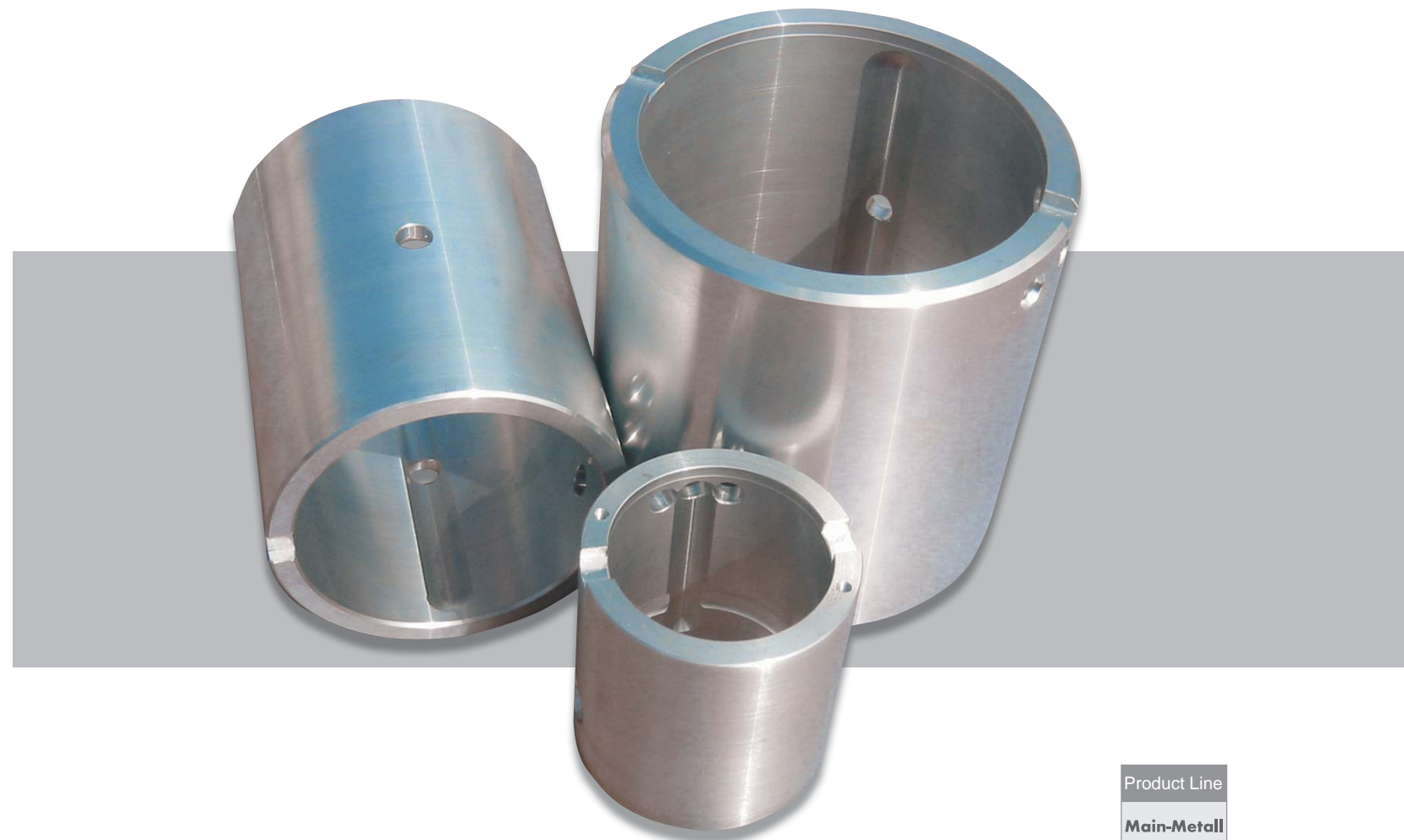




Plain bearings and guiding elements  
*made of Main-Metall®*



Product Line  
**Main-Metall**

## Basics

We use the product name Main-Metall® for sliding and guiding elements manufactured from a zinc-aluminium alloy with the same name and, in particular:

- bearing bushes and shells
- slide strips and plates
- guiding elements
- wear strips and plates
- connecting rod bearing
- thrust collars
- spindle nuts

Main-Metall® is a zinc alloy containing a high percentage of aluminium with an addition of copper. In combination with other alloy elements, special additives and particular manufacturing techniques, we achieve optimum sliding and wear characteristics.

