

WWIP

Top Selection Projects by Wikov / vol. 1

A portrait of Martin Wichterle, Wikov Industry owner, wearing a dark suit jacket over a light blue shirt. He is standing in front of a textured, light-colored wall. The image is partially overlaid by a dark blue vertical bar on the left and a white text box at the bottom.

Being our customer!

I always feel a real pleasure to take part in any of our new projects coming to life. Welcome to our brand-new **WIP journal – Wikov Important Projects**. Here we present a selection of the most interesting and inspiring recent projects of our Wikov engineering group. To start with, I would like to apologize to all the projects, and actually to all the customers, that we have not managed to present in this issue. There are really lots of them. We have been continuously welcoming new and new customers from various parts of the world and various businesses. I would like to thank all of them. For every single customer contributes to the success of Wikov greatly. Thanks to your trust, listening to each other, determination and sometimes great patience, Wikov has become an immensely stable partner on whom you can rely. Almost 20 years has passed since 2002 when we started building the modern Wikov engineering group; since then we have been growing constantly - and what is important - sustainably. We have made a number of mistakes on our path to our current position as a world-renowned manufacturer of mechanical gearboxes and there's no doubt we will make lots of mistakes even in the future. We are committed to learn from our mistakes, and therefore to stay with you. And with our employees. I would like to thank our employees so much. Without their commitment, searching for solutions both to daily problems and strategic challenges... without all of this... Wikov would have never reached its current point. Wikov has been changing constantly, responding to the stimuli of the world around us, which is a sign of life. I wish you pleasant reading and please, be our customers.

Martin Wichterle, Wikov Industry owner

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Across industries

The stability of Wikov is mainly provided by our focus on multiple industries. This approach requires extensive know-how about each application for which we supply a gearbox or a drive. And it is the know-how passed from one generation of our gearbox engineers to another which forms the core of our business. We have been manufacturing gearboxes for over 100 years and we are really proud of this fact. We know we are good at what we do and are not afraid to say it while constantly improving our skills to higher levels. In the past, our grandfathers were one of the first ones in the business to start applying CNC machines; today we use technologies such as robotics, remote diagnostics, on-line configurators and artificial intelligence. We are world leaders in terms of the power density and efficiency of our gearboxes. I wish you an inspiring read.

