

Our development process for customised gear pumps is as clear as the lens in your car headlights.

An example from the plastics industry.

Gear pump for the phosgene-free production of polycarbonate used in car headlight lenses.



Production of polycarbonate presents numerous challenges. In 2012, a customer contacted us with a request to come up with a new process polycarbonate production without phosgene. Phosgene is not only poisonous, it is also extremely damaging to the environment. The process developer contacted several pump manufacturers to know if they could design a pump that would meet the specific requirements. WITTE was the only company willing to take on the challenge; together with the developer we designed a pump that was as innovative as the task itself. In 2019, it was time to take the next step.

The challenge:

WITTE was tasked with further developing the custom product – on a much larger scale.

New dimensions for more throughput

The custom product from 2012 turned out to be so successful that production on a scale large enough to generate more throughput was required. Once again, WITTE was the first choice.



CHALLENGE

Developing special pumps is an elaborate process. Not only does it call for flexible structures, but a readiness to familiarise with the issues faced by the client and find solutions that often go beyond the standard product line. This applies to accurate processes in particular, such as the manufacture of polycarbonate, which is used to make the lenses for car headlights, among other things. The pump must maintain a steady vacuum

as oxidation leads to discolouration of the material – resulting in a product which cannot be sold. There was no magnetically coupled pump available in the required size and that met the high standard of quality expected in polycarbonate manufacture – until WITTE built it.

SOLUTION



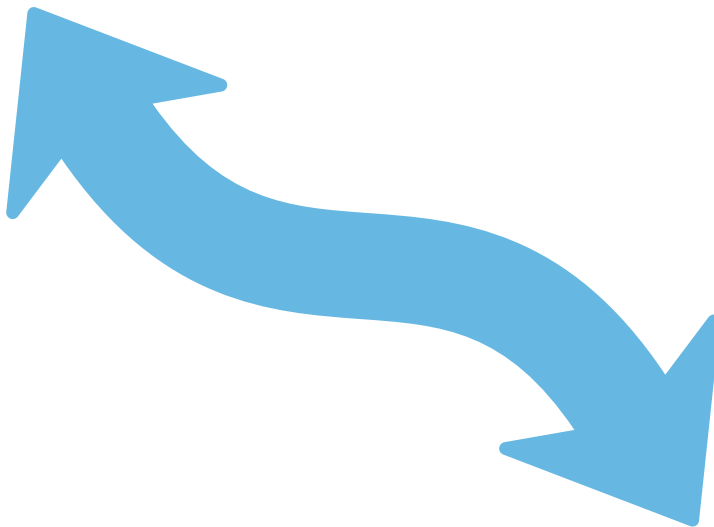
Being active in research and development enabled us to customise new products and concepts on a regular basis. Be it new bearing geometries or innovative materials: our close cooperation with customers, research institutes and partners enabled us to tailor individual solutions for our customers again and again.

This development phase also gave rise to a vacuum-sealed magnetic coupling that can be used without a sealing medium. The new pump now delivers 13.4 tonnes of polycarbonate prepolymer per hour. The previous model only managed an hourly rate of 7.5 tonnes. Furthermore, it boasts a displacement volume of 1,482 cm³ per revolution – approximately double the previous 716 cm³!



OUR EXPERTISE

As a highly specialised development and technology partner, we not only manufacture and supply gear pumps, but also develop innovative solutions that meet your wishes and requirements. We provide support for the entire process – from idea generation to prototype designing and launching serial production. We create pumps that are tailored 100% to meet your specific requirements – even if a previously unknown process is being followed.



THE ADVANTAGE FOR YOU

Our trendsetting developments have made otherwise impossible processes a reality and success. The collaboration of engineers, technicians, mechanics and designers enables exploring new ideas on a daily basis.

Technical solution



UPSCALING

2012

7.5 t/h at 716 cm³/U

2019

13.4 t/h at 1482 cm³/U

Redesigning a magnetically coupled polymer pump for the prepolymer process in polycarbonate manufacturing. The pumps, including magnetic coupling, were scaled to twice the size for the purpose of increasing production capacity.

