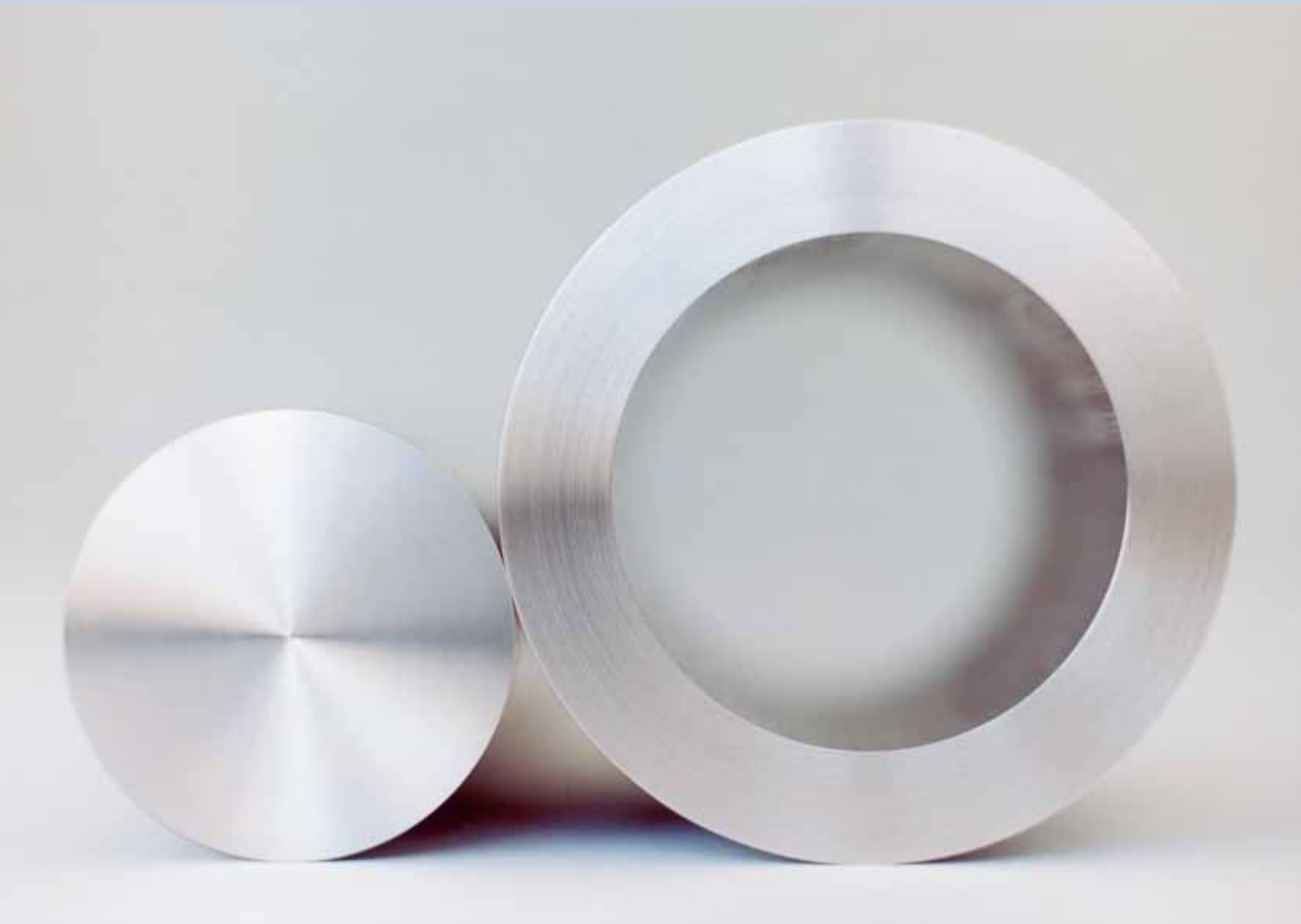
SWISSMETAL

Precision in Copper

CN8 – a most efficient material for challenging applications



Wearing parts are very often the critical parts in mechanical assembly processes, limiting the life duration. That is why designers pay particular attention to bearings and bushings. These types of parts must display a combination of high strength, good corrosion resistance and low friction coefficient.