Antonín Růžička,
Chief Executive Officer, Wikov Industry

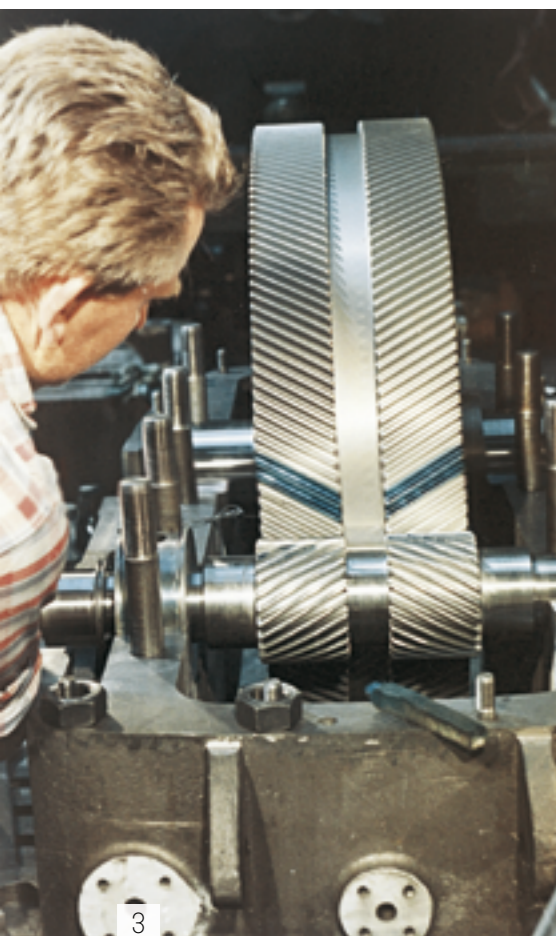




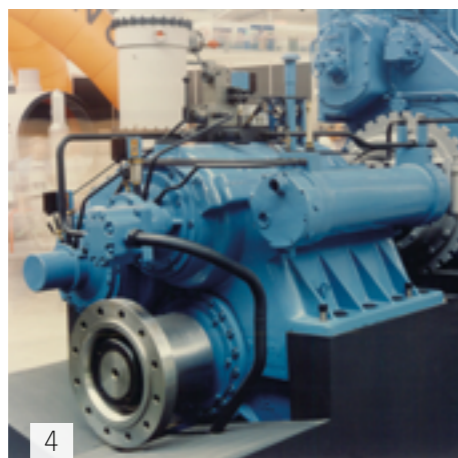
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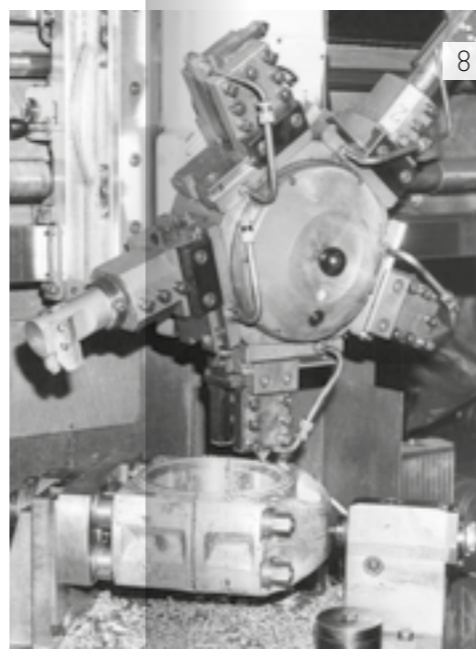
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The Essence of Engineering

On exactly 22 December 1918 the company Wikov was founded. This merger resulted in the largest Czechoslovak plant for the production of agricultural machinery. The factory employed 2,000 workers. The range of products offered was extremely wide: small hand tools, ploughs, threshing machines, steam locomotives, stable diesel/gasoline/gas engines, generators, tractors, tailored cars. After World War II in 1946, Wikov was nationalized and renamed *Agrostroj Prostějov*.

The Wikov brand was revived in 2004 by Martin Wichterle, when he renamed the newly acquired companies ČKD Hronov and Škoda Gear from Pilsen as **Wikov MGI** and **Wikov Gear**. This is how the modern history of the company began to be written. Nowadays, in addition to the already mentioned companies, **Wikov Sázavan** (formerly *Strojírny Sázavan*, formerly Bata's manufacturing plant) from Zruč nad Sázavou, the design office **Orbital2**, the company **Detail CZ** from Žirovnice and Jemnice producing parts for trucks, the German company **GGT GMEINDER GETRIEBETECHNIK** engaged in the production and servicing of gearboxes for rail vehicles and, last but not least, the **Wikov - RS** assembly plant in Tver, Russia. All these companies are engaged in engineering production, the core products of the group are mechanical gearboxes and gears for a wide range of industries. The Wikov Industry Group exports more than 75% of its production abroad, employs over 1,000 workers and its sales are around USD 120 million.

1/ Final assembly of the PRn series high-speed planetary gearbox in the Pilsen plant. These gearboxes are still used worldwide in compressor applications due to their high reliability. The 1960s.

2/ Locomotive gearbox assembly plant in Mosbach, Germany. To date, Gmeinder has successfully delivered more than 70,000 special ones worldwide. The 1970s.

3/ Double helical gearing of single-stage high speed gearbox on assembly in Pilsen plant. The 1980s.

4/ Gearbox VP61 for ship propeller drive made in Hronov plant. Pictured here in complete drive with CKD diesel engine. 1985.

5/ Final assembly of the parallel shaft gearbox of a multi-roll calender for the rubber industry. Hronov. 1995.

6/ 3.4MW planetary gearbox with flexible pin technology and variable ratio unit ready to pack. The gearbox has been successfully used in a wind turbine in harsh conditions of Norway as a demonstrator. Hronov. 2004.

7/ A worker poses in front of a 44-tonne gear wheel made in the Pilsen factory. 1904.

8/ SKJ 8 CNC carousel as one of the first CNC machines in Hronov. Here when machining connecting rod heads of large diesel engines. 1976.

Mineral Processing

Shock-load resistant planetary gearbox Orbi-flex® for stirred media mills

End User: Mining companies / mineral processing industry

Location: Worldwide

Scope of Supply: A planetary gearbox incl. accessory equipment

Application: Stirred Mill

Customer: Swiss Tower Mills Minerals AG

In 2012 Swiss Tower Mills Minerals AG and Outotec entered in to an exclusive technology agreement to market STM's VRM (Vertical ReGrind Mill) type mills. The Outotec brand name is HIG-mill™ (High Intensity Grinding mill). More than

200 grinding mills are operating today to grind industrial minerals with truly minimized energy requirements. The largest units in operation have each an installed motor power of 5 MW.

The ceramic grinding beads in the mixing cylinder are put in motion by the grinding rotors which are mounted on the mill shaft. The mill shaft is powered by a motor and gearbox arrangement. The high packing density of the grinding media produces strong friction, which causes efficient grinding of the product. The variable speed of the milling shaft allows for an energy efficient grinding process to reach the required product particle size. The feed material is supplied as a slurry from below by a feed pump. The mineral particles, which become smaller during the grinding process, rise up in the mill cylinder and leave the mill via a natural overflow on top. Gravity supports to retain the grinding beads, which have a higher density than the slurry, in the milling chamber.

