

**Reverse Engineering**

**Customised Manufacture of Parts  
and Assemblies**



# Reverse engineering from KSB: High-quality spare parts, reliably supplied

Whenever you need parts for KSB pumps and valves or third-party products, our reverse engineering service is the ideal solution. Take advantage of our rapid manufacturing processes to order castings, machined parts and complete assemblies for pumps, valves and other rotating equipment. Get high-quality spare parts from a single, reliable source.

### Your challenges



Downtime and production loss due to lengthy lead times



Spare parts obsolescence leads to costly component replacement or even system conversion.



Spare parts not available in optimal material and design increase maintenance costs.



Spare parts have to be stored until they become needed. This causes high initial investment.

### Your benefits



Extended system availability and mean time between repairs (MTBR)



Reduced maintenance and inventory costs



Fast manufacturing and delivery in emergency cases



Independence from OEM spare part policies

# Our range of solutions for products and spare parts

We engineer everything from entire assemblies to spare parts. Our offering includes centrifugal, reciprocating and vacuum pumps<sup>1</sup>, compressors, motors, gear boxes, mixers, fans and valves. We manufacture cast and machined parts such as casings, bearing housings, covers, impellers, shafts, sleeves, rings, pistons and more.



We pour over 300 alloys. Our foundries are designed for maximum flexibility to support our customer's changing needs. We are equipped to pour ferrous, non-ferrous, nickel-base and cobalt-base alloys.

<sup>1</sup> New third-party pumps may only be manufactured outside of the European Union (EU Machinery Directive); modifications to pumps (retrofits) are still possible without regional restrictions.



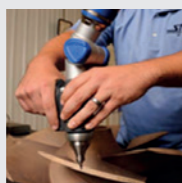
## Value-added engineering

Our engineering staff can improve your mean time between repairs (MTBR) and reduce your maintenance costs by developing quality solutions that meet your needs and expectations.

Engineering type	What we do
<b>Reverse engineering</b>	We work together with you to provide a direct replacement that will meet or exceed the original fit, form and function of your part or pump.
<b>Metallurgical engineering</b>	We assist you with material upgrades to enhance your equipment reliability.
<b>Design engineering</b>	We upgrade your casing, seal chamber, bearing housing or existing API pump to the latest API 610 edition. We standardise components to maximise part interchangeability.
<b>Hydraulic engineering</b>	We use computational fluid dynamics (CFD) to optimise the hydraulic fit of a pump, resulting in an extended MTBR and lower energy costs for pump operation.

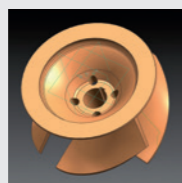


### Reverse engineering process: cast or printed parts<sup>1</sup>



#### Measurements

If a drawing is not available, we use specialised equipment to measure and digitise the geometry of a sample part.



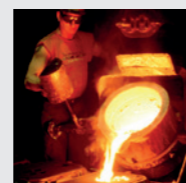
#### 3D design

Our experts then rationalise the data into a 3D model. Metallurgical, design or hydraulic upgrades are provided if required.



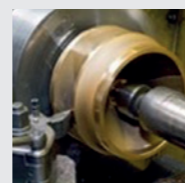
#### Moulding

Based on the 3D model, the mould is created using a sand printer or conventional patterns.



#### Casting

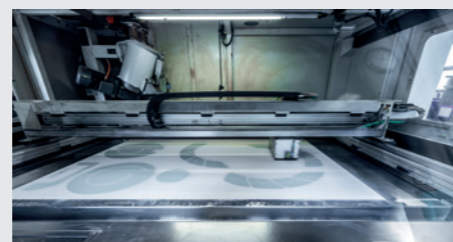
In the next step, the raw part is cast. We pour 300 different alloys.



#### Machining

Depending on the part type, final process steps such as machining, balancing and testing are performed.

#### Alternative process: 3D metal printing



Based on the 3D model, the raw part is produced in an additive manufacturing process. Metallic powder is selectively melted layer by layer using a laser.