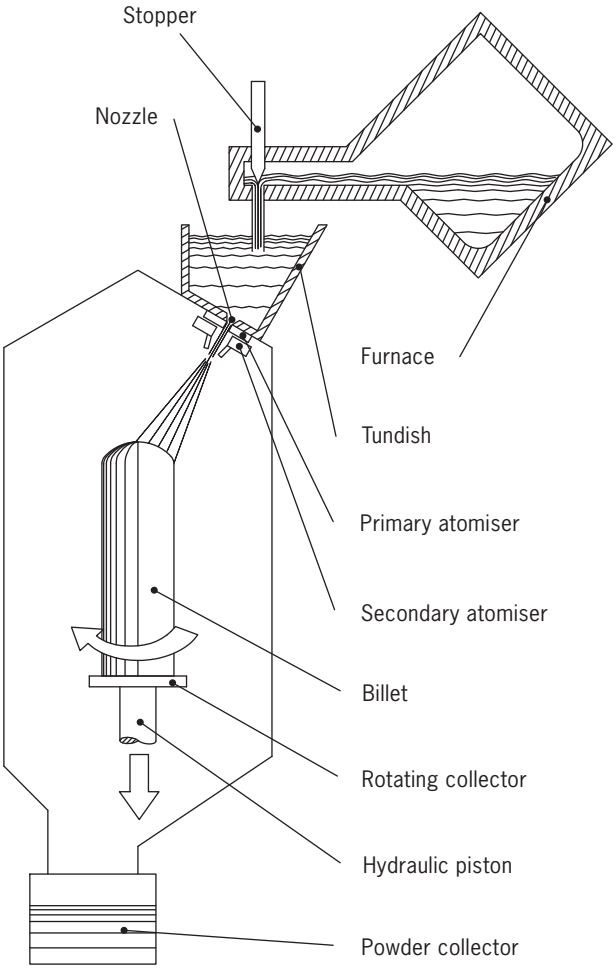
In this context, Swissmetal has developed specialist know-how for the manufacture of large dimension rods and tubes from a very high performance alloy designated CN8.

This material has an optimized combination of all the properties required for wearing applications and is capable of satisfying the most critical bushing and bearings requirements. Independent friction tests have shown a reduction of 30% in the friction coefficient compared with beryllium copper, which was previously considered as the reference material in this field of application.