The material Main-Metall®, our proven »house brand« for many decades, is the first choice with numerous technical applications and meets high demands regarding functionality and operational safety.

Thanks to its particular technical advantages, Main-Metall® is successfully used in general machinery, in the automotive industry, in tool-making and press manufacture, in the construction machine sector, in the plant construction as well as in the steel and rolling mill industries.

We combine the operational safety of our plain bearings made of Main-Metall® with our comprehensive services for our customers: based on the operational data, we compute and design the product, manufacture it with state-of-the-art facilities allowing for an optimum manufacturing quality and offer our customers a comprehensive service in the course of the bearings' working lives.

### Fields of application

Proven applications of material Main-Metall® are:

- bearing bushes and bearing shells in general machine construction
- bearing for rotary cement kilns
- plain bearings in the wind industry
- guiding elements in mechanical and hydraulic presses
- piston guiding elements for pumps
- worm wheels and worm wheel rims in equipment engine ring and measurement
- threaded spindles and adjustment nuts
- thrust members and ball sockets
- guiding elements for spindles and pillar guiding elements
- plain bushes and slide plates
- guiding bushes and wear plates for tools employed in plastics processing and metal forming

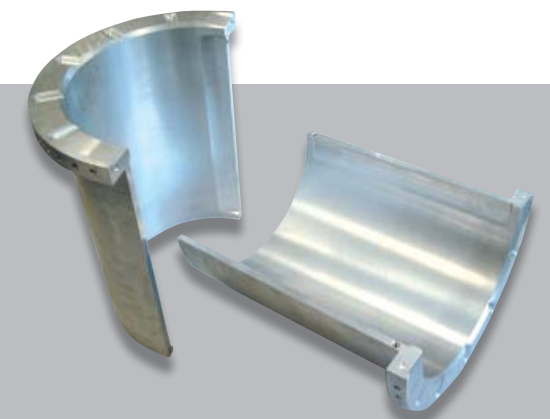
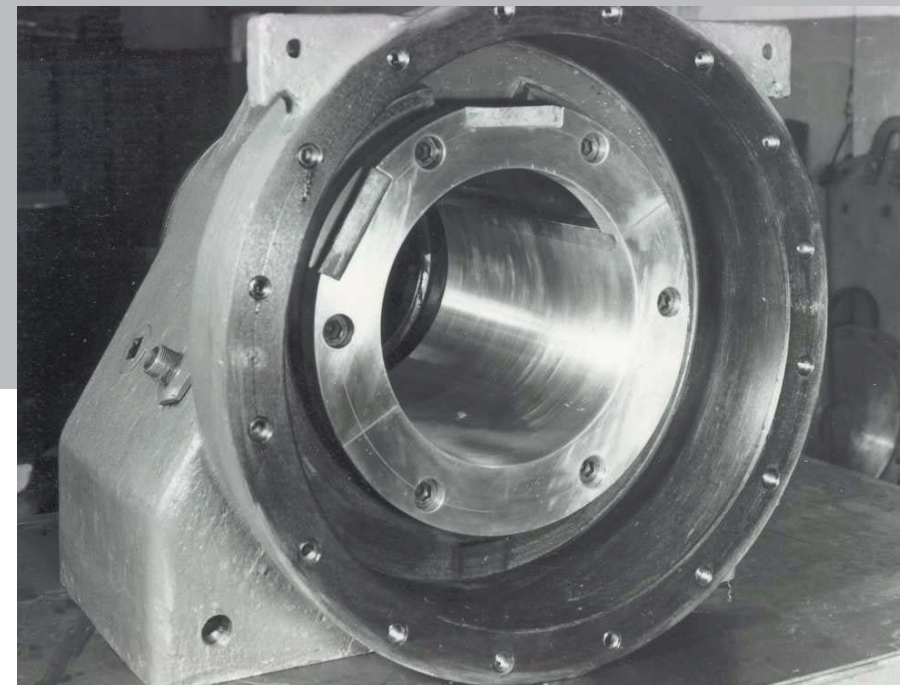
### Advantages

The essential advantages of Main-Metall® as a bearing and constructional material are:

- very good cost/performance ratio through low specific weight
- independence from international copper markets
- very good gliding and emergency running properties, no pitting of the shaft
- long working life
- good wear resistance
- very good thermal conductivity
- good embedding ability and very good wettability with lubricants
- extraordinary adhesion of the lubricating film
- low sensitivity to edge pressure
- good dampening / shock-absorbing properties



Our efficient Product Development Department is at your disposal for technical advice, the making of prototypes, and for practical testing.