Shock loads occur during the milling process and they affect the mill shaft drive fitted with an Orbi-flex® gearbox applying technology of a flexible pin. Flexible pin contributes to an extended life of the planetary gearbox through optimal shock load distribution on the gearbox internals.



gearbox specification

Single-stage planetary gearbox Orbi-flex®

input power: 5,000 kW (6,798 HP)

rated output torque: 365 kNm

input speed: 750 rpm

output speed: 130 rpm

ratio: 5.730

weight: 18,500 kg (40,785 lb)





Cement Industry

Tailor-made ball mill drive for Spassk cement

End User: JSC Spassk cement, Vostok Cement Group

Location: Spassk-Dalny, Primorsky, Russia

Scope of Supply: Horizontal ball mill drive with 2 Side Drive gearboxes

Application: Ball mill

Customer: JSC Spassk cement

One of the largest projects in the history of the Pilsen factory in the terms of total weight - 120t drive of a horizontal ball mill for a Russian ce-

ment plant JSC Spassk cement of the private group Vostok cement, which operates three cement plants supplying 95% of their output to the Russian market.

The drive by Wikov replaced almost 40 years old Aerofof-2 that was manufactured locally as experimental unit and the original manufacturer was not capable of any support anymore. The task was a technical solution replacing former drive and complying with standards and requirements of the operations and maintenance staff at Spassk cement. Wikov in Pilsen specialized in custom-made gear units was the choice for the cement plant set in Russia's remote Far East.

The drive for Spassk cement consists of two Side Drive gearboxes and a segmented girth gear with protection covers. The Side Drive gearbox is engineered to reflect general maintenance and service issues with drives in cement plants. Main focus lied on the elimination of contamination of the lubrication system. The gearbox features separate lubrication system that keeps its internals separated from external pollution.



gearbox specification

Horizontal ball mill drive with two Side Drive gear units

rated power: 2 x 2,000 kW (2,720 HP)

input speed: 490 rpm

output speed: 12.5 rpm

ratio: 29.187

weight: 120,000 kg (265,000 lb) – total drive



End User: Steel tube manufacturers
Location: Worldwide
Scope of Supply: Set of top, center and bottom gearbox
Application: Seamless tube reducing and sizing block
Customer: Friedrich Kocks GmbH & Co KG

Already in 2003 Friedrich Kocks GmbH & Co KG and Wikov started their joint cooperation in the field of advanced rolling technology for long products.

Kocks was looking for an experienced, reliable gearbox designer and manufacturer and finally entered into a joint partnership with Wikov for various applications. Kocks is for decades the hidden champion in the global niche market of sizing technology for long products such as the production of special bar qualities (SBQ) and seamless tubes. Wikov can look back to a history of more than 100 years of experience in design and manufacturing of special gearboxes for various industries and applications.

With the implementation of the Kocks Reducing & Sizing Block (RSB®) in C-module design

for bar and wire rod mills, the basis for a joint successful partnership was established. Since that time almost all reducing and shifting gears were supplied by Wikov based on the individual process and application requirements of Kocks. Based on the success in bar and wire rod applications Wikov started to supply also the reducer gearboxes for various Kocks Stretch Reducing Blocks for the production of seamless tubes.

In order to assure the quality and reliability of the gearboxes Kocks and Wikov developed in close cooperation detailed assembly steps, special quality test as well as test run proceedings. After some years of successful under load operation of the gears also joint inspections and investigations took place at the customers site. Wear behaviour, bearing lifetime and possible leakage reasons were investigated and subsequent design reviews and further design optimizations executed.

Based on the different individual views and perspective of the specialists of Kocks, Wikov and various selected customers, detailed know how was jointly acquired in close cooperation result-

ing in absolute reliable high-end gear boxes based on progressive design solutions and robust heavy duty operation parameters.

At the time Kocks developed the newest RSB® (Reducing & Sizing Block) in 5.0 design also Wikov specialists were involved to design the optimum drive train for the state of the art application. Various individual targets have to be fulfilled such as increase of acceptable load capability, reduced foot print and shortest installation time. Also minimized spare parts requirement by maximum exchangeability between the individual gearboxes was requested and finally achieved. The whole drivetrain was jointly re-designed and resulted in an exceptional jointly-developed drive solution for the newest RSB® 5.0.

In the meantime more than 118 RSB® are operating successful world wide in quality mills for wire rod and special bar production. The latest ones are all equipped with the special jointly developed drive train.

This success story underlines how important a close cooperation and longterm partnership can be and that longterm success always beats short-term achievements. This success has not been possible without joining forces, mutual trust and common targets.



