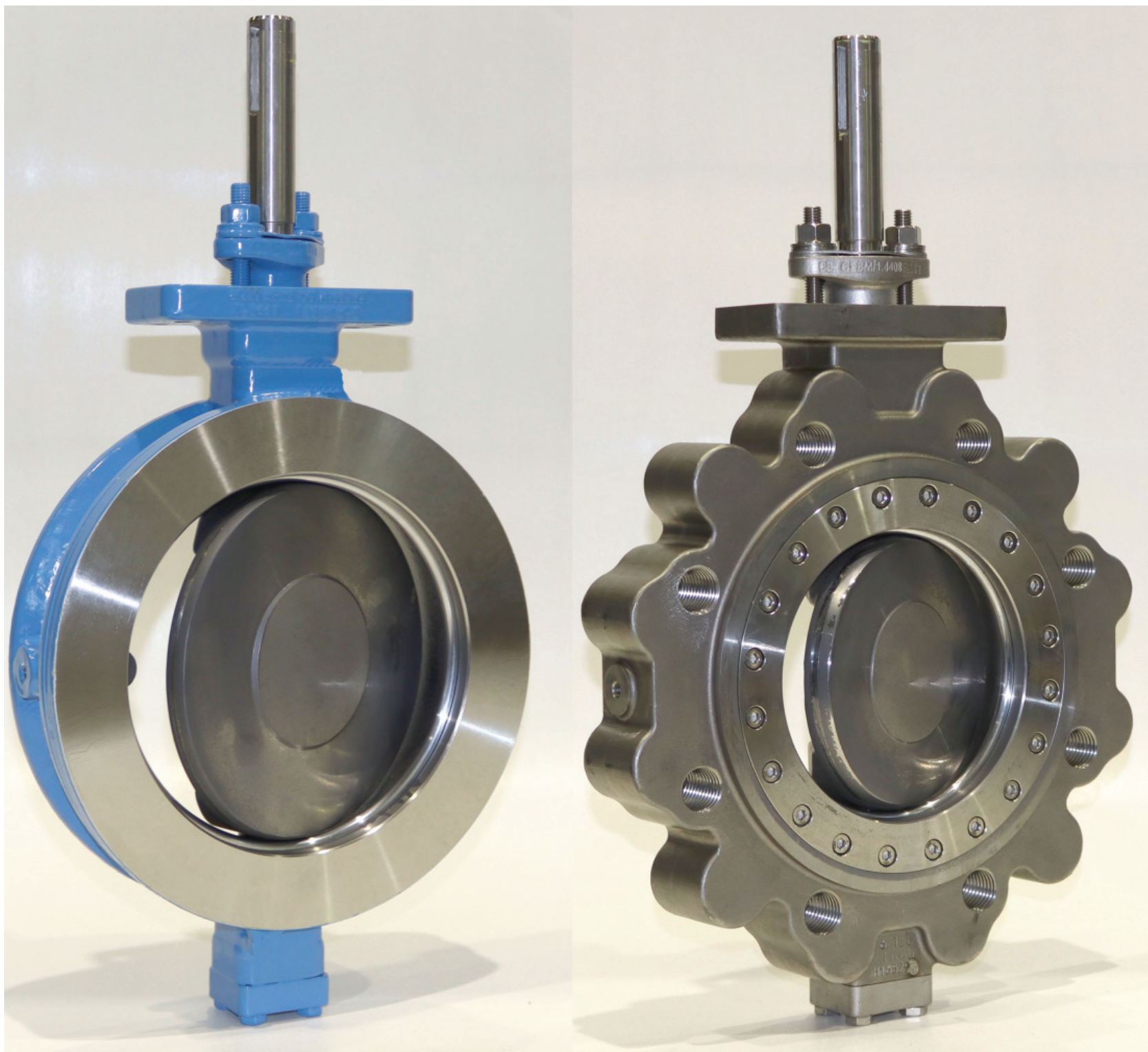


Neles can pride itself on 65 years of experience in designing and manufacturing flow control solutions for various process sectors. Building on this foundation of knowledge, expertise and insights, the company is ready for the 21st century with exciting developments in renewable energies and more mature sectors such as oil and gas. One telling example is the revamped butterfly valve range that Neles recently introduced.



The modular butterfly valve range enables a vast number of configurations with Neles™ Neldisc™ metal seat and Jamesbury™ Wafer-Sphere™ soft seat

Neles, the road ahead

Recently, on July 1st, Neles celebrated its first anniversary. Last year, the company spun out of Metso. Needless to say, the Neles-brand goes a long way (see box text Neles DNA). In fact, Neles was born in the 1950's, when Antti Nelimarkka and Eino Santasalo established Neles Oy in Helsinki, Finland.

Soon after its inception, the company specializes in valves under the brand name Neles. Fast forward six decades, and Neles – formerly known as Metso Flow Control – has become an “industry-leading trade name”, the company states, with a portfolio ranging from reliable valves to also include expert

services and intelligent valve controller solutions.

As this article is written, there might be already changes on the horizon. Just one day after its anniversary, Neles and fellow Finnish company Valmet announced that they have agreed a merger that will provide “enhanced growth opportunities and benefit from broader revenue and cost synergies”. Whereas Valmet is focused on technologies, automation systems and

Modular design

Neles has implemented modular design for its butterfly valve range, combining – amongst other components – metal- and soft-seated types, to be precise Neles™ Neldisc™ metal seat and Jamesbury™ Wafer-Sphere™ soft seat. By combining various parameters, such as materials, sizes, pressure classes etc., customers can get the exact configuration for their application.

According to Neles, the ‘product platform offers reliable solutions for a wide range of applications, including a high-cycling valve to handle high-purity gases and valves for abrasive service or corrosive media. The cross-compatible components and standardized parts make it easy to upgrade valve performance without the need to replace the entire valve.’

“Instead of focusing only on one maintenance interval, we wanted to think about the entire life cycle of the product. Along with high performance, the valves are also designed for maintenance, which means they are easy to assemble and take apart. Serviceability increases the lifetime and safety