Billet manufacture by the Osprey process

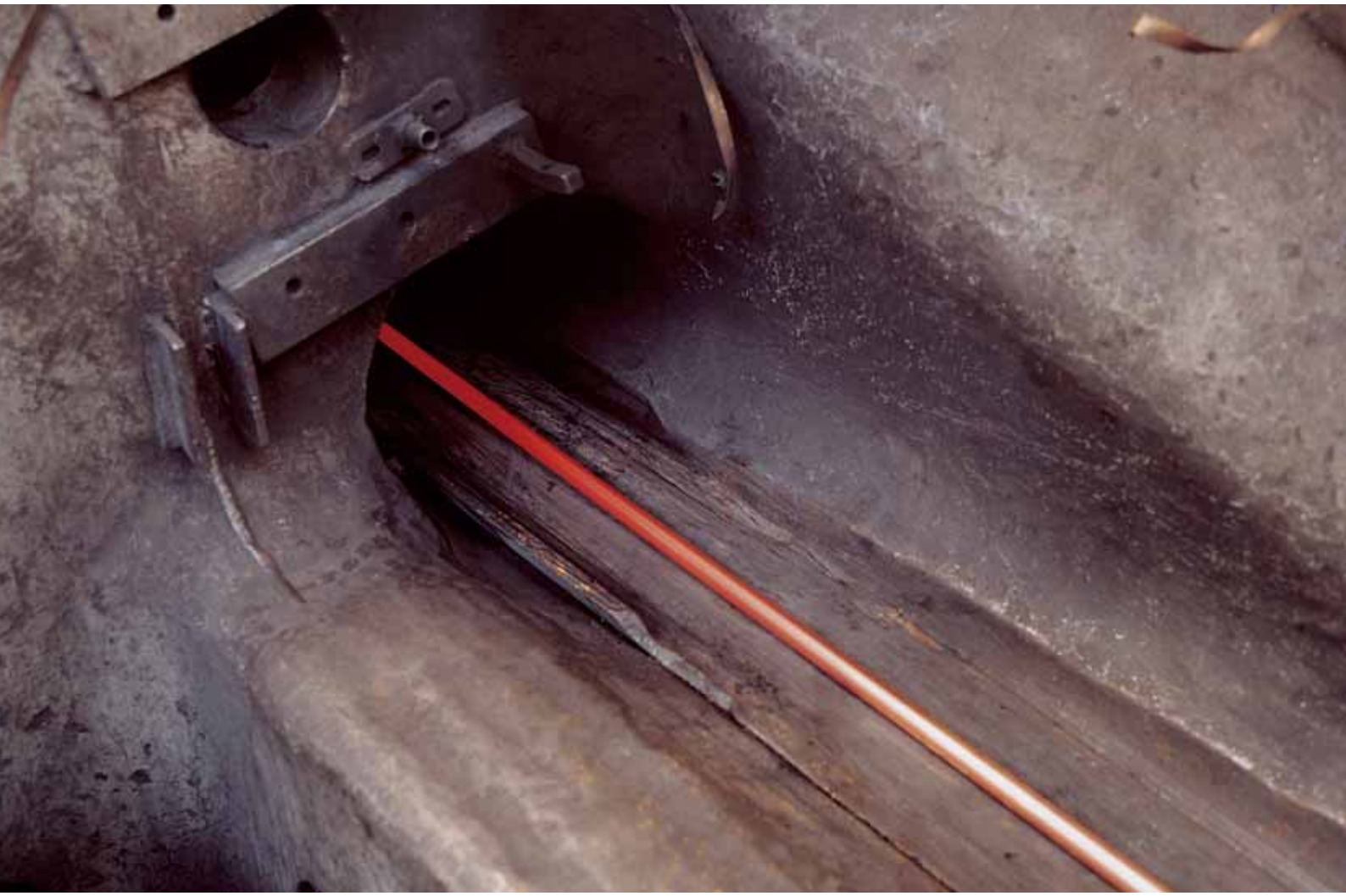
The first manufacturing operation is billet casting. Since CN8 has a very large melting interval (950 – 1115°C/1742 – 2039°F), the chemistry of the alloying elements is not suitable for traditional casting and solidifying processes due to the undesirable segregation phenomenon.

The solution selected by Swissmetal is the Osprey process (spray-compacting of billets). This is a rapid solidification process similar to powder metallurgy and consequently avoids any segregation phenomenon. The Osprey process is also commercially viable because it yields much larger billets than powder metallurgy. Since the CN8 Osprey billets are free of undesired segregation and the billets are of commercial size, they are ready for hot extrusion and further manufacturing operations.



Hot extrusion

The material is extruded in large dimension rods up to 120 mm (4.72 inches). Further development work currently underway for the manufacture of tubes from the CN8 Osprey billets. As the material is extruded directly into water, it is in a quenched and solutionized state ready for either cold deformation or aging heat treatment.



Cold drawing

To increase the level of strength, the material must be cold-deformed before aging. Swissmetal has specific equipment for the cold deformation of large dimension rods, bars and tubes. Adjustment of the cold deformation rate allows for precise selection of the final requested mechanical properties.