Steel Industry

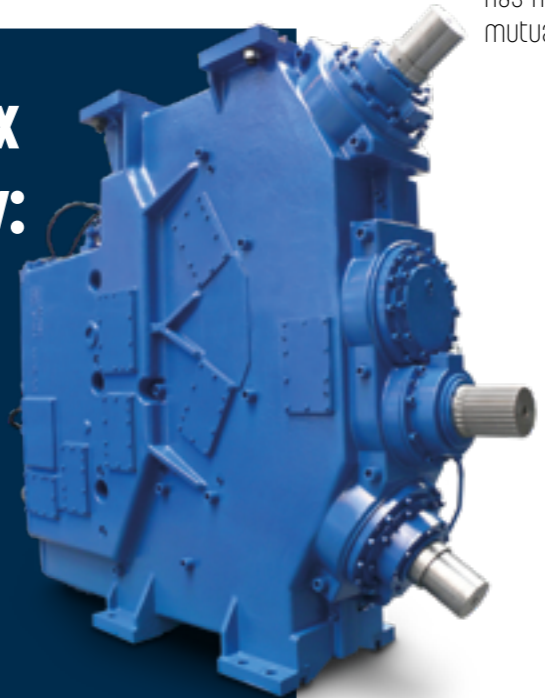
Joint partnership – joint success



gearbox specification

Tailor-made gearbox for RSB® technology:

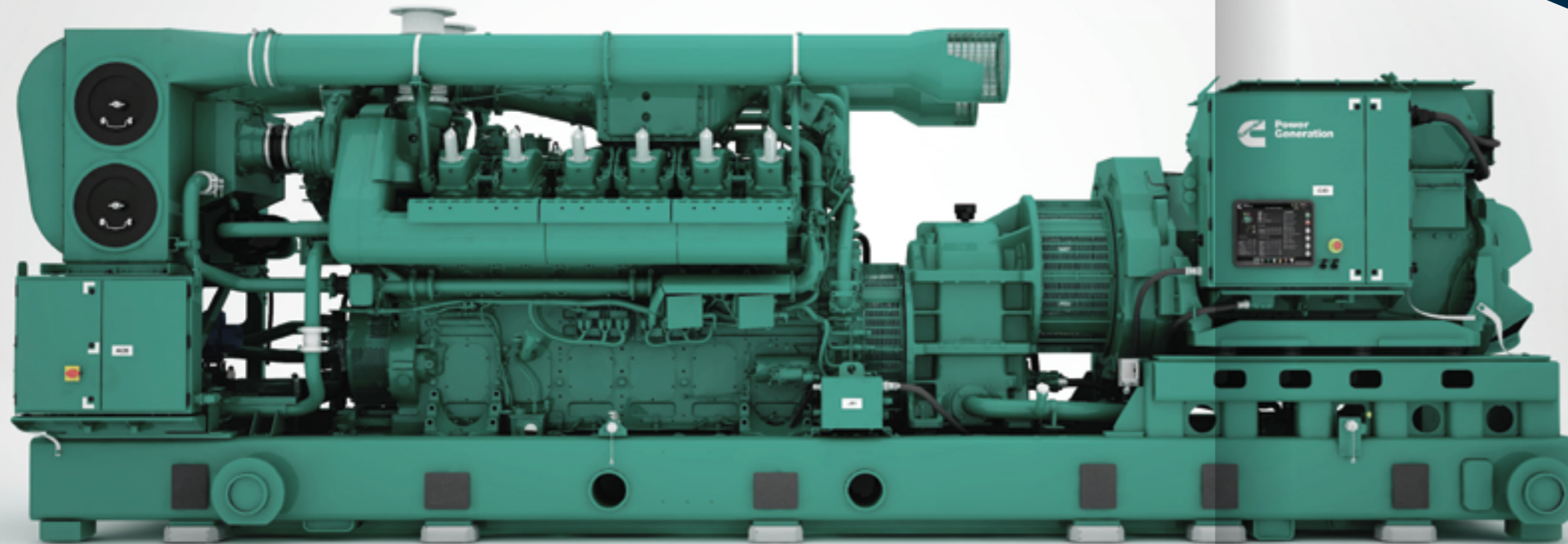
input power: 1,600 kW
rolling moment: 70,000 Nm
ratio: 4.74 / 1.95
weight: 7,575 kg





Power Generation

Turbo gearbox for the latest model of Cummins' gas generator



End User: as per Cummins' choice
Location: as per Cummins' choice (Cummins Fridley, Minneapolis, MN, U.S.A.)
Scope of Supply: Special high-speed gearbox
Application: Genset
Customer: Cummins Inc.

Cummins Inc., a global power leader, is a corporation of complementary business segments that design, manufacture, distribute and service a broad portfolio of power solutions. The company's products range from diesel, natu-

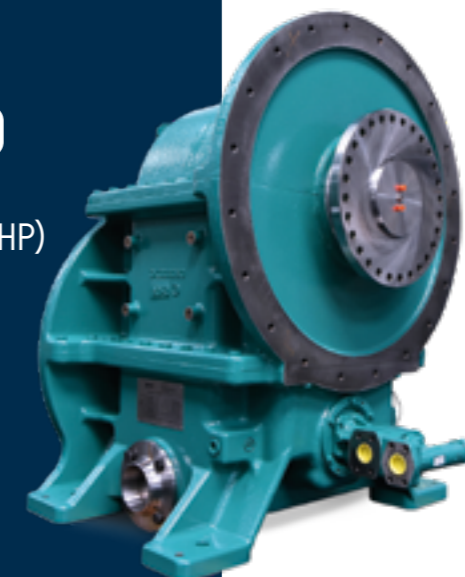
ral gas, electric and hybrid powertrains and powertrain-related components. Headquartered in Columbus, Indiana (U.S.), since its founding in 1919, Cummins employs approximately 61,600 people committed to powering a more prosperous world through three global corporate responsibility priorities critical to healthy communities: education, environment and equality of opportunity.