## Our scope of products

In the first place, we manufacture bearings and guiding elements from single pieces to series production and ready to be installed. Our manufacturing department is capable of building small filigree parts as well as bearing shells having a diameter of up to 1.200 mm.

We supply the following markets with our products made to customer request or of our own design:

### General machine building and plant construction

- Bearing bushes
- Bearing shells and segments
- Connecting rod bearings
- Worm wheels
- Thrust collars
- Spindle nuts
- Slide strips
- Wear plates
- Guiding elements

### Automotive industry, agricultural and forestry

- Plain shell halves
- Bushes for steering systems and gear boxes in fork-lifts and loading units
- Bushes and spindle nuts for wine presses, harvesting machines, threshing machines, cutting machines, hoisting winches

### Hydraulics

- Pistons
- Piston guides
- Bottom and guide bushes
- Glands
- Packing washers
- Valve blocks

### Construction machines, hoisting devices, and crane systems

- Bearings for excavators, concrete mixers, road rollers, bulldozers
- Bushes for rollers, pulleys, and worm wheels
- Pistons for concrete pumps

### Mining and metallurgical works

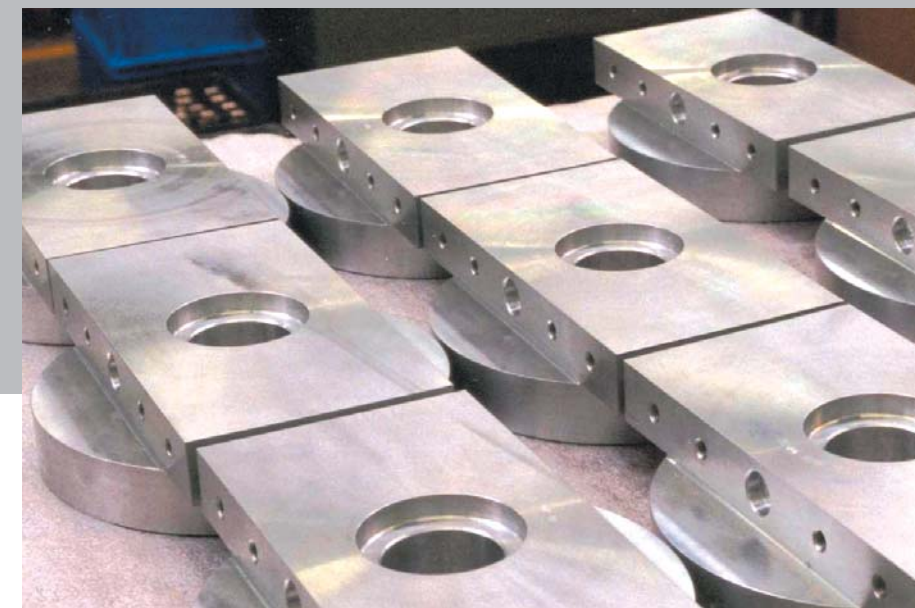
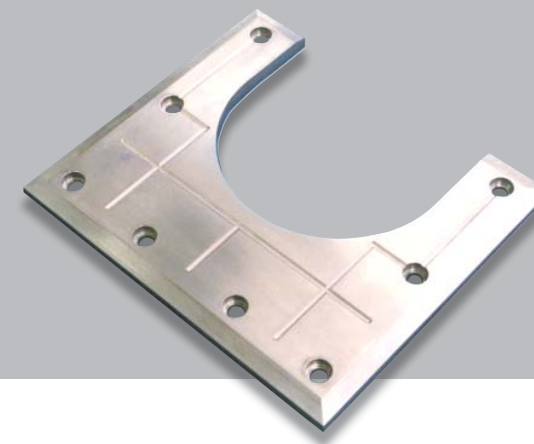
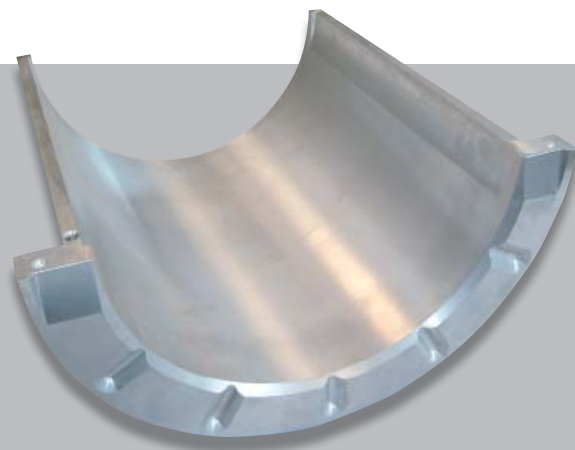
- Bearings and wear parts for support of mine workings and conveying systems
- Slide strips and wear plates for mill stands and forging machines
- Bearings for separating plants, crap cutters and ingot turning lathes

