# Powder metallurgical hard alloys

Wear and corrosion resistant

Swiss Steel Group

# Metallurgical and manufacturing know-how

**Swiss Steel Group with the facilities at Deutsche Edelstahlwerke offers a wide range of gas atomized Fe-, Ni- and Co-based metal powders. These are ideally suited for various applications.**

The know-how of Deutsche Edelstahlwerke is characterized by more than 160 years of experience in steel production. In addition to the conventional melting metallurgy, Deutsche Edelstahlwerke disposes of state-of-the-art facilities for powder metallurgy - from production of powder and semi-finished products to ready to install components.

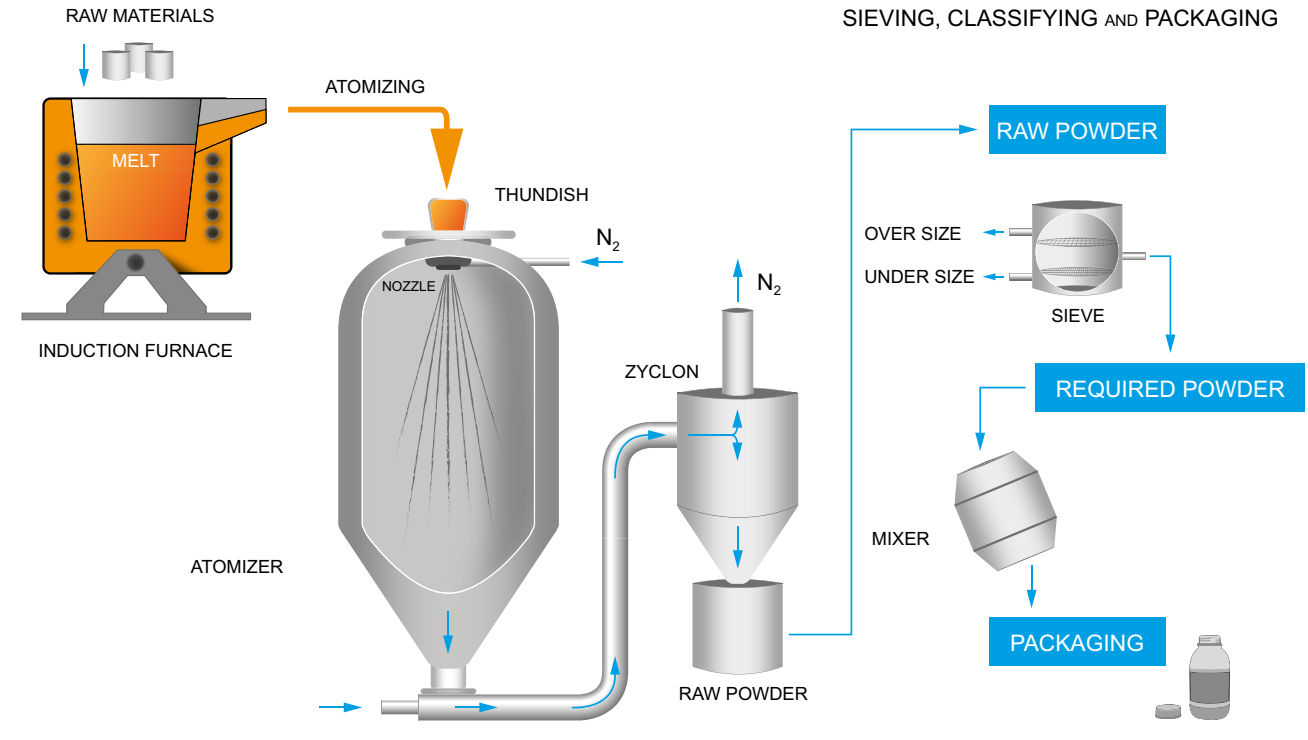
For powder production, raw materials are melted in an induction furnace and filled into an atomizer.

The actual atomization process takes place in a closed container in which the liquid melt is atomized under high pressure with the aid of inert gas.

In gas atomization, the solidification rate is sufficiently low so that the particles are formed in spherical shape.

The spherical particles guarantee excellent flow characteristics and thus good dosability of the powder.
The powder is also separated under inert gas. This ensures that the powder cools down without surface oxidation. The result is a low oxygen content in the powder.

## Metal powder production: Fe-, Ni- and Co-based alloys



# Wear and corrosion resistant

Hard alloys are metallic materials based on Fe, Ni or Co that contain a hard phase content of up to 50% by volume. This makes them ideal, for example, for coating components and surfaces subject to particulary high stresses and wear.