TECHNICAL PARAMETERS



VISCOSITY	0.55 Pa s
TEMPERATURE	250 °C (482 °F)
MINIMUM CAPACITY	7,300 kg/hr
MAXIMUM CAPACITY	13,400 kg/hr
MEDIA/FLUIDS	Prepolymer Polycarbonate (PC)

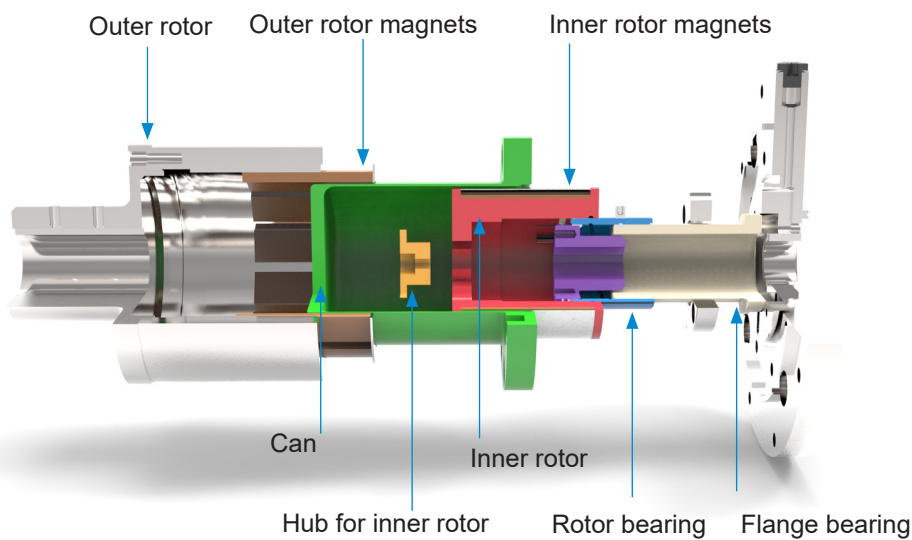
HOUSING	Stainless steel 1.4313
GEAR WHEELS	Martensitic chrome steel 1.4112 (AISI 440B)
COVER	Stainless steel 1.4313 (~ AISI E415)
SHAFT SEAL	Magnetic coupling
FRICTION BEARING	Nickel silver alloy (NiAg)

SPECIAL FEATURE: MAGNETIC COUPLING

The magnetic coupling involves a specially designed seal without rotating sealing surfaces, often referred to as “sealless pumps”. With the magnetic coupling, it is only possible to hermetically separate product chamber and atmosphere using static seals.

torque from drive to pump, instead just magnetic forces. The magnetic coupling works without slip (synchronous magnetic coupling). This means that the pump speed always corresponds to the drive speed, as long as the maximum transferable torque is not exceeded.

There is no classic shaft connection to transfer drive



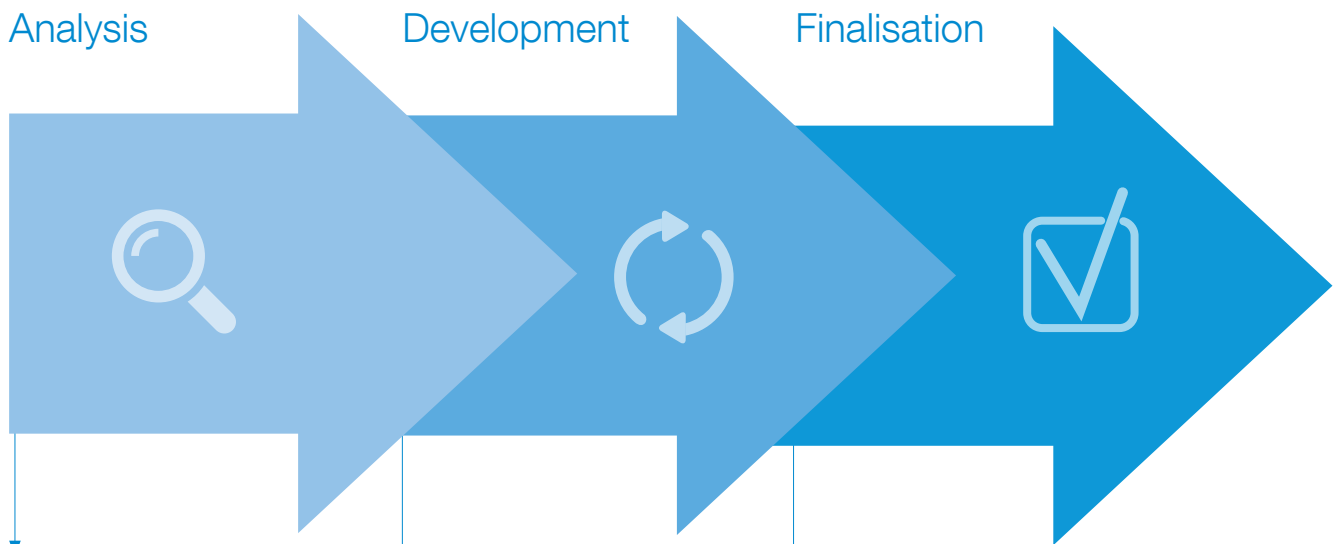
←—————→
Expanded view

Additional information
about the magnetic
coupling





From the idea ...

