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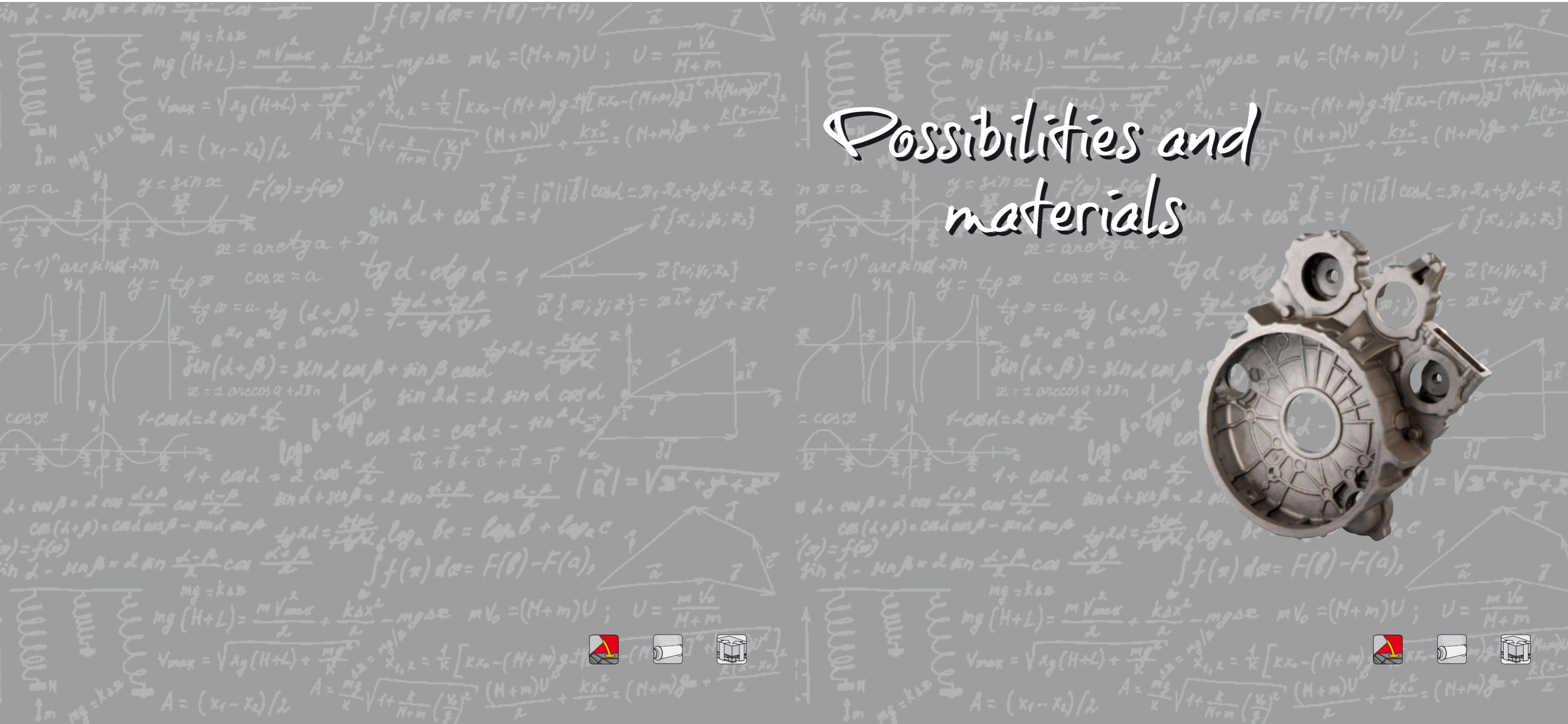
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Inventions in Iron.



# Possibilities and materials



# Welcome to a world of possibilities

Next to the immense know-how of our employees, our range of materials, production and finishing processes are the most significant competences of Jürgens Foundry – Inventions in Iron.