For more than a decade, Deutsche Edelstahlwerke has successfully produced a wide range of powder metallurgical products and offers more than 200 grades.

We would be happy to work with you to develop a material for your application.

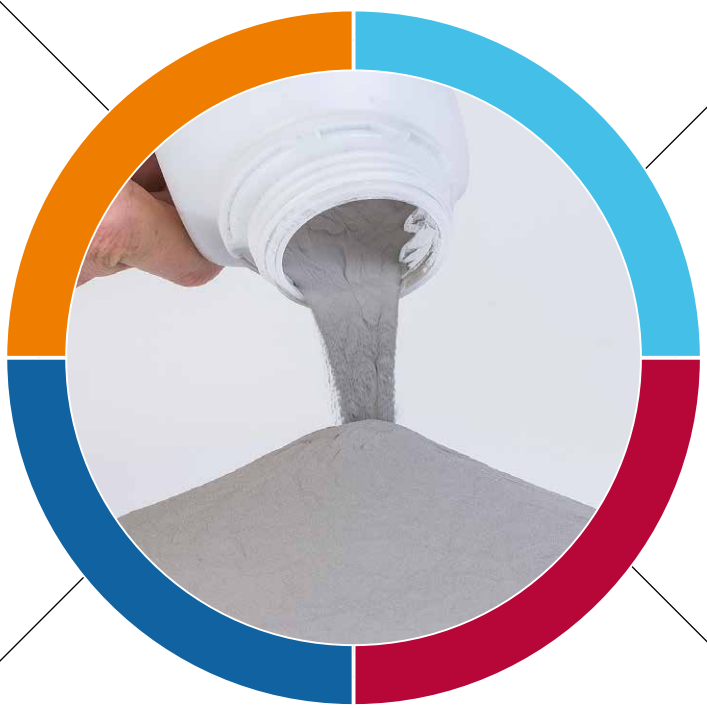
# Tailor-made for every application

### Iron base

Our portfolio comprises of over 50 different iron-based materials, ranging from low-alloy to high-alloy grades.
Please contact us to discuss the optimal material selection for our application.

### Cobalt base

Our cobalt-based alloys feature excellent high-temperature strength and oxidation resistance in combination with high wear resistance. This makes them the ideal materials for high-temperature applications.



### Nickel base

For applications requiring very good corrosion and oxidation resistance, our nickel-chromium alloys are the optimum solution.

### Tailor-made for your application

In addition to the materials listed, which are only an excerpt of our portefolio, our customers have the option of individual material compositions. Please feel free to contact us at powder@swisssteelgroup.com

# Iron-based materials*

## Low alloy materials

| Material / Standard | Chemical composition [in wt.-%] | | | | | |
|---|---|---|---|---|---|---|
| | C | Si | Mn | Cr | Mo | V |
| **Bainidur AM** | 0.22 | 0.8 | 1.4 | 1.0 | 1.0 | - |
| **SW 2365** | 0.32 | 0.3 | 0.3 | 3.0 | 2.5 | 0.5 |
| **SZW 5051** | 0.35 | 0.3 | 1.0 | 7.0 | 2.0 | - |

## Corrosion resistant materials

| Material / Standard | Chemical composition [in wt.-%] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | C | Si | Mn | Cr | Mo | Ni | Cu | Nb | N |
| **AS 4-P/LC (1.4404)** | < 0.03 | 1.0 | 1.0 | 17.0 | 2.0 | 13.0 | - | - | - |
| **17-4 PH (1.4548)** | < 0.07 | 0.5 | 0.5 | 17.0 | - | 4.0 | 4.0 | 0.3 | - |
| **1.4462** | < 0.03 | 0.5 | 1.0 | 22.0 | 3.0 | 5.5 | - | - | 0.15 |
| **A 7CN-P** | 0.1 | 1.0 | 7.0 | 19.0 | - | 9.0 | - | - | - |
| **HSA / Medidur** | 1.0 [1)] | - | 21.0 | 18.0 | 2.0 | < 0.1 | - | - | - |
| **Printdur® HCT** | 0.4 [2)] | - | 3.0 | 13.0 | 1.0 | - | - | - | - |