The ABN380 high-speed gearbox is a part of a new generation Cummins' genset driven by reciprocating internal combustion engines. The C25G gas generator series, which has a power density of 580 kW (60 Hz) from a 25L engine, is the latest gas generator model launched by Cummins Power Generation, joining Cummins' QSK60G and HSK78G gas product portfolio. It offers a total package of gas generator capabilities for prime, peaking power and island mode applications, while being suitable for a diverse set of industries ranging from hospitals and manufacturing to commercial building and greenhouses requiring reliable continuous operation.

gearbox specification

High-speed gearbox ABN380

rated power: 2,860 kW (3,889 HP)
input speed: 1,509 rpm
output speed: 1,800 rpm
ratio: 1.193
weight: 1,830 kg (4,034 lb)
efficiency: 99,3%



Tidal Power

Horizon 2020 FloTEC project with planetary gearboxes Orbi-flex®

End User: Orbital Marine Power Ltd.
Location: Orkney Islands
Applications: A floating tidal turbine
Scope of Supply: A planetary gearbox Orbi-flex®
Customer: SKF

SKF is providing Orbital Marine Power with fully integrated drivetrain solutions covering both nacelles and pitching hubs for the world's most advanced tidal turbine being developed under FloTEC. The FloTEC project consortium was established to bring together leading project developers, researchers and supply chain providers to support the commercialisation of low cost

tidal energy with Orbital Marine's floating tidal technology.

Orbital Marine Power Ltd. is an innovative Scottish engineering company focused on the development of a tidal energy turbine technology capable of producing a step-change reduction in the cost of energy from tidal currents. The company's novel floating technology offers a low-cost solution for simplified and safe manufacture, installation, access and maintenance along with the ability to use low cost, small workboats for all offshore operations.

Next generation 2 MW floating tidal platform was built in Scotland and installed at the European Marine Energy Centre in Orkney. The 72 metre long O2 device's turbine rotors can be turned 360° to allow power to be extracted from both tidal directions, with capabilities of powering more than 1,700 homes per year.

gearbox specification

Orbi-flex® planetary gearbox

input power: 1,130 kW
input speed: 11 rpm
ratio: 126.47
weight: 18,500 kg (40,785 lb)



Sugar Industry

Orbi-flex® planetary gearboxes for cane mills

End User: Zucarmex | Ingenio El Higo, S.A de C.V

Location: El Higo, Veracruz, Mexico

Scope of Supply: Six pcs. of Orbi-flex® planetary gearboxes

Application: Sugar cane mill

Zucarmex is a leading producer of sugar in North America operating six sugar mills in Mexico and one refinery in California, U.S.A. The company specializes in the cultivation and transformation of cane for the production and marketing of sugar, as well as its derived products.

The delivery to El Higo sugar mill was realized via Ecomssa, Wikov's authorised distributor in Central America, and covers six large size planetary gearboxes that replaced original units from a Brazilian producer. Complete change took place in 2018-2019. The planetary gearboxes from Orbi-flex® series are characterized by flexible pins in each planet of a low speed stage. The flexible pin contributes to extended life of the gearbox that is exposed to shock loads from the cane mill.



gearbox specification

3-stage planetary gearbox Orbi-flex® 6700

rated power: 1,865 kW (2,500 HP)

input speed: 1,200 rpm

output speed: 5.86 rpm

output torque: 3,040 kNm

ratio: 204.9

weight: 50,000 kg (110,230 lb)



Rail Vehicles

The brand new MF19 metro for Paris has Czech footprint

End User: RATP

Location: Paris

Scope of Supply: Complete kits of gearboxes

Customer: Bombardier Transportation GmbH

In December 2019, Consortium Bombardier-Alstom received official Paris Transport Administration (RATP) order confirming that the consortium has been awarded the contract to design and produce the new generation of metros for Île-de-France Mobilités and RATP.

Initially, the new trains will be deployed on three Paris metro lines (3bis, 7bis and 10) and their entry into service will take place between 2024 and 2026. The confirmed part of the contract covers the delivery of 44 trains.

MF19 metros will replace three former rolling stock generations including the MF67, MF77 and MF88 series.