### Tool manufacture

- Guide bushes and slide plates for blanking and punching die
- Cam dwell plates
- Vee guides and cover plate guides
- Angular slide plates

### Cement and stone industry

- Bearing shells and thrust collars for roller stations
- Rocker bearings for crushers
- Bushes for presses, mixer and conveying equipment



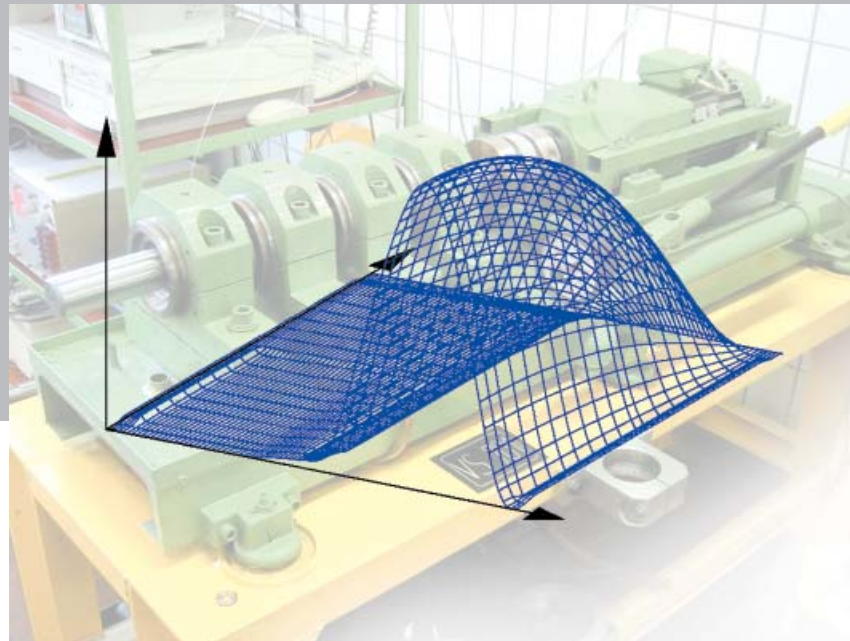
From the very start of product development up to manufacturing  
**all services provided by one partner**

**We perform development and construction**  
We invite you to benefit from our experience in research, development, and product design. In the case of new developments or problems with gliding and guiding tasks, we recommend you to contact us already in the planning phase. We develop elaborated installation proposals and the best solutions to problems. With this, you will benefit from our close co-operation with research institutes and technical universities as well as from our participation in relevant DIN and VDI committees.

**We compute and test**  
With the help of our proven computing methods, we dimension the Main-Metall® products by considering the complete tribological system, the lubricant, and the materials of the sliding partner. If demanded, we also perform testing under conditions close to reality in order to grant a high functional safety of your Main-Metall® product.

**We manufacture quality products**  
The experience of our qualified employees in combination with the latest manufacturing methods and with a modern quality management certified as per DIN ISO 9001:2000 assure you a high quality standard as well as delivery in good time.

**We help and advise**  
After the installation and during the operation of Main-Metall® products, we remain at your disposal to provide you with any further technical advice and service, at any time.