[1)] C + N = 1.0
[2)] C + N = 0.4

## Wear resistant materials

| Material / Standard | Chemical composition [in wt.-%] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | C | Si | Mn | Cr | Mo | Ni | Co | V | W |
| **Powderfort (~1.2709)** | < 0.02 | 0.5 | 0.5 | - | 5.0 | 18.0 | 13.5 | - | - |
| **Printdur 2343** | 0.37 | 1.0 | 0.5 | 5.5 | 1.3 | - | - | 0.4 | - |
| **Printdur 2842** | 0.9 | 0.1 | 1.8 | 0.5 | - | - | - | 0.1 | - |
| **FeCrV1-P** | 0.55 | 0.3 | 0.3 | 4.5 | 2.7 | - | - | 1.2 | 2.2 |
| **FeCrV10-P** | 2.5 | 1.0 | 1.0 | 4.5 | 1.2 | - | - | 10.0 | - |
| **FeCrV12-P** | 2.8 | 1.0 | 1.0 | 4.5 | 1.2 | - | - | 12.0 | - |
| **FeCrV15-P** | 4.3 | 1.1 | 1.1 | 13.0 | 1.2 | - | - | 15.0 | - |
| **SEO-P** | 3.7 | 0.5 | 0.5 | 30.0 | - | - | - | - | - |

*Excerpt only of our portfolio.
Our materials experts are available to work with your design team to develop customized products that are best suited for your application. Powder materials are available in particle size distribution of 0 - 250 µm. Particle size distribution and chemical specifications according to customer requirements are possible. Our metal powder is certified according to IATF16949 (automotive quality management) and DIN EN ISO 13485 (medical device quality management).

# Nickel- and cobalt-based materials*

## Nickel based materials

| Material / Standard | Chemical composition [in wt.-%] | | | | | | |
|---|---|---|---|---|---|---|---|
| | C | Si | Mn | Cr | Mo | Fe | Nb |
| **625** | < 0.03 | 0.5 | 0.5 | 22.0 | 9.0 | 4.0 | 3.5 |
| **625 LFe** | < 0.03 | 0.5 | 0.5 | 22.0 | 9.0 | < 0.5 | 3.5 |
| **Nibasit Ni60A-P** | 0.8 | 4.0 | 0.1 | 17.5 | - | 18.0 | - |

## Cobalt based materials

| Material / Standard | Chemical composition [in wt.-%] | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | C | Si | Mn | Cr | Mo | Ni | Fe | W |
| **Celsit 21-P** | 0.25 | 1.2 | 0.5 | 27.0 | 5.3 | 3.0 | 1.0 | - |
| **Celsit V-P** | 1.1 | 1.2 | 0.5 | 28.0 | - | 1.0 | 1.0 | 4.5 |
| **Celsit SN-P** | 1.4 | 1.2 | 0.5 | 30.0 | - | 1.0 | 1.0 | 8.5 |
| **Celsit N-P** | 2.4 | 1.2 | 0.5 | 32.0 | - | 1.0 | 1.0 | 12.5 |
| **SZW 5021** | 1.9 | 1.2 | 0.5 | 26.0 | - | 22.0 | 1.0 | 12.5 |
| **CoCrF75** | < 0.14 | < 1.0 | < 1.0 | 28.0 | 6.0 | < 0.1 | < 0.75 | - |

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# More than just metal powder

## Best properties due to optimum microstructure - Powder metallurgical tool steels

In addition to conventionally melted steels, we offer powder metallurgically produced cold-work and high-speed steels. In contrast to tool steels produced by melting powder metallurgical tool steels offer optimized properties in terms of wear, toughness and hardness. These properties are archieved by a fine-grained and segregation-free microstructure. As a result, the service life of heavily stressed components can be increased.
Learn more at: powder@swisssteelgroup.com

## The Printdur portfolio for additive manufacturing

Metal powders for additive manufacturing are also offered, in addition to our hard alloys and powder metallurgical tool steels. We offer a wide product variety and range, the latest production technology, combined with excellent product quality.

Whether in aviation, medical technology, toolmaking or in automotive lightweight construction, additive manufacturing is on the rise and high-quality metal powders are essential.

Besides the wide range of our Printdur portfolio, there is also the possibility of individual material solutions. These may involve classic powder grades, bainitic steels or martensitic tool steels.
Please contact us at: powder@swisssteelgroup.com

Highest quality, individual service, and close customer proximity are just a few of our strengths. Our materials experts are available to work on special steel solutions with you.

Are you interested in other special steel solutions?
Learn more at: swisssteel-group.com

**Swiss Steel Group**

Production site:
Deutsche Edelstahlwerke
Specialty Steel GmbH & Co. KG

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