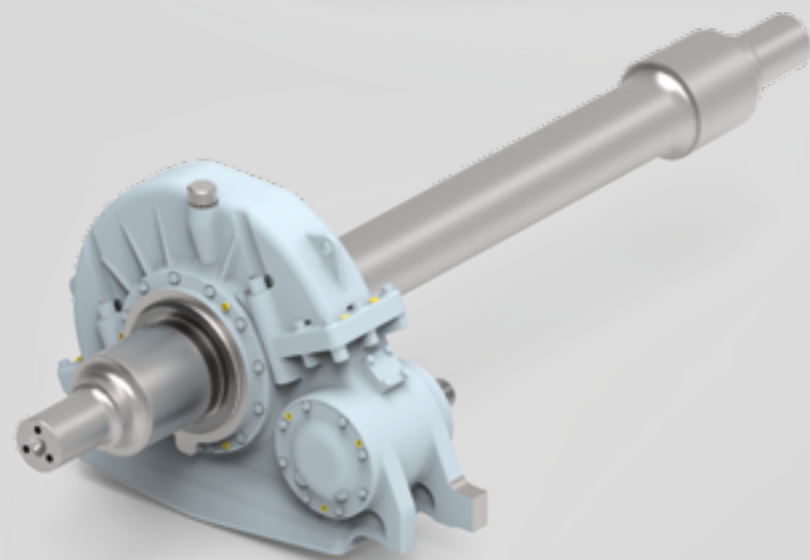
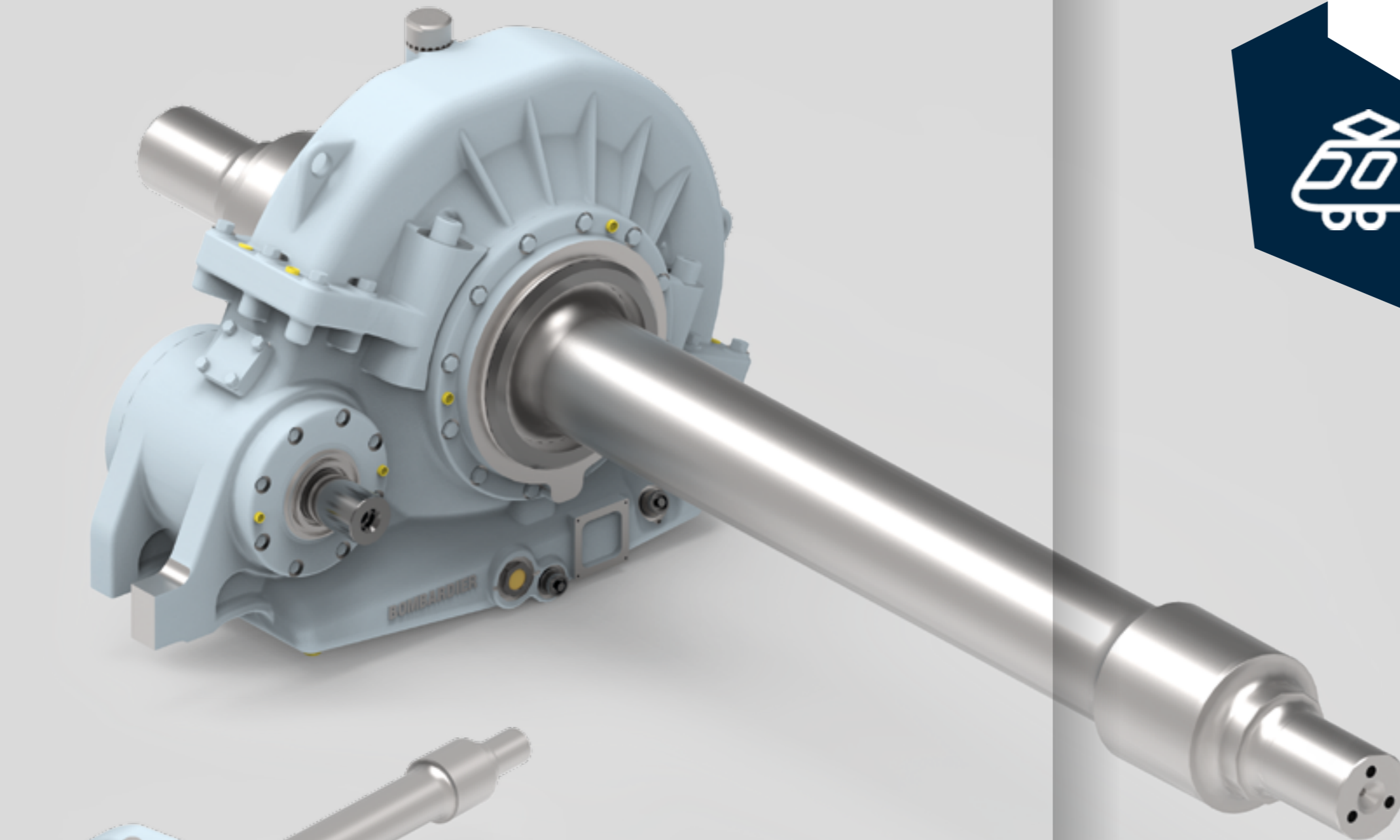
„This new eco-designed metro equipped with the latest on-board technologies represents tomorrow’s modern mass transportation for RATP and Île-de-France Mobilités. In addition to optimal performance and reliability, the MF19’s innovation lies in its modularity and scalability adapted to the existing Paris network,” said Laurent Bouyer, President of Bombardier Transportation France.

