



ECN

Your energy. Our passion.

Metal Injection Moulding (MIM)

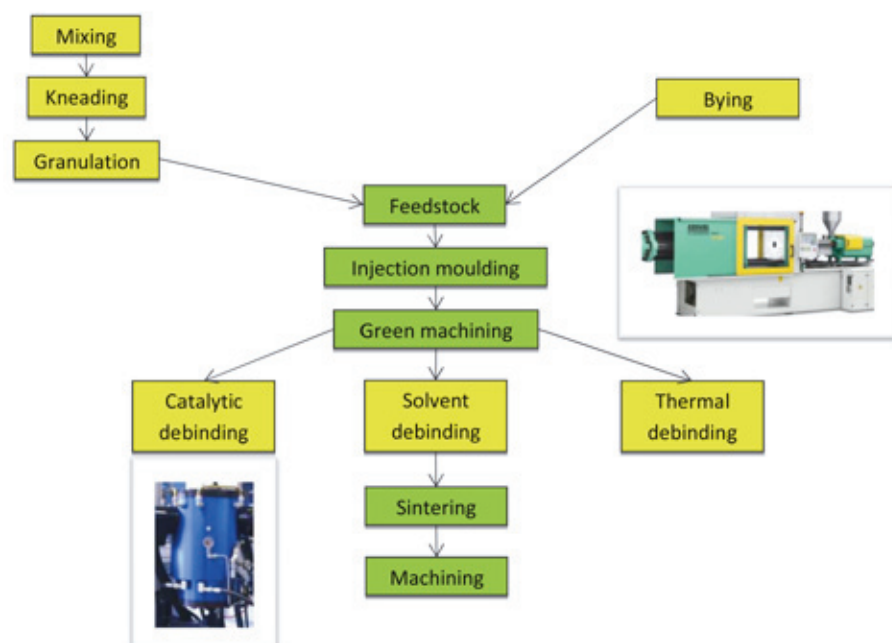
Tungsten and molybdenum refractory metal products

ECN develops and produces world class quality refractory metal products through Metal Injection Moulding.

The ECN Metal Injection Moulding Technology is recognized to produce the world's highest quality tungsten and tungsten alloy parts available at the moment. The technology comprises the knowhow regarding the processes of compounding, injection moulding, debinding and sintering, and can be used with a variety of metals and metal alloys, such as refractory metals and special steels. The technology has been optimized for the production of tungsten parts used for lighting, extreme temperatures, shielding and vacuum applications. The stainless steel parts that have been realised belong to the low activation Oxide Dispersed Strengthened (ODS) Eurofer steels.

