A Brief History and Description of the Company

Established in 1977, FAI-FTC is a foundry for heat-resistant and stainless steel. In its two plants, the company produces static castings and centrifugally cast tubes in accordance with clients’ projects and specifications.

The most direct and effective way to produce steel items in complex shapes is by either static casting or centrifugal casting in a rotating mould. Casting is the only possible option when items are to be made in special alloys with high physical and mechanical properties. The characteristics of these alloys do not allow the material to undergo processes such as rolling, forging, or drawing while the process of casting enables the production of items of complex design in a wide range of materials by simply varying the elements that make up the alloy.

Thanks to a greater flexibility in the foundry production process, users may even order only a few pieces at a time, thus reducing stock costs. The quality of the castings is superior to that of welded products from rolled steel, as castings that have been designed correctly present fewer defects and last longer. In particular, statistical data show that the difference between the cost of a rolled tube and that of a centrifugally cast tube increases in proportion to the tube diameter. So the bigger the dimensions of the tube, the cheaper it will be to purchase tubes using the centrifugal casting process.

The advantages of casting over rolling or other processes:

- Project flexibility: with this production technique, complex forms can be created.
- Metallurgical versatility: the process allows the use of a large quantity of alloys with high mechanical properties.
- Quality: greater uniformity of mechanical properties.
- Lower Costs: increased product lifetime and smaller minimum production batches.

Its key markets are the steel industry, heat treatment, petrochemical, and incinerators. The quality of its products and a reactive service are the founding values of the company. Driven by the conviction that the Quality Management System is essential to continuous improvement, the company achieved its first certification of compliance with UNI EN ISO 9001 Standards as early as 1994.

Right from the beginning, FAI-FTC has been a member of the Steel Founders’ Society of America and as such has always been updated on innovations and advanced research in the sector, in terms of both materials and production technologies.

Why Choose a Casting

Established in 1977, FAI-FTC is a foundry for heat-resistant and stainless steel. In its two plants, the company produces static castings and centrifugally cast tubes in accordance with clients’ projects and specifications.

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How to Order Castings

The relation between customer and foundry is of the utmost importance, from the initial product engineering phase, throughout all the production steps and right up to the operation. Close cooperation between technical departments in defining and designing the casting, as well as proper scheduling of lead times, guarantee satisfaction and excellent results to both the customer and the supplier.

To produce a casting with any moulding process, it is necessary to know in advance:

- the project (design, dimensional tolerances, machining parameters)
- the number of pieces
- the alloy
- required final testing
- supplementary requirements such as:
  - dye penetrant inspection or x-ray controls
  - acceptance criteria
- any other information that may contribute to the successful outcome of production and the use of the casting

All relevant details must be specified both on the request for quotation and on the purchase order.

The Quality of the Castings

The quality of the casting defines its final cost: the higher the quality of the casting, the less its real cost.

The actual cost of the equipment does not coincide with its purchase price alone, but also depends on its lifetime and on set-up costs.

\[
\text{Actual Cost} = \frac{\text{Cost of Purchase} + \text{Number of set-ups} \times \text{Cost of set-ups}}{\text{duration}}
\]

A good quality casting has a longer lifetime and therefore reduces the number of set-ups required to replace any worn-out part.

As a consequence, the quality control of the castings is an important phase of the production process. However, it is important not to require more controls than necessary, as these may also excessively affect the final price of the pieces.

In general, there are two quick, simple and inexpensive methods that enable us to verify the quality of the castings:

- visual and dimensional inspections: a fast and very economic method for timely detection of potential surface flaws such as porosity, cracks, inclusions, etc.
- Dye Penetrant Inspection: a simple and low-cost method for the detection of surface defects not visible to the naked eye.

X-ray control belongs to quite another category. It is very costly and should be used only for the production of prototypes.
Recommendations on the Use of Castings

The life of heat-resistant castings can be prolonged by following a few simple rules:

- handle the castings with care during unpacking, storage and assembly: heat-resistant alloys have low ductility at room temperature; any type of impact may damage the pieces;
- always clean the surface from contaminants (oils, grease, paints...) prior to introducing the equipments into the furnace: at high temperatures, such contaminants may make the atmosphere in the plant become corrosive;
- during operation, periodically check the surface of the casting, taking care to note any signs of initial defects and how long it takes before they appear. It is recommended to report immediately to the supplier, in order to understand the reason of anomalies and then take actions to delay or prevent further damage;
- inform your supplier immediately if you need to change the operating conditions of the furnace.

In general, the continuous exchange of information between the user and the foundry can contribute to product improvement, even under the most severe operating conditions.

Heat-resistant Steels

Heat-resistant cast steels are used in systems where the operating temperature exceeds 650°C (1200°F) and can endure temperatures of up to 1220°C (2228°F).

In order to identify the best alloy to meet production needs, these operating conditions must be taken into consideration:

- normal operating temperature
- maximum and minimum furnace temperature
- maximum and minimum temperature close to the components
- periodicity of temperature cycles
- thermal expansion of the components
- applied load
- loading method, support and structural constraints
- minimum duration required (calculated through a trade-off analysis between cost and duration of the casting)
- acceptable degree of deformation
- operating atmosphere

In keeping with these data, the engineer establishes the most suitable alloy capable of

- resisting the temperatures and corrosive environment of the system
- having a deformation that is controlled and compatible with the structure limitations of system
- having a creep in conformity with the load on the piece
- having the necessary tensile strength

Several reports and researches offer plenty of technical data and case studies that engineers can use to decide which alloy is best for even the most complex operating conditions. During this phase, it is essential that the client provide the supplier with as much information as possible.