## Core shooter production

Our highly mechanised core production primarily consists of lots of core shooter machines that operate in a cold-box process – with shooter volumes of 2.5 to 20 litres and core box heights of up to 620 mm. The core sand mixture we use is firstly prepared using a batch mixer and then completed with a pre-programmed, part-specific mixture ratio by the individual core shooter machines. In addition we have a hand core making area for manufacturing larger and more

specialised cores for prototypes in resole-CO<sub>2</sub> processes.



## ABB smelting processes

We melt our spheroidal graphite iron in ABB medium-frequency crucible furnaces with a capacity of 4 tons – with a daily melting rate of around 5 tons of fluid iron and an 80 ton daily output of spheroidal cast iron.

The process control and the high power density of this melting plant leads to a flexible melting process and efficient utilisation of energy. Therefore we have created an energy use concept that includes an environmen-



## Melting treatment

Our melting consists of a sophisticated mixture: through charging troughs ABB smelting processes are used for bulk crude iron, scrap steel, body sheet cladding, recycled materials sorted according to type and particular alloy.

is moved with the required magnesium and the stipulated foundry quality is guaranteed. Last but not least the melt arrives at the waiting mould boxes via the casting machine, where it sets and cools into the shape of your casting.

The base melt gained from this process is firstly further treated with a wire injection process: a magnesium based flux cored wire is injected, the base melt

## Small moulding machine

We produce up to 120 cope and drag boxes per hour, with a maximum weight of around 120 kg and a flask size of 620x620x220/220+50 mm, with our small moulding machine, which has a pattern turntable and is a fully-automated drop-plate moulding machine. The moulding sand used is compacted by the SEIATSU airflow squeeze press-moulding process: An air current is passed through the moulding sand with positive pressure from the back

of the mould in the direction of the pattern and escapes via vents in the pattern plate or similar vents in the pattern plate holder. Finally the moulding sand is compacted once more from above by a hydraulic multi-plate press.

The result is an even and highly compressed mould face that meets the requirement for a true-to-size precision casting with a perfect surface.

## Large moulding machine

This fully-automated drop-plate moulding machine produces up to 30 box halves per hour – with unit weights of 80 to 1000 kg and a flask size of 1500x1200x400/400+50 mm. The patterns are fed in lines into the machine and moulded. As with the small moulding machine, the moulding sand is compacted by means of the SEIATSU airflow squeeze press-moulding process. An air current is passed through the moulding sand with positive pressure

from the back of the mould in the direction of the pattern. Finally the moulding sand is compacted from above by a hydraulic multi-plate press. The mould boxes are put into three levels for pouring and cooling – to produce your individual casting with a flawless surface.

## Measuring techniques / Processing / Certification

An optical vacuum emission spectrometer outwardly examines the exact compositions of individual melt samples. After pouring each batch we carry out initial sample flow controls as an interim audit of the casting after-treatment as well as final testing via quality control. Our quality demands include hardness, visual and ultrasonic testing as well as magnetic powder and dye penetrant testing and 3D coordinate measurements controlling tensile and notched-bar impact tests.

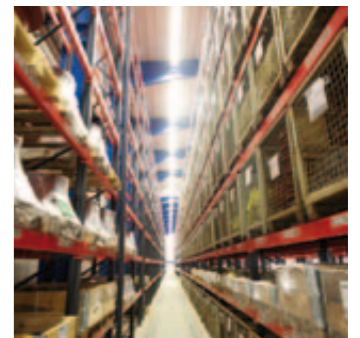
We record and analyse all test results via our central production planning and control system. Our success has been proved time and again with test certificates in accordance with DIN EN 10204 from recognised experts, our DIN EN ISO 9001 certified quality management and further external certification.

