

Why rubber really is an engineered product

Rubber is often seen as a commonplace, inexpensive material that is straightforward to purchase and use. Expert Richard Groot however knows all too well that the correct composition, design and production of rubber items is essential to ensure a long service life.

By David Sear



Which ring would you choose? They will all 'fit' inside the coupling, but an inappropriate choice could quickly lead to unscheduled downtimes...

Valve World's appointment to visit Mr. Groot at Artech Rubber in Zutphen, the Netherlands, was almost cancelled at the very last minute. "I have just taken a phone call from one of my European distributors," he said when we arrived at his office. "They have asked me to contribute to an emergency meeting tomorrow with a client who is experiencing problems with rubber-cotton fabric components in a submarine. As you can imagine, if you are preparing to dive then you want to be absolutely certain that each and every component – be they metals, plastics, rubber or whatever – is going to do the job you expect it to do and is not going to start causing problems."

Mr. Groot is certainly the right person to call up in situations such as this as he has amassed an extensive knowledge on specifying and applying rubber parts in an incredibly wide range of applications. His knowledge is based on a career spent working with rubber, culminating in the take-over of Artech Rubber in the Netherlands in 2017

followed by the acquisition of a major customer, a part of Freudenberg-Schneegans.

"At Artech Rubber our key competencies include making rubber molded parts, rubber to metal bonded parts, sealing rings and O-rings, gaskets in special material as well as plastic injection molded TPE/plastic parts. We also make a wide range of coupling rings in all kinds of materials. Our products are used in factory transportation systems, the machine building industry, marine and offshore, the foodstuffs industry, pharmaceuticals, agriculture, the chemicals industry, etc," he explained.

Attention to detail

Inviting Valve World for a factory tour, Mr Groot noted that many of the products leaving the Artech Rubber premises are indeed destined for use in the flow control sector. "For example, take these rubber-to-metal bonded parts which are actually used in rotary lobe pumps. As you might imagine the rubber layer is subject to extensive



A candid shot inside Artech Rubber in Zutphen, The Netherlands, shows Richard Groot doing what he excels in: explaining how to design and produce rubber components that will meet user's expectations. "This is one of our conventional machines but is actually the perfect tool with which to produce rubber parts made out of two compounds."

wear and tear. That's why the connection between the rubber and the metal needs to be of exceptionally high quality and the mechanical properties of the rubber also need to be spot on."

As our tour further revealed, Artech Rubber can respond very flexibly to customer requests thanks to its extensive machine park, which includes both conventional, semi-automatic and fully-automatic machines. This means the company can easily fulfil orders for both small and large quantities, at the same time giving clients the optimum balance between price and quality. "We are here to help all customers, whether they have one-off requirements or regularly place major orders," commented Mr. Groot. "The starting point for a new customer is to understand what he wants to achieve, to work out the most suitable

rubber composition for his application, and to design and produce an appropriate mould. We have our own mould-making department to ensure the produced parts will function perfectly."

Giving an example of Artech's production flexibility, Mr. Groot mentions a recent phone call from a ship that had come to a Dutch port in need of urgent repairs. "The crew were desperately searching for just a handful of rubber rings but in very specific sizes. These were simply not available off-the-shelf. So we arranged for one of the crew members to bring an existing ring over to us. Using that ring as a guide we quickly prepared a mould and within 24 hours had made a new set of rings. Of course making a unique mould for a limited number of parts is not going to be cheap, but the cost for the customer was negligible compared to the expense of keeping a vessel idle in port."

Continuing our walk through the Artech factory, Valve World couldn't help but form the impression that producing rubber parts is actually quite a simple process. Rubber is injected into a mould, heated, pressurized, and finally trimmed to size. Mr. Groot agrees that the process may look straightforward, but comments that careful attention is needed at all stages to ensure the final product lives up to expectations. "Firstly there's the quality and the composition of the basic rubber you use, which can be quite different from supplier to supplier. In my experience rubber quality can vary much more than say with metals. That's why we work with top-line suppliers who we can trust to provide a consistent and reliable product. It is also important to correctly set the process temperature and pressure, as incorrect parameters can affect the performance of the rubber component. There is a lot which can go wrong which is

why we have a well-equipped quality control department where we can check both the quality of the incoming raw rubber as well as the quality of the outgoing products."

In addition, Mr. Groot stresses that there is a huge gap between production and application know-how. "Let me be honest: most producers are quite aware of the correct way to manufacture a part. Give them the drawing and they should be able to make it for you. But designing a new rubber item is a totally different proposition and beyond the capabilities of most producers. For example, I have seen engineering departments draw up designs for rubber components with metal tolerances! These are simply not producible in rubber. Other regular faults include designs that are too complex to manufacture or would be too expensive to make. At Artech, we offer the perfect combination of expertise such as materials selection, engineering new parts and cost-effective production techniques."

The price of rubber

Back in his office, Mr. Groot quickly handles some phone messages and queries from staff before reflecting again on the general lack of expertise when it comes to rubber. "I have to say that the average knowledge of rubber is quite low amongst many of our customers so we fulfil a big role in providing reliable advice and guidance on what would work best for their applications. And problems are by no means restricted to cutting-edge applications; I have seen cases where even very simple products fail to live up to expectations."

Giving an example, Mr. Groot recalls a construction company manager who visited Artech Rubber after becoming very disillusioned with the quality of the rubber products he had purchased elsewhere.



Artech Rubber has developed a unique product that can be used to seal gaps where pipelines pass through walls. Fully tight up to 3 bars, they are ideal for use in say ship bulkheads but are equally effective in stopping the irritating ticking noise associated with central heating pipes.



Once encased on rubber, metal balls like this are used in non-return valves on pipelines. By allowing air into the pipeline the valves help prevent compression damage.



This two-component ring has a soft rubber inner ring with a hard plastic lining and is used for transport systems in the food industry.

Required as part of heavy-weight flooring, these rubber products were not consistent in quality and therefore were creating serious issues for the builders. Mr. Groot: “this manager had brought along some samples and as soon as we analysed them we saw that there was simply too much variation in

the composition of the rubber. His procurement team had gone for the cheapest quote so it was obvious that his supplier had cut too many corners.”

Sometimes, however, problems can crop up even in plants where the rubber components have been working well for many years. Mr. Groot: “a while ago we were asked to inspect a fuel storage facility that was experiencing unexpected failures in rubber seals. It turns out that the company had modified its processes, storing fuel additives in separate tanks instead of immediately mixing them with the petrol. Now these additives are very aggressive so if stored undiluted will quickly cause rubber seals on double block and bleed valves to degrade.”

As the examples above will show, working out why a rubber product has failed often requires a holistic viewpoint. Mr. Groot: “you have to be able to consider the problem from all angles. Has something been altered in the application, for example, such as the pressure or temperature, or perhaps the shape of the product has led to the failure.” Whilst discussing the issue of shapes and sizes, Mr. Groot reveals a property which, he stresses, makes rubber so unique in the materials world. “Rubber has a memory.



Just a small selection of the many rubber-to-metal parts that Artech can manufacture.

That gives it some very desirable properties but at the same time this is a property you should not take for granted. Absolutely the worst thing you can do with rubber is to overly compress it because that may affect its properties.” This issue is apparently a major challenge in sectors such as food, dairy and pharmaceuticals where couplings have rubber rings designed to completely fill any dead spaces for reasons of hygiene. “The trick is to optimize the ring size and shape so that it will nicely fill the cavity in the coupling whilst leaving enough room for the rubber to expand slightly after being compressed. Applications like these can be a real challenge, but that’s exactly what we at Artech Rubber excel in!”