Below are some tables to illustrate which are the key elements in choosing cast steels to be used in various sectors.
<table>
<thead>
<tr>
<th>Alloy</th>
<th>Material-number</th>
<th>C [%]</th>
<th>Si [%]</th>
<th>Mn [%]</th>
<th>P max [%]</th>
<th>S max [%]</th>
<th>Cr [%]</th>
<th>Ni [%]</th>
<th>Mo [%]</th>
<th>Nb [%]</th>
<th>Co [%]</th>
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<th>Tensile Test</th>
<th>Hardness</th>
<th>Specific Weight</th>
<th>Heat Capacity</th>
<th>Thermal Conductivity</th>
<th>Average Thermal Expansion</th>
<th>Long term Characteristics</th>
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1) T Max = 1,1*Ftc
2) This type can also be used for wear resistant castings; in this case it can be aged without heat treatment.
3) +A indicates “annealing”
4) The castings must be supplied in annealed condition; in this case a max. value for the hardness can be agreed in advance.
5) Heat treatment: annealing.
6) The castings can be supplied in annealed condition; in this case a max. value for the hardness can be agreed in advance.
7) T Max = 1,1*Ftc
8) +A indicates “annealing” after 20°C and
9) The castings must be supplied in annealed condition; in this case a max. value for the hardness can be agreed in advance.
10) T Max = 1,1*Ftc
11) The castings must be supplied in annealed condition; in this case a max. value for the hardness can be agreed in advance.
12) T Max = 1,1*Ftc
13) The castings must be supplied in annealed condition; in this case a max. value for the hardness can be agreed in advance.
### Austenitic Materials

#### Composition

- **CrNiSiNb**
- **NiCrSiNb**
- **35-25-20-20-Nb**
- **NiCrNb**
- **NiCrCo**
- **CrNiSi**
- **GX 25**
- **GX 40**

#### Heat Treatment

- **Desig.**
- **Nominal Temperatures**

#### Tensile Test

- **Min.**
- **Max.**

#### Mechanical Properties

- **Specific Weight**
- **Heat Capacity**
- **Z诤 No.**

#### Nominal Thermal Expansion

- **Nominal Temperature Range**

#### Long-term Characteristics

- **Max. Temperature in Air**
- **Max. Temperature in Air**

### Alloy Properties

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<tr>
<th>Alloy</th>
<th>Cr (wt.%)</th>
<th>Ni (wt.%)</th>
<th>Mo (wt.%)</th>
<th>Si (wt.%)</th>
<th>S (wt.%)</th>
<th>C (wt.%)</th>
<th>C (wt.%)</th>
<th>Ni (wt.%)</th>
<th>Mn (wt.%)</th>
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</table>

### Additional Notes

- **σ**: Stress in MPa for 1% elongation after 1020°C.
- **σ**: Stress in MPa for 1% elongation after 1020°C.
### Mechanical Characteristics at Ambient Temperature

<table>
<thead>
<tr>
<th>Designation</th>
<th>Material number</th>
<th>Corrosion-resistant Materials</th>
<th>Cr [%]</th>
<th>Mn [%]</th>
<th>Ni [%]</th>
<th>Cu [%]</th>
<th>W [%]</th>
<th>Mo [%]</th>
<th>Al [wt %]</th>
<th>Si [wt %]</th>
<th>Max. [%]</th>
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<td>0,035</td>
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### Designation Material-

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<th>Heat Treatment</th>
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# Superalloys

## Composition

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<th>Mn [%]</th>
<th>P [%]</th>
<th>S [%]</th>
<th>Cr [%]</th>
<th>Mn [%]</th>
<th>Mo [%]</th>
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## Heat Treatment

### Tensile Test

- 240: Yield Stress
- 400: Tensile Stress
- 3: Elongation

### Hardness

- A: % min.
- 650: [HB] max.

### Specific Weight

- 492: [kg/dm3] at 20°C

### Heat Capacity

- 521: [J/(kg*K)] at 20°C

### Thermal Conductivity

- 604: [W / (m * K)] at 20°C

### Average Thermal Expansion

- 731: [10^-6*K^-1] between 20°C and 1000°C

### Long Term Characteristics

- 919: Max. Temperature in Air

### Max. Temperature in Air

- 1138: 20°C
- 1148: 100°C
- 1158: 500°C
- 1168: 800°C
- 1178: 1000°C
- 1188: 1100°C

### Designation Material-number

- 24815: 2.4815
- 24778: 2.4778
- 24808: 2.4808
- 24915: 2.4915

### Temperature

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<td>[J/(kg*K)]</td>
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</table>

### Notes

- 1 Mpa = 1 N/mm²
- σ_r: Mittlere Spannung für Bruch nach 100h und 1.000h
- σ_1%: Mittlere Spannung für 1%-Dehnung nach 10.000h
- σ_re: Mittlere Spannung für 1%-Dehnung nach 10.000h
Some of our products
Our commitment

We believe in our work and accomplish it with fairness and enthusiasm, always following these principles:

- Maximum attention to safety in our facilities and to environmental protection.
- Constant training of personnel.
- Continuous improvement of product quality and service through:
  - investments in state-of-the-art equipment;
  - use of software for the calculation of complex parameters such as casting and feeding systems, stress on resilient sections, etc.;
  - collaboration with research laboratories.