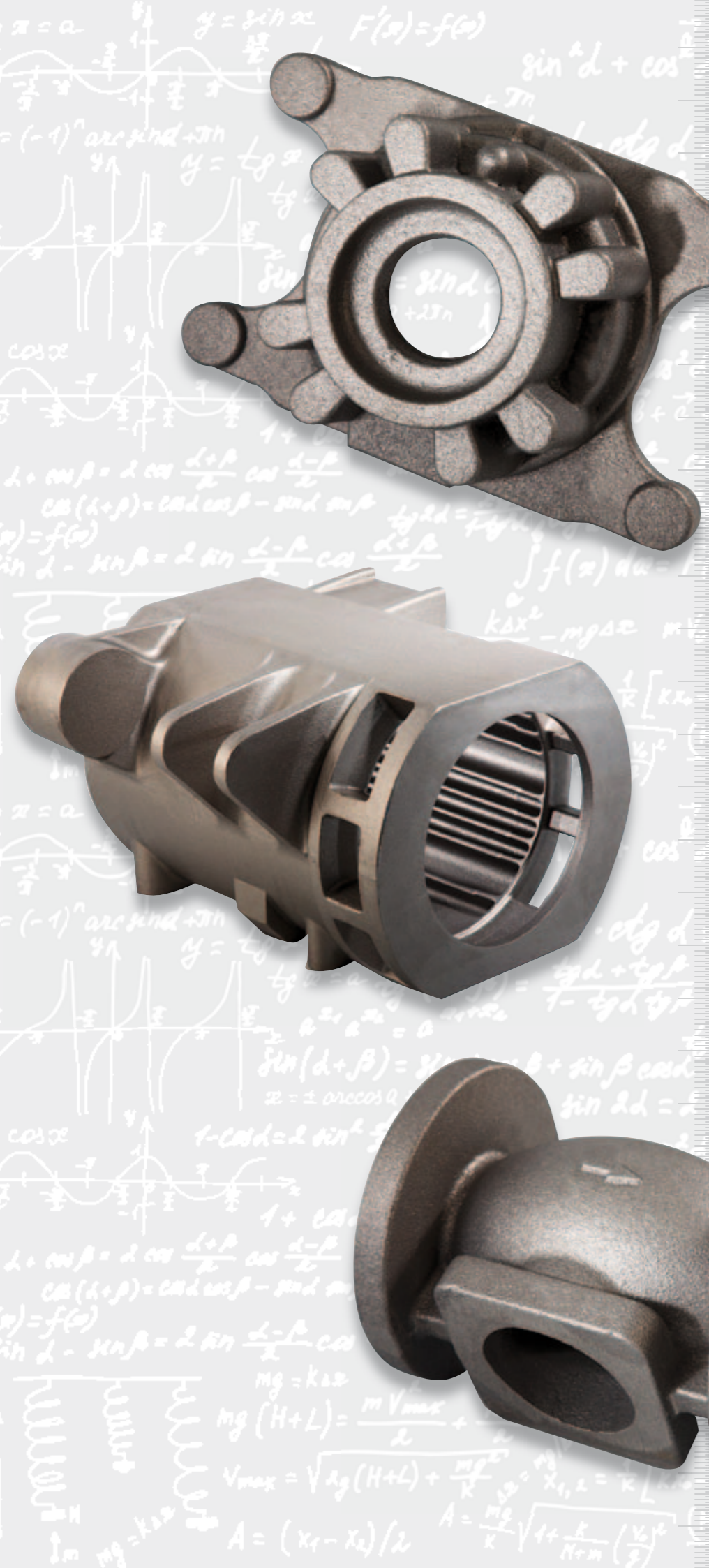


## QLO system with BSS and integrated packing station

Semi-automatic warehouse system with a barcode scanning system of around 4000 m<sup>2</sup>

- ♦ In six rows
- ♦ With a total length of around 120 m
- ♦ With a height of around 9 m
- ♦ With a width of around 16 m
- ♦ Around 3500 spaces, of which:
  - ♦ Around 1560 are palette spaces
  - ♦ Around 1760 are wire mesh crate spaces
  - ♦ Around 180 are special format spaces
- ♦ Around 200 bookings in and out per day
- ♦ With fully automated packing station
- ♦ With five casting control spaces and linear feeding through the warehouse system