The fleet will consist of 30 five-car trains for line 10 (76 m long) and 14 four-car trains for lines 7bis and 3bis (60 and 86 m long).

The environmentally-friendly new metros will be eco-designed (20 per cent recycled materials used in their production), making them 98 per cent recoverable at the end of their lifespan. They will consume 20 per cent less energy than the trains currently in service (MF77), thanks in particular to 100 per cent electric braking and 100 per cent LED lighting. These new trains will also make it possible to reduce maintenance costs by 15 per cent compared to the MF01.



Bombardier selected Wikov MGI as the gearbox supplier for this important project. It is a great commitment and honour for Wikov, which is why it attaches extreme importance to this order. The first kits of one-stage helical gearboxes according to Bombardier’s design, with delivery in mid-2021, will be subjected to long-term comprehensive testing in Bombardier factory. Subsequent deliveries are planned from 2022.



gearbox specification

One-stage gearbox with solid shaft

input power: 250 kW

maximum input speed: 3.700 rpm



End User: TSO
Location: France
Scope of Supply: Axle gearbox with hydraulic motor
Application: Multi Tasker rail crane
Customer: Kirow Ardelt GmbH

Kirow is the world market leader for railway cranes and slag pot carriers. Products by Kirow are based on extensive, more than one century long experience and a high degree of innovation. The goal always remains the same: increasing efficiency and safety whilst lowering environmental impact.

The Kirow Multi Tasker is the ultimate lifting machine for clearing up after an accident. Kirow railway cranes excel with their extremely high load moment capacity. It is the only machine that can work in the rail environment that can lift and manoeuvre any kind of rolling stock into the neighbouring track and, in the case of the strongest cranes, even lengthways in front of its buffers. Accident sites in the middle of large railway stations, on tracks alongside rivers, in cuttings or in the mountains are difficult for rubber-tyred vehicles to access. But the Multi Tasker can reach them quickly and easily as it can be moved, just like a normal carriage, to the site by a locomotive and is immediately ready

for action. The Kirow railway crane is also extremely safe. Its electronic load moment limitation system, which always keeps the crane within a safe working range, is connected into the crane's control system. This safety feature is complemented by the exceptional visibility which the Multi Tasker's cabin offers its operator. This cabin's big safety glass windows provide a perfect all-round view and outstanding vision. This is supported by a camera for the rear, whose image is displayed on a high-resolution screen. It is easy to concentrate when working in the Multi Tasker. Only high-quality components, mainly made by German manufacturers, are used to build it. This quality and the finely tuned compatibility of the components give the crane operator confidence and assurance even in tricky situations.

One of the key components are the axle drives from GGT GMEINDER GETRIEBE-TECHNIK GmbH company. Gmeinder hydraulic driven final axle gearboxes perfectly fits the extreme rail conditions. Drive contains a switching device for disengaging the transmission for a fast transfer. Kirow and Gmeinder benefit from long-term cooperation. The vast majority of rail cranes around the world use gear units designed, manufactured and tested in Mosbach, Germany.



Rail Vehicles

Kirow Ardelt – Kingdom of Rail Cranes



Gearbox specification

Hydraulic motor driven axle gearbox

- Maximum torque at the input shaft:** 1,000 Nm
- Max. rotational speed of axle shaft:** 235 rpm (driving mode), 940 rpm (towing mode)
- Gear ratio:** 9,1269
- Weight (without axle shaft, without oil):** 425 kg





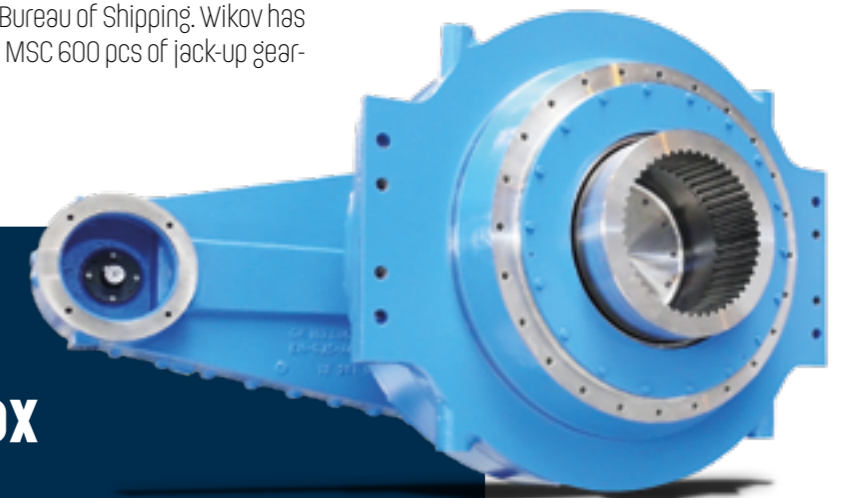
End User: Offshore drilling contractors
Builder: PaxOcean Group, Dalian Shipbuilding, Shanghai Waigaoqiao Shipbuilding
Scope of Supply: helical planetary gearbox
Application: CJ46 jack-up drilling platform
Customer: GustoMSC an NOV (National Oilwell Varco) company



