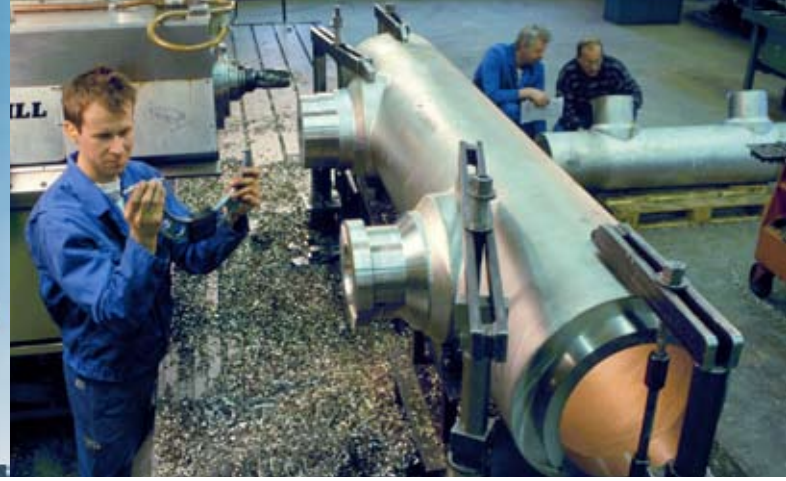


Powder metallurgy solutions for offshore applications





Offshore applications for net shape parts

Sandvik Powdermet – experts in materials technology and production services

Sandvik Powdermet focuses on materials technology for the development, production and supply of hot isostatic processed powder metallurgy components.

We are the world's leading supplier of Powder Metallurgy (PM), Hot Isostatic Processed (HIP), Near Net Shaped (NNS) components ranging from 100 grams to 15 tonnes, in high alloyed steels, stainless steels, Ni and Co base alloys and Metal Matrix Composites (MMC).

Our business objective is to lead the expansion of HIP, NNS components through the active development and marketing of components with complex geometry on short reliable delivery, combined with design flexibility and tailor-made properties.

We aim to establish long term partnerships with our customers in order to give a competitive edge to their products.

Using active supplier/subcontractor networks, we utilize world class technology to manufacture our components.

Commercial advantages

- Short delivery time
- Design freedom and flexibility
- Minimised welding
- Elimination or reduction in machining
- Cost savings for finished product
- Life cycle cost savings

Technical advantages

- Isotropic physical properties, no segregations
- Enhanced properties vs. castings and forgings
- Ultrasonic inspection
- Clad or compound solutions
- MMC: Metal Matrix Composites

The PM HIP Process

The PM HIP process allows for considerable design flexibility in shaping components, making it especially suitable for flanges, fittings, tees, valve bodies, manifolds, piping and pump parts. Often involving irregular shapes and small runs of a type and size, each component can be individually designed, so that it is guaranteed to meet its operating requirements.

The production process from the melt to the finished product takes place in three stages. Powder is produced by inert gas atomization. The powder is canned in sheet metal capsules to give the product its desired shape. The capsules are then consolidated into full density under high pressure and temperature by Hot Isostatic Processing (HIP).

Quality assurance

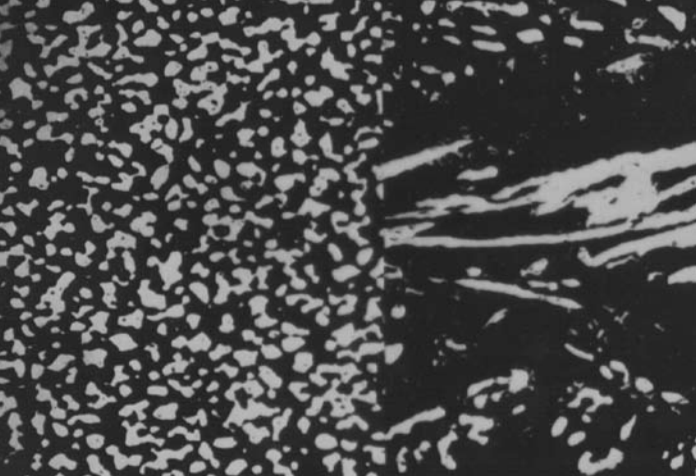
The entire production flow complies with comprehensive quality assurance systems in accordance with the ISO 9001 2000 standard. Sandvik Powdermet also has an environmental management system in compliance with ISO 14001 2004 and occupational health and safety standards in accordance with OH SAS 18001.