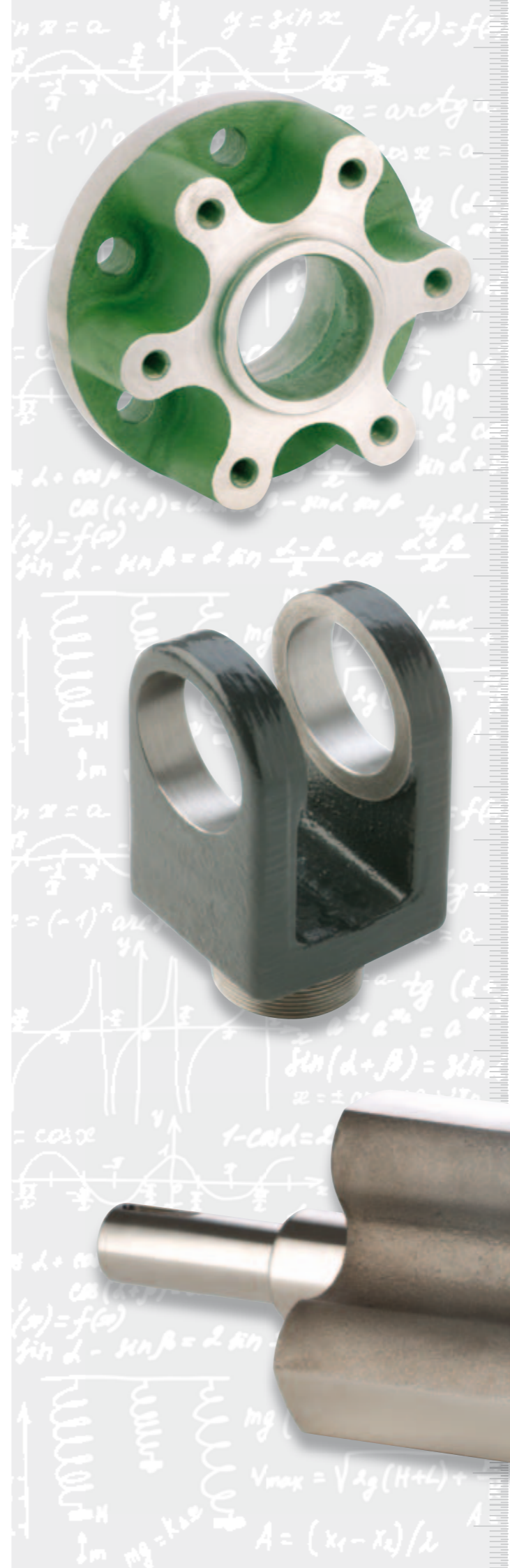




## Raw cast parts

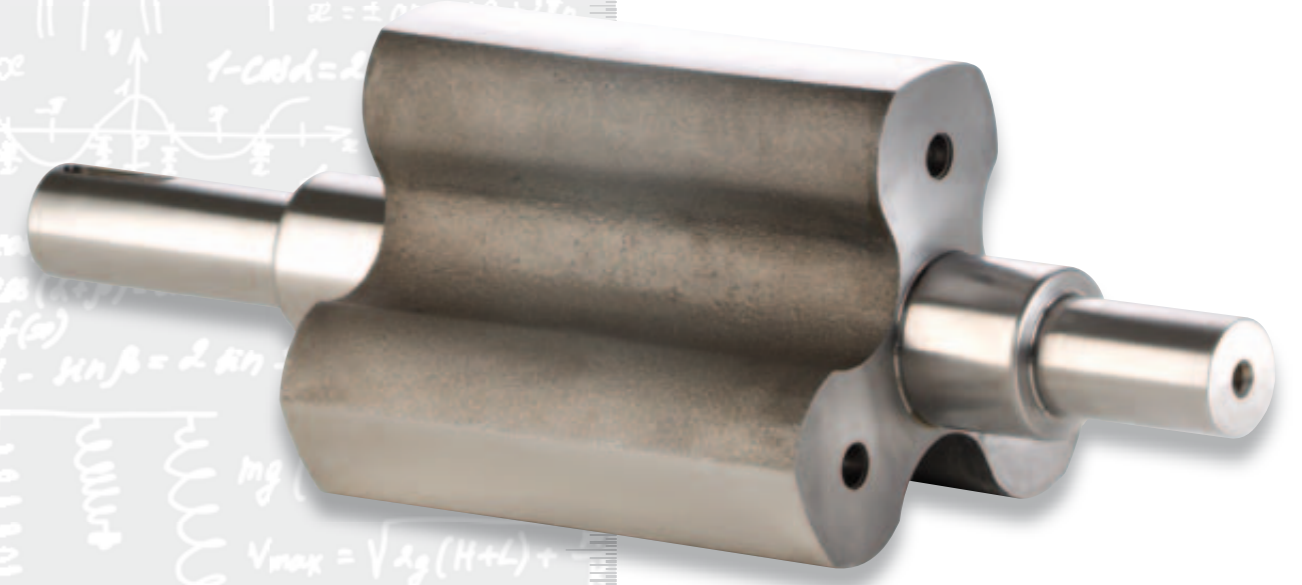
The unit weight of our cast pieces ranges from 1 kg to 1000 kg.