Two types of heat treatments are applied to this type of alloy:

1. Recrystallization/solutionizing heat treatment (annealing)

This heat treatment is used as an intermediate operation in the manufacturing process to recover a structure able to support further cold deformation. To avoid precipitation of the undesired brittle gamma phase, the heat treatment is carried out in a temperature range where this second phase is solutionized or is not precipitated in the material. This heat treatment is followed by water quenching and the material obtained is in its most plastic deformable state.

2. Aging heat treatment

Aging heat treatment is the final metallurgical operation of the manufacturing process. The objective of this treatment is to increase the strength of the material. In the case of CN8, the aging process has been termed “Spinodal decomposition”.

Swissmetal has developed considerable metallurgical know-how for this alloy and has a wide range of temper combinations relating to the degree of cold deformation as well as the actual aging parameters. The richness of the alloy allows us to optimize the various types of final properties in the material.

Finished product

After laboratory tests (chemical composition, mechanical properties), the material is delivered in rod, bar and tube with diameter and length tailored to the customer order and specification.

Some typical mechanical properties

Type	Diameter	Yield strength ($Rp_{0.2}$) [N/mm²/KSI]	Tensile strength (Rm) [N/mm²/KSI]	Elongation A50/2"	Brinell Hardness [HB]
Type 1	43 mm / 1.7"	1170/170	1230/178	2	340
Type 2	68 mm / 2.7"	1115/162	1200/174	5	340
Type 3	101 mm / 4.0"	860/125	1000/145	6	300
Type 3	51 mm / 2.0"	865/125	1004/146	6	300
Type 4	5 mm / 2.0"	697/101	846/123	8	----
Type 5	51 mm / 2.0"	628/91	797/116	17	----

Brief portrait

Swissmetal manufactures and sells high-quality speciality products made from copper and copper alloys in markets around the world. Its products are mainly used in the electronics, telecommunications, aviation, petroleum, automotive, stationery and watch industries and also for architectural purposes. Based in Dornach, Switzerland, Swissmetal is listed on the SWX Swiss Exchange as Swissmetal Holding Ltd.

Swissmetal Holding Ltd
Weidenstrasse 50
4143 Dornach 1 · Switzerland
Phone +41 61 705 33 33
Fax +41 61 705 36 10

Swissmetal Industries Ltd
Weidenstrasse 50
4143 Dornach 1 · Switzerland
Phone +41 61 705 33 33
Fax +41 61 705 36 10

Grand-Rue 6
2732 Reconvilier · Switzerland
Phone +41 32 482 04 82
Fax +41 32 482 01 16

Swissmetal Lüdenscheid GmbH
Altenaer Straße 109
58507 Lüdenscheid · Germany
Phone +49 23 51 181 0
Fax +49 23 51 181 209

Swissmetal Design Solutions Ltd
Weidenstrasse 50
4143 Dornach 1 · Switzerland
Phone +41 61 705 36 36
Fax +41 61 705 36 10
design-solutions@swissmetal.com

contact@swissmetal.com
www.swissmetal.com

Avins International Ltd
Weidenstrasse 50
4143 Dornach · Switzerland
Phone +41 61 705 36 00
Fax +41 61 705 36 11

Avins Switzerland Ltd
Weidenstrasse 50
4143 Dornach · Switzerland
Phone +41 61 705 36 00
Fax +41 61 705 36 11

Avins USA Corporation
Central Office The Americas
2 North Road
Warren · NJ 07059 · USA
Phone +1 732 469 8800
Fax +1 732 469 8801

West Coast Office
2716 Ocean Park Blvd. · Suite 1048
Santa Monica · CA 90405-5294 · USA
Phone +1 310 392 9292
Fax +1 310 392 1362

Avins Germany GmbH
Altenaer Straße 109
P.O. Box 13 60
58507 Lüdenscheid · Germany
Phone +49 2351 181 0
Fax +49 2351 181 200

info@avins.com
www.avins.com

SWISSMETAL avins

30 015/e 06.2008