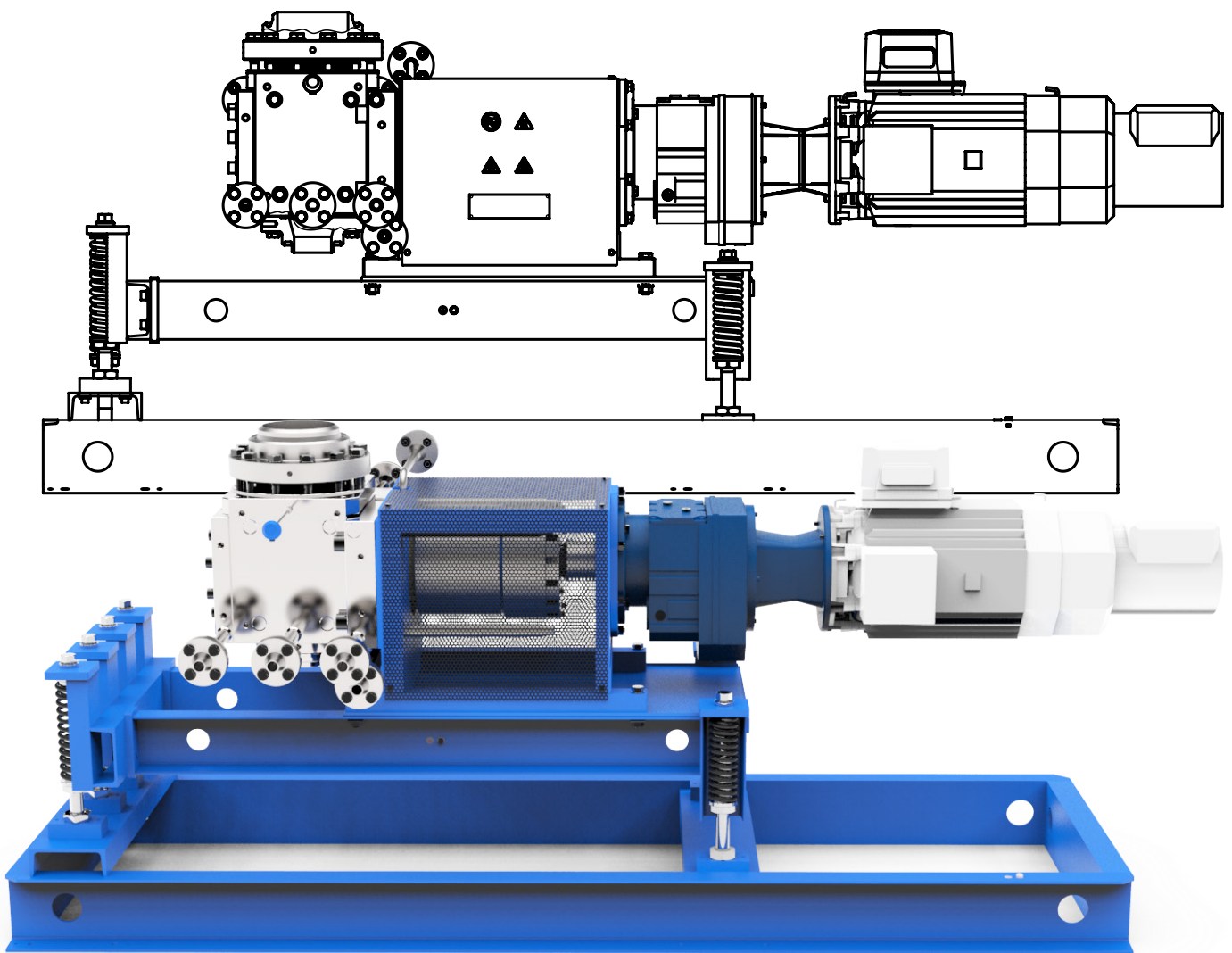


In any project, we not only analyse the process parameters in detail, but also take a broader look at the upstream and downstream process stages. In order to select the best possible components and materials, it is important to be familiar with the environment in which the pump will be used.

The phosgene-free melt generation were challenging aspects of this project. Together with the customer, we examined the specified technical parameters and chose appropriate materials for the core components based on this.

Once the process had been finalised and the pumps designed, work began on the project. BOOSTER pumps and polymer pumps were additionally used in the process for the necessary pressure build-up.

... to the customised product





Making new discoveries with WITTE

With a zest for action and attention to detail, we take up challenges that others shy away from.

We are passionate about delivering solutions that push the boundaries of what is possible.



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