The flask size of our fully-automated moulding machine:  
from  
620 mm x 620 mm x 220 mm/220 + 50  
to a maximum of  
1500 mm x 1200 mm x 400/450 mm



## Machined parts

Surface	CNC lathes
Chromating	Max. height
Ferric nitro carbonising	up to 300 mm
Priming	Max. width
Painting	up to 1000 mm
Powder coating	
and many more	Coordinate measuring machine
	Table sizes
CNC drilling and milling machine	1700 x 1000 mm
Tables sizes	Max. width
up to 1250 x 1600 mm	1500 mm
Traverse paths	Measuring range
X = max. 2000 mm	X = 800 mm
Y = max. 1600 mm	Y = 1000 mm
Z = max. 1250 mm	Z = 700 mm
Horizontal machining centres	Processing
Tables sizes	Grinding
up to 1000 x 1000 mm	Broaching
Traverse paths	Drilling
X = max. 1350 mm	Component group assembly
Y = max. 1250 mm	and many more
Z = max. 790 mm	



Cast iron with spheroidal graphite (mechanical properties)

Material designation					
Abbreviation	Number	Determining wall thickness t/mm	0.2 % proof stress R <sub>p0.2</sub> (Mpa/min)	Tensile strength R <sub>m</sub> (Mpa/min)	Elongation at fracture A (%)/min
EN-GJS-350-22-LT <sup>a</sup>	5.3100	t ≤ 30	220	350	22
		30 < t ≤ 60	210	330	18
		60 < t ≤ 200	200	320	15
EN-GJS-350-22-RT <sup>b</sup>	5.3101	t ≤ 30	220	350	22
		30 < t ≤ 60	220	330	18
		60 < t ≤ 200	210	320	15
EN-GJS-350-22	5.3102	t ≤ 30	220	350	22
		30 < t ≤ 60	220	330	18
		60 < t ≤ 200	210	320	15
EN-GJS-400-18-LT <sup>a</sup>	5.3103	t ≤ 30	240	400	18
		30 < t ≤ 60	230	380	15
		60 < t ≤ 200	220	360	12
EN-GJS-400-18-RT <sup>b</sup>	5.3104	t ≤ 30	250	400	18
		30 < t ≤ 60	250	390	15
		60 < t ≤ 200	240	370	12
EN-GJS-400-18	5.3105	t ≤ 30	250	400	18
		30 < t ≤ 60	250	390	15
		60 < t ≤ 200	240	370	12
EN-GJS-400-15	5.3106	t ≤ 30	250	400	15
		30 < t ≤ 60	250	390	14
		60 < t ≤ 200	240	370	11
EN-GJS-450-10	5.3107	t ≤ 30	310	450	10
		30 < t ≤ 60	to be agreed between manufacturer and buyer	to be agreed between manufacturer and buyer	to be agreed between manufacturer and buyer
		60 < t ≤ 200			
EN-GJS-500-7	5.3200	t ≤ 30	320	500	7
		30 < t ≤ 60	300	450	7
		60 < t ≤ 200	290	420	5
EN-GJS-600-3	5.3201	t ≤ 30	370	600	3
		30 < t ≤ 60	360	600	2
		60 < t ≤ 200	340	550	1
EN-GJS-700-2	5.3300	t ≤ 30	420	700	2
		30 < t ≤ 60	400	700	2
		60 < t ≤ 200	380	650	1
EN-GJS-800-2	5.3301	t ≤ 30	480	800	2
		30 < t ≤ 60	to be agreed between manufacturer and buyer	to be agreed between manufacturer and buyer	to be agreed between manufacturer and buyer
		60 < t ≤ 200			
EN-GJS-900-2	5.3302	t ≤ 30	600	900	2
		30 < t ≤ 60	to be agreed between manufacturer and buyer	to be agreed between manufacturer and buyer	to be agreed between manufacturer and buyer
		60 < t ≤ 200			