<sup>1</sup> Even much easier for machined parts

## Ready for a quotation?

In order to prepare a personalised quotation, we first need information about your part and quantity requirements. Just follow these five steps to help us better understand your needs.



Make images of all sides of the part and especially of any specialties, e. g. worn areas.



Measure and document dimensions of the part: height, depth, "box size" is sufficient.



State the approximate weight of the part.



Identify and document the part material.



State the desired quantity. The higher the quantity of parts – the lower the part price.

We offer three different delivery categories depending on the urgency of your order.

Delivery category	Typical delivery time <sup>1</sup>
Regular	6-8 weeks
Express line	3-4 weeks
Emergency case	1-2 weeks

<sup>1</sup> Depending on part type; example: standard impeller

## Reverse engineering: What we have already done

Discover how our reverse engineering processes have benefited our customers. We offer short delivery times, solutions for obsolete original parts and longer service lives thanks to upgraded designs, higher-grade materials or KSB's own high-quality materials. Furthermore, we help you to avoid system modifications.

### Hydraulic upgrade: NPSHr reduction for longer uptime

#### Challenge:

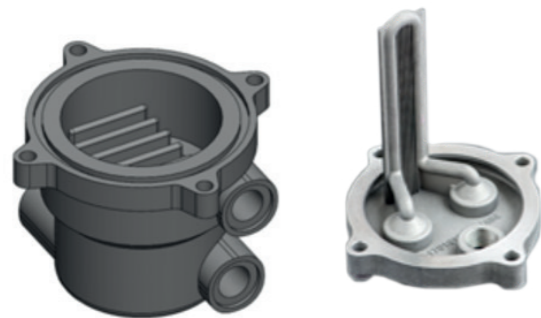
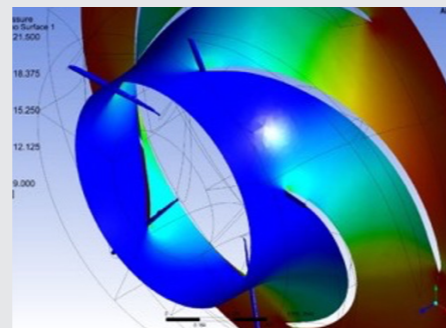
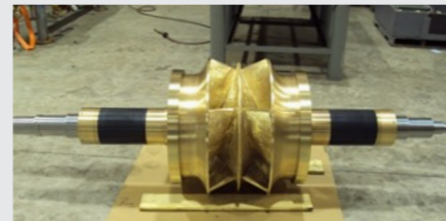
The profile of a river changed over the years reducing the available suction level by 3 m. This caused the pump to operate with cavitation effecting a significant damage to the impeller.

#### Solution:

Based on a computational fluid dynamics (CFD) optimisation, a hydraulic specialist reduced the NPSHr by 4 m to the initial design point.

#### Customer benefit:

The mean time between repairs before the upgrade was 8 months. The pump has been running for 5 years now without any problems.



Original part

New design

### 3D printing: Design upgrade reduces weight and improves properties

#### Challenge:

The customer needed an oil cooler in a critical pump application as soon as possible.

#### Solution:

A 3D printing process was selected. The design upgrade effected a weight reduction and an improvement of the heat transfer. The delivery took place within 2 weeks.

#### Customer benefit:

Quick availability of the critical pump and improvement of part's properties.

### Shaft cannot be delivered by OEM

#### Challenge:

The customer needed a shaft for an axial flow pump. The OEM no longer exists.

#### Solution:

Production and delivery of the shaft (length: 5.6 m) by KSB.

#### Customer benefit:

The customer received the spare part to repair and continue to operate the pump.



### Third party drop-in replacement pump package in short delivery time

#### Challenge:

The customer wanted a spare BB1 pump package upgraded to the latest API edition – without changing the piping. The delivery time of the OEM was too long.

#### Solution:

A complete pump package was delivered in 22 weeks. The pump and the baseplate were designed and manufactured by KSB; the drive and coupling were procured; the assembly of the package was carried out by KSB.

#### Customer benefit:

The replacement pump package was delivered within a short time. Thanks to state-of-the-art technology, system availability and operating reliability were increased.