Benefits

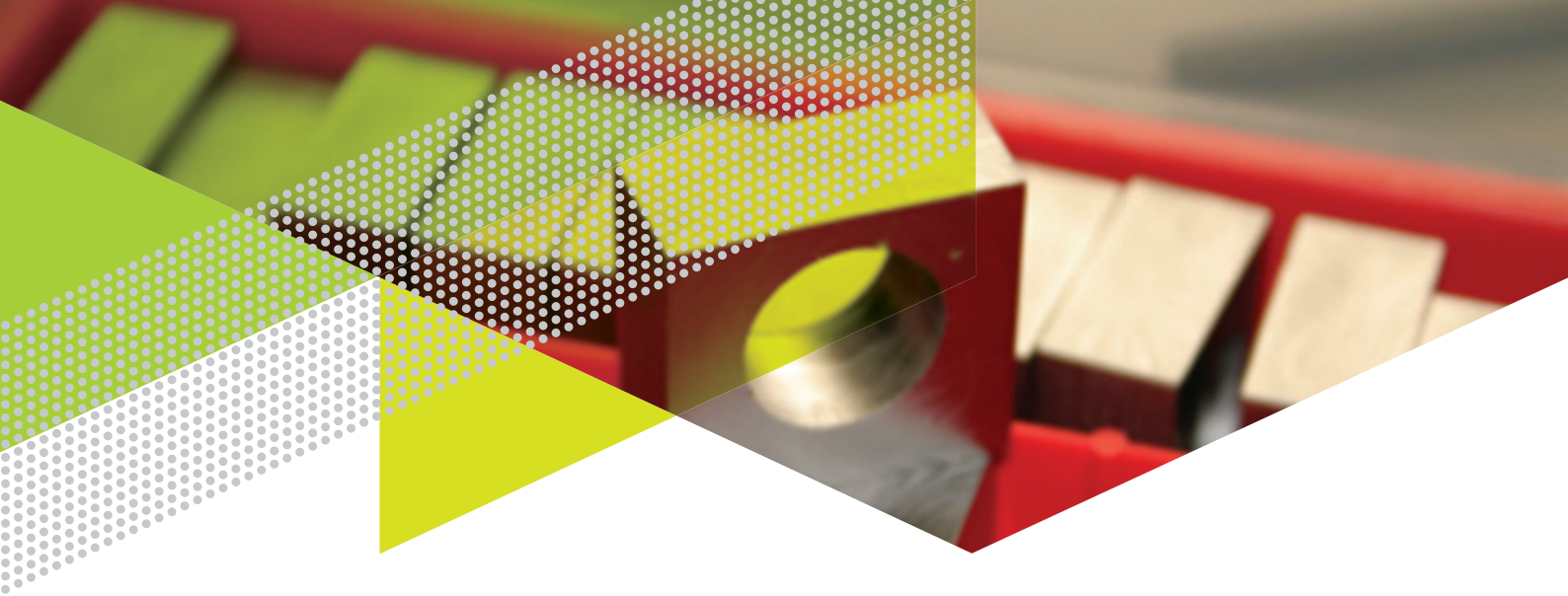
- Efficient, clean net-shape manufacturing, no need for machining
- Isotropic, homogeneous and fine microstructure
- Special material compositions
- High-purity materials
- High temperature resistance, high thermal conductivity, high resistance to wear
- Many possibilities for alternative designs
- Suitable for large-scale manufacturing
- High density or defined porosity



ECN
Westerduinweg 3, Petten
High Tech Campus 5, Eindhoven
The Netherlands

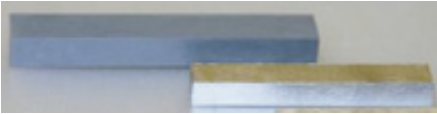
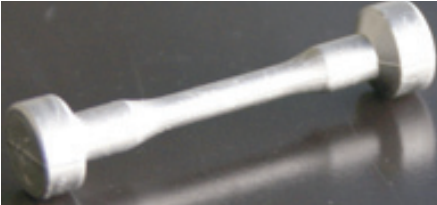

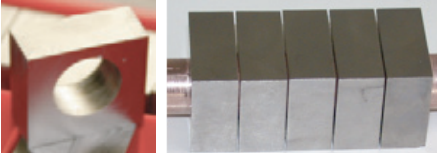
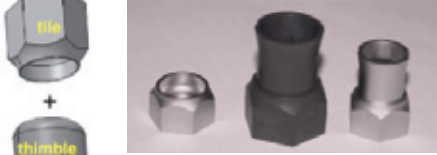
Contact:
Environment & Energy Engineering
T +31 (0)88 515 4661
eee@ecn.nl

ecn.nl/eee
ecn.nl/serviceoket



Products

Examples of products and parts produced to prove the viability of the technology in the most challenging environments as well as production parts for complex industrial or lighting solutions.

 <p>Green & as sintered Standard Charpy test sample</p>  <p>As sintered Standard Tensile test sample</p>	 <p>As sintered bolts</p>
 <p>As sintered monoblocks and mock up for ITER divertor target</p>	 <p>Pilot products by 2-step MIM process</p> <p>= one part</p>

Materials science at ECN

ECN solves both complex and more simple engineering issues. We have built many pilot set-ups and installations that involved extremely highly demanding process conditions. Solutions are often found through practical combinations of different materials such as glass, ceramics and metals. This way the special process demands can be met in a cost-effective manner.

Common material combinations are:

- Construction materials such as high-strength steels and high alloys,
- Refractory metals and ODS steels,
- Aluminium, non-ferrous materials,
- Composites,
- Glass and quartz,
- Ceramic materials,
- (Fibre reinforced) graphite,
- (Fibre reinforced) plastics,
- Coatings; organic, hybrid and inorganic.