NOTE: The mechanical properties of the samples manufactured from the cast sample pieces during mechanical processing could differ from the mechanical properties of the cast parts.

- <sup>a</sup> LT for low temperatures  
<sup>b</sup> RT for room temperatures



Bainitic cast iron with nodular graphite

Material designation			Impact energy at room temperature 23 °C ± 5 °C	
Abbreviation	Number	Determining wall thickness <sup>a</sup> t/mm	Average of 3 tests J/min	Single value J/min
EN-GJS-800-10-RT	5.3401	t ≤ 30	10	9
		30 < t ≤ 60	9	8
		60 < t ≤ 100	8	7

<sup>a</sup> For a determining wall thickness of more than 100 mm the manufacturer and the buyer must agree the type and size of the test piece and the minimum value to be achieved.

Material designation					
Abbreviation	Number	Determining wall thickness <sup>a</sup> t/mm	0.2 % proof stress R <sub>p0.2</sub> (Mpa/min)	Tensile strength R <sub>m</sub> (MPa/min)	Elongation at fracture A (%)/min
EN-GJS-800-10 EN-GJS-800-10-RT	5.3400 5.3401	t ≤ 30	500	800	10
		30 < t ≤ 60		750	6
		60 < t ≤ 100		720	5
EN-GJS-900-8	5.3402	t ≤ 30	600	900	8
		30 < t ≤ 60		850	5
		60 < t ≤ 100		820	4
EN-GJS-1050-6	5.3403	t ≤ 30	700	1050	6
		30 < t ≤ 60		1000	4
		60 < t ≤ 100		970	3
EN-GJS-1200-3	5.3404	t ≤ 30	850	1200	3
		30 < t ≤ 60		1170	2
		60 < t ≤ 100		1140	1
EN-GJS-1400-1	5.3405	t ≤ 30	1100	1400	1
		30 < t ≤ 60		to be agreed between manufacturer and buyer	to be agreed between manufacturer and buyer
		60 < t ≤ 100			

NOTE: the determining wall thickness has no influence on the minimum 0.2 % proof stress, provided the heat treatment parameters and the chemical composition are coordinated on the determining wall thickness.

<sup>a</sup> For a determining wall thickness of more than 100 mm the manufacturer and the buyer must agree the type and size of the test piece and the minimum value to be achieved.

Cast iron with spheroidal graphite with guaranteed notched bar impact work

Material designation		Minimum value for notched bar impact work in joules					
Abbreviation	Number	Average of 3 tests at 23 °C ± 5 °C	Single value	Average of 3 tests at -20 °C ± 2 °C	Single value	Average of 3 tests at -40 °C ± 2 °C	Single value
GGG-35.3 EN-GJS-350-22-LT	EN-JS1015	-	-	-	-	12	9
GGG-35.3 EN-GJS-350-22-RT	EN-JS1014	17	14	-	-	-	-
GGG-40.3 EN-GJS-400-18-LT	EN-JS1025	-	-	12	9	-	-
GGG-40.3 EN-GJS-400-18-RT	EN-JS1024	14	11	-	-	-	-

