in several foundry engineering, -improvement and -realization projects for over a decade now.

Replacement of the DISA moulding line required that not only the exact positions/situation but also the surroundings of the equipment as well as the equipment and technology operating in conjunction with the new equipment needed to be adjusted. For the replacement of the moulding line itself the foundation needed preparation for both the new line as well as its automatic pattern changer. The project also involved engineering and implementing height and angles/intersections of the Return Sand Conveyors. Gemco designed, constructed and implemented a Sand Aerator for the DISA Supply belt as well as a new Sand Supply Unit (SSU) underneath the mixer at the Sand Preparation Plant. Further

works at the Sand preparation Plant included updating/adjusting the Drag-out belt conveyor which feeds the DISA sand inlet, and adjust the height of the Sand Mixer in order to fit the new SSU. The Synchronized Belt Conveyor (SBC) was lifted, without dis-assembly, to fit the new height of the new line's Precision Mould Conveyor. The height of the pouring furnace and cranes were lifted accordingly. Improvements on the sound isolation cabin around the shakeout area have also been realized.

After start-up and final take over Dovre is up and running to achieve its aim of boosting capacity and efficiency while cutting costs and at the same time providing ever higher quality products.

Keeping pace with progress



In addition to the earlier mentioned **Lovink**-project on the Lost Foam Line, Gemco is now in the process of the realization works on their Flaskless Vertical Greensand line where the existing DISA moulding line will be replaced with a new [DISA] line. Replacing a moulding line may sound like an “off the shelf, into place” exercise; however, the reverse is true. Each foundry has its specific requirements, corresponding configuration and periphery. For that reason, and to provide for a smooth replacement of the moulding line at Lovink, Gemco was asked to review the concept and draw a budget for the realization, perform the engineering of involved/relevant equipment and parts so as to ensure a flawless integration of the new line with the equipment in place. The works encompass the supervision of equipment production, installation and going into production of the line.

Smart solutions are applied for auxiliary works which include the necessary adjustments on the pouring crane and ladles to be able to produce different metals on the line, redesign of the sand inlet to optimize sand compaction, new “sand and casting” transport to the shake out to reduce casting damage and as a result of reviewing different concepts an extended wedging area. A creative and adequate solution is produced to reuse the existing SSU and adapting it to the new sand infeed position.

To complete the support Gemco also performed a Casting Quality Assessment on Lovink’s No-Bake Line.

Lovink Technocast produces a variety of products including: High Tech products such as turbo housings (Lost Foam Line), small series of special parts for many industries (No-Bake Line) and parts for stoves and cookers (Greensand Line). Lovink Technocast also has a dedicated enameling plant for high end products.

GREENFIELD HIGH TECH AUTOMOTIVE SAFETY PARTS FOUNDRY IN UNITED ARAB EMIRATES

TharwaCorporation

Advanced Manufacturing Solutions, AMS, a subsidiary of TharwaCorporation, identified opportunities to develop a foundry operation in The Emirates due to the local infrastructure, attractive environment, labor opportunities and energy prices.

The foundry will be located in KIZAD. This is a new to be developed industrial zone, specially supported by the Abu Dhabi emirate, also the capital of The United Arab Emirates. The Development Zone will have the highest standards in factory production, energy consumption, material handling and waste recycling.

Artist impression



The foundry is developed together with TIER 1 companies who are providing offtake agreements for an extreme fast ramp-up of the foundry creating the desired return to the strategic investors.

The foundry is set to produce ductile iron and grey iron safety parts for the automotive industry with the latest technologies available in the market. The automation level in this plant will be second to none including the involved automated logistics.

Gemco provides services to TharwaCorporation for the development of the foundry, the project management, project engineering and equipment selection. In a later stage, Gemco has offered technology-transfer including tool-designs and training of local staff including ramp-up management.

Contact:
Bas van Gemert
bas.van.gemert@gemco.nl



GEMCO Cast Metal Technology sponsors...

The Race of the Classics is the largest and most prestigious students 'sailing event in Europe, where teams of different Universities and Colleges from The Netherlands compete on classical sailing ships. The 5-6 days yearly event usually takes place in the spring. The ships then sail from a port on The Netherlands 'North Sea Coast towards the coast of England, to finish in Amsterdam. Gemco sponsors the Students' Team from the TU/e (Technical University Eindhoven).



Solar Team Eindhoven is a multidisciplinary team which consists of 23 students from **TU/e**, Eindhoven University of Technology. The team participated with a new concept in the Cruiser Class in the World Solar Challenge 2015. Teams from across the globe competed with solar cars in a 3000 kilometer long challenge from Darwin to Adelaide in Australia.

The team wanted to display what is their vision of the 'car of The future'. As they stated: "Winning the World Solar Challenge is one of the main goals of Solar Team Eindhoven, but not our only goal. Our mission is to contribute to a sustainable future. We want to realize an innovative car which is ready for the market of tomorrow".

For the record: They won again in their class

Check their achievements on: www.solarteam eindhoven.nl



Photographs: TU Eindhoven, Bart van Overbeeke



In 2013 and 2015 the Solar Team Eindhoven claimed victory in the cruiser class.



Thank you for seeing us....



GEMCO Engineers B.V.
Engineers & Contractors
Science Park Eindhoven 5053
5692 EB Son
P.O. Box 1713
5602 BS Eindhoven
The Netherlands
Tel. : +31 40 264 36 07
Fax : +31 40 264 36 40
E-mail: eng@gemco.nl



Gemco team and Gemco stand at Gifa 2015

GEMCO Mexico
4to Retorno Osa Menor No. 2 Int. 28
Edif. Atrium Col. Reserva
Territorial Atlixcayotl
San Andrés Cholula, Puebla, México
C.P. 72810
Tel.: +52 (222) 482 52 32
Fax: +52 (222) 482 52 33
E-mail: eng@gemco.nl

GEMCO Cast Metal Technology
(Shanghai) Co., Ltd.
Rm.1007, 10th floor
No.28 Jinling West Road Shanghai
Shanghai 200001 China
GemcoChina@gemco.nl

We'll see you again soon...



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"looking forward to welcome you at our booth in **Hall 7 / 7-524**"



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Knight Wendling GmbH
Consultants & Engineers
Arnheimer Strasse 118
D-40489 Düsseldorf, Germany
Tel.: +49 (0)211-77 00 6-0
Fax: +49 (0)211-77 00 6-77
E-mail: info@knightwendling.de



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