Product size and weight range

Maximum dimensions after HIP are 1200 mm diameter and 2850 mm high. Maximum weight is approximately 15 tonnes.

The Sandvik Group

The Sandvik Group is a global high technology enterprise with 39,000 employees in 130 countries. Sandvik's operations are concentrated on three core businesses: Sandvik Tooling, Sandvik Mining and Construction and Sandvik Materials Technology – areas in which the group holds leading global positions in selected niches.



Applications

The wye-piece

40% weight reduction achieved on wye-piece using hot isostatic pressing.

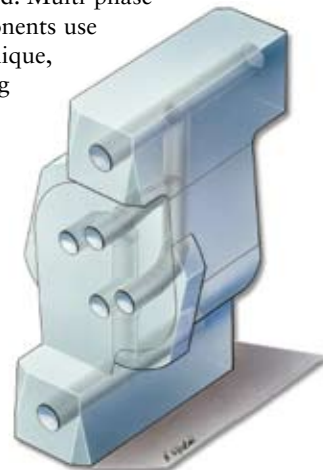
The benefits and successes of hot isostatic pressing in the manufacture of high grade steel components are creating high levels of among offshore customers for Sandvik Powdermet products, the recognised PM HIP specialist. A large subsea wye-piece in UNS S318 03 duplex stainless steel was a particularly demanding order, requiring a great deal of design work, including stress analysis and 3D finite element analysis. Made conventionally by casting or forging, the piece would have been oversized, giving a likely weight of around 3,5 tonnes to withstand the 250 bar design pressure. The PM HIP process permits a significant degree of optimization, with the result that the finished piece weighed only 2 tonnes.



Wye-piece in duplex stainless steel made by Sandvik Powdermet. The angle between the legs is 15 degrees and maximum wall thickness 80 mm (weight 2 tonnes).

The swivel

Sandvik Powdermet has achieved market penetration with offshore components, utilizing the company's net shape expertise to produce complicated parts for subsea applications. Key areas are barrels for multi-fluid analysis, wye-pieces for pipeline installations, manifolds for topside and subsea installations, valve bodies for choke and control valves and swivels. Swivels with internal passages for oil/ gas, water injection and power connections are heavy duty items with considerable value added. Multi-phase duplex stainless steel swivel components use the versatility of the PM HIP technique, which is capable of accommodating multiple, flow paths.



See through illustration of top part of the swivel, weight 9 tonnes.

Manifolds

Manifolds are designed with integrated branches. The HIP process allows wall thickness to be optimized. Critical welds are eliminated and machining and NDE are reduced. Clad designs are an option.

Common alloys: Duplex, Super Duplex and Austenitic Stainless Steel.





More Offshore applications

Manifold/manifold system

Customer/field: Scomark, England/Marathon, East Brae North Sea

Material: UNS 31803, Duplex alt UNS 32760, Super Duplex

Dimensions: ID 16"

Weight: 1-4 tonnes/piece

Valve body

Customer/field: Different customers

Material: UNS 31803, Duplex alt UNS 32760, Super Duplex, UNS 31254 Super Austenite

Weight: 250-2000 kg/piece

Elbow riser

Customer/field: Sofec, USA/TerraNova, Canada

Material: Alternative depending on atmosphere; UNS 31803, Duplex alt UNS 32760, Super Duplex

Dimensions: Length 900 mm, OD 350-550 mm, ID 250 mm

Weight: 160-450 kg/piece

Mixerhouse

Customer/field: FRAMO, Norway/Gullflaks, North Sea

Material: Two different materials in one piece, Super Duplex/Duplex, UNS 32760/UNS 31803

Dimensions: Length 1800 mm, OD 750-900 mm, ID 550 mm

Weight: 1-3 tonnes/piece

Wye-piece

Customer/field: Rockwater, England/East Spar Alliance, Australia

Material: UNS 31803, Duplex

Dimensions: Length 2000 mm, OD 450 mm, ID 350 mm

Weight: 2 tonnes/piece