LT for low temperatures  
RT for room temperatures

Comparison of the new material designations as per DIN EN 1563 with the previous material designations as per DIN 1693-1 (1973) and DIN 1693-2 (1977-10)

Material as per DIN 1693-1 or 1693-2		Material as per DIN EN 1563	
Abbreviation	Number	Abbreviation	Number
Separate cast sample pieces			
GGG-35.3	0.7033	EN-GJS-350-22-LT	EN-JS1015
-	-	EN-GJS-350-22-RT	EN-JS1014
-	-	EN-GJS-350-22	EN-JS1010
GGG-40.3	0.7043	EN-GJS-400-18-LT	EN-JS1025
-	-	EN-GJS-400-18-RT	EN-JS1024
-	-	EN-GJS-400-18T	EN-JS1020
GGG-40	0.7040	EN-GJS-400-15	EN-JS1030
-	-	EN-GJS-450-10	EN-JS1040
GGG-50	0.7050	EN-GJS-500-7	EN-JS1050
GGG-60	0.7060	EN-GJS-600-3	EN-JS1060
GGG-70	0.7070	EN-GJS-700-2	EN-JS1070
GGG-80	0.7080	EN-GJS-800-2	EN-JS1080
-	-	EN-GJS-900-2	EN-JS1090
cast-on sample pieces			
-	-	EN-GJS-350-22U-LT	EN-JS1019
-	-	EN-GJS-350-22U-RT	EN-JS1029
-	-	EN-GJS-350-22U	EN-JS1032
GGG-40.3	0.7043	EN-GJS-400-18U-LT	EN-JS1049
-	-	EN-GJS-450-10U	EN-JS1132
GGG-50	0.7050	EN-GJS-500-7U	EN-JS1082
GGG-60	0.7060	EN-GJS-600-3U	EN-JS1092
GGG-70	0.7070	EN-GJS-700-2U	EN-JS1102
-	-	EN-GJS-800-2U	EN-JS1112
-	-	EN-GJS-900-2U	EN-JS1122



Tensile strength properties of castings with flake graphite, as measured by samples that have been manufactured by mechanical processing of casting sample pieces

Material designation		Determining wall thickness t/mm		Tensile strength <sup>a</sup>
Abbreviation	Number	>	<	Critical values in casting samples pieces R <sub>m</sub> (MPa/min)
EN-GJL-100	5.1100	5	40	<b>100</b>
EN-GJL-150	5.1200	2,5 <sup>b</sup> 50 100	50 100 200	<b>150</b> 130 110
EN-GJL-200	5.1300	2,5 <sup>b</sup> 50 100	50 100 200	<b>200</b> 180 160
EN-GJL-250	5.1301	5 <sup>b</sup> 50 100	50 100 200	<b>250</b> 220 200
EN-GJL-300	5.1302	10 <sup>b</sup> 50 100	50 100 200	<b>300</b> 260 240
EN-GJL-350	5.1303	10 <sup>b</sup> 50 100	50 100 200	<b>350</b> 310 280

- NOTE 1: The material designation is independent of the type of casting sample piece.
- NOTE 2: Material EN-GJL-100 (5.1100) is the most suitable for high damping capacity and thermal diffusivity.
- NOTE 3: The figures in bold give the minimum tensile strength for the associated abbreviation type. The values refer to the diameter of a casting piece in its raw cast state according to the applicable are of the Determining wall thickness.
- NOTE 4: For a determining wall thickness of over 200 mm the manufacturer and the buyer must agree the type and size of the test piece and the minimum value to be achieved.
- <sup>a</sup> If the tensile strength is set as a distinguishing property, the type of sample pieces (see 8.2) must also be stated in the order. If it is not stipulated, the manufacturer will decide on the type of sample piece.
- <sup>b</sup> This value is included as the lower limit in the Determining wall thickness area.

Our wide range of casting processes answers for every requirement!