GustoMSC, founded in the 1860's, is a world renowned and leading design and engineering company in the offshore energy market. They serve the offshore industry by providing best-in-class solutions for mobile offshore units. In 2018, Gusto became a part of the NOV Marine & Construction group that offers a large range of products, engineering, design services, and support for maritime installations and vessels. The combined power of NOV leading equipment suites and GustoMSC advanced engineering capabilities and innovative designs leads to exciting integrated solutions.

boxes for 11 drilling rigs within 2014 and 2015. We consider this project very successful from two points of view. At first, GustoMSC was satisfied with the realisation of the project. At second, everyone is satisfied with the quality since we have received no claim or complaint for any of those 600 delivered gearboxes.

The jack-up gearbox engineered and manufactured by Wikov has a design assessment certification by American Bureau of Shipping. Wikov has delivered to Gusto MSC 600 pcs of jack-up gear-



Oil & Gas

Jack-up gearboxes for rigs using the proven GustoMSC CJ46 design



gearbox specification

Tailor-made helical-planetary gearbox

- ratio: 7,389
- max. jacking / gearbox output torque: 1,070 kNm (789,191 lb)
- jacking capacity / pinion load: 296 t (652,568 lb)
- max. normal holding / gearbox output torque: 1,373 kNm (1,012,673 lb)
- normal holding capacity / pinion load: 400 t (881,850 lb)
- weight: 5,800 kg (12,787 lb)

Glassmaking Industry

Blimp merges two seemingly disparate fields – glassmaking and mechanical engineering

Blimp, a stunning and massive crystal cloud floats in space with the lightness of a zeppelin. Blimp is an original lighting piece produced by the Bomma glassworks. It is a product combining more elements than initially meets the eye. Mr. Martin Wichterle, the owner of the Wikov engineering group, is also the owner of two Czech glassworks – Bomma and Rückl, which produce very complicated, luxurious and award-winning glass products. The synergy of two seemingly completely different fields of mechanical engineering and glassmaking was put to use in the Blimp lighting collection.

The Big-Game trio, comprising designers Augustin Scott de Martinville, Grégoire Jeanmonod and Elric Petit, is behind the Blimp collection design. The three designers describe their work as simple, functional and optimistic, and Blimp is no exception. Pendant lighting, floor lamps and

wall lights form a part of this unique collection. The company Wikov Sázavan from Zruč nad Sázavou, which, in the Wikov engineering group, plays the role of a high-precision machined parts supplier for various industries, participated in the production of the metal form for such a large lighting. Metal forms for glassworks are not exactly a common product range of Wikov Sázavan, so preparing such a complex part for production was a real challenge. The actual milling was done on a state-of-the-art 5-axis Hermle C42U milling machine.

Then it was the turn of the master glassmakers to blow the lighting into the milled aluminum form. Blimp is the largest lighting that can be hand-created at Bomma. This stylish giant is thus testimony to human ingenuity and first-class craftsmanship – glassmaking and engineering.





Construction Machinery

Details in Detail CZ. Small precision parts for award-winning construction machinery

Cooperation between Doosan Bobcat and Detail CZ began already in year 2008, when Bobcat production site in Dobris (Czech Republic) needed to substitute / add new supplier into their panel and have been looking for new sustainable and reliable partner for supplying machined parts. Thanks to competitive process, technology and price, Detail became partner of Bobcat in Czech Republic first. Thanks to Detail machining capability and also self-developed network of local sub-contractors for specific material treatments there was opened space to increase part types portfolio as well as overall volume. As stable supplier Detail increased co-operation with Doosan Bobcat company and started to supply parts within EMEA region also to Bobcat plant in France and like from year 2016 also to overseas location in USA. All these led currently to over 400 different kind of parts, more than 1.300.000 parts delivered annually to

Dobris plant and close to 2 million parts worldwide. This long term successful co-operation brought benefits for both parties. Detail CZ as proud supplier to Doosan Bobcat is pleased to help our customer to continuous growth and development including production of market successful construction machines like T590 compact track loader with 2020 award Lowest Cost of Ownership. Last but not least Detail CZ participates in deliveries of components to brand new L85 compact wheel loader awarded by world – renowned iF Design Award 2021 developed and produced in Czech Republic Bobcat plant. This underlines also our effort and with further improving of technologies not only on listed components we are looking forward for common further growth and development.