### Third-party drop-in replacement valve

#### Challenge:

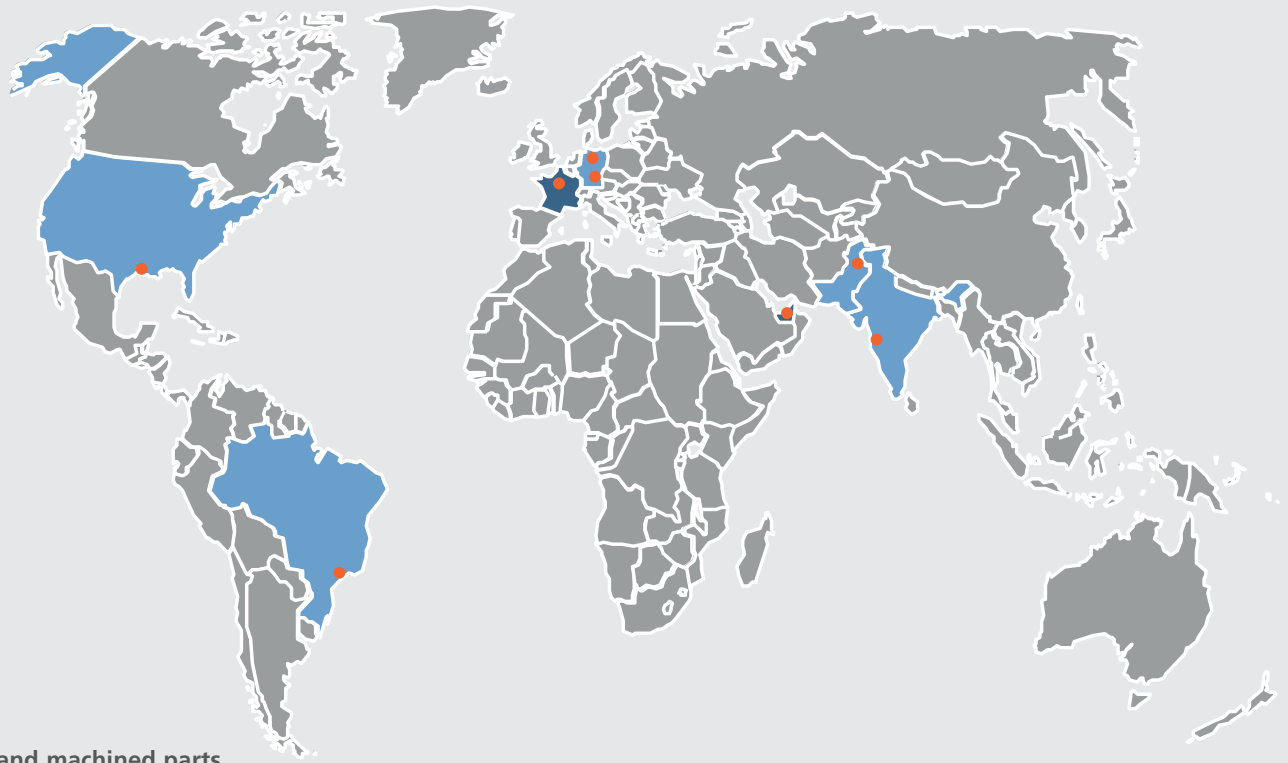
The customer needed 5 new 3-way gate valves DN 300, PN 10. The OEM no longer exists.

#### Solution:

The valves were measured, engineered, manufactured and delivered by KSB.

#### Customer benefit:

The system could be operated without a modification.



- Cast and machined parts
- Machined parts

## Reverse engineering – Our global production hubs

The KSB newsletter –  
 don't miss out, sign up now:  
[www.ksb.com/newsletter](http://www.ksb.com/newsletter)



**KSB SE & Co. KGaA**  
 Johann-Klein-Straße 9  
 67227 Frankenthal (Germany)  
[www.ksb.com](http://www.ksb.com)

You can also visit us at  
[www.ksb.com/socialmedia](http://www.ksb.com/socialmedia)