Main-Metall® in figures



Chemical composition (analysis (reference values))				
	Aluminum	Copper	Others and Additives	Zinc
%	35-40	1-5	2	Rest

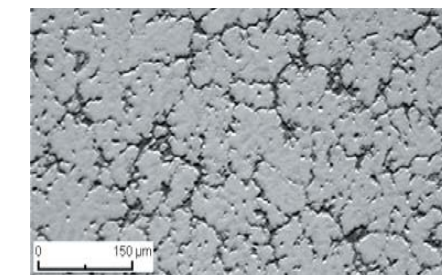
Sum of accompanying elements and additives. The composition is adapted to the various casting methods.

Technological data*			
Brinell hardness		HB 5/2500	80-110
Tensile strength	R <sub>m</sub>	MPa	280-320
0,2 % proof strength	R <sub>p0,2</sub>	MPa	220-300
Fracture elongation	A <sub>5</sub>	%	5-15
0,2 % offset yield strength	σ <sub>d0,2</sub>	MPa	240-270

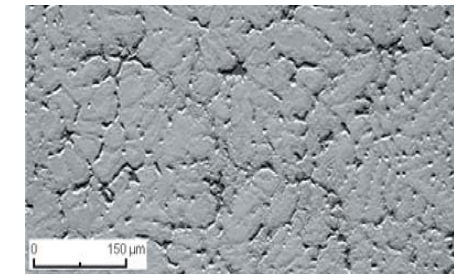
\*Standard values for chill casting determined with a separately cast test piece.

Physical data		
Density	kg/m <sup>3</sup>	4200-4500
E-module	MPa	75000
Heat conductivity	W/(m·K)	100 - 108
Specific heat capacity (20°C)	J/(kg·K)	670
Electrical conductivity	S/m	16,6 x 10 <sup>6</sup>
Linear expansion coefficient	1/K	22 x 10 <sup>-6</sup> - 24 x 10 <sup>-6</sup>
Case temperature	°C	-30 - 120

The mechanical characteristics and the microstructure allow to be modified by appropriate heat treatment.



Main-Metall®  
Sand casting



Main-Metall®  
Continuous casting

#### Metallurgical composition and microstructure

The exclusive use of high-purity primary metals of first casts and the production of the alloy in our works make sure that the quality remains on a uniformly high level.

The generated material has a heterogeneous and dendrite capillary microstructure with fine-grained composition of segregated mixed crystals. The mixed crystals themselves have a zone-shaped structure, with the difference of concentration between the core and the edge being considerable. In an intercrystalline process, a hard type of crystal rich in copper is separated. This microstructure is responsible for the special tribological characteristics of Main-Metall®.

#### Lubrication and lubricants

- Main-Metall®**
- is suitable for applications with oil or grease lubrication in the field of mixed friction as well as for hydrodynamic operation conditions.
  - is compatible with most lubricants on mineral oil or synthetic basis.
  - forms a powerful and low-cost tribological system, in particular with steel (preferably hardened and ground) as counter-material and with mineral oils customary in trade.

#### Quality

Our enterprise is certified as per DIN EN ISO 9001:2000. In manufacturing our Main-Metall® products, the materials and the production process are subject to continuous quality checks with permanent documentation after each working step.

We perform the following checks:

- chemical analysis of the material.
- geometrical measurement, inspection of the shape and of any positional deviations.
- surface roughness.
- hardness test according to DIN ISO 4384-2.
- in addition, destructive test methods are available for the mechanical workshop and are employed on a random sampling basis.
- the inspection of the metallic microstructure is effected microscopically.



Main-Metall International AG  
Business Cube  
Birkenstr. 47  
CH-6343 Rotkreuz

Fon: +41 41 740-6400  
Fax: +41 41 740-6402

[www.main-metall.com](http://www.main-metall.com)

Main-Metall Tribologie GmbH  
Industriestr. 1  
D-66885 Altenglan

Fon: + 49 6381 913-0  
Fax: + 49 6381 913-110

Main-Metall Española, S.L.  
Apartado 73  
E-39300 Torrelavega

Fon: + 34 942 8259-00  
Fax: + 34 942 8259-06

Main-Metall do Brasil  
Indústria e Comércio Ltda.  
Rua Dois, 368  
Distrito Industrial João Narezzi  
BR-13347-404 Indaiatuba (SP)  
Fon: +55 19 3936-6565  
Fax: +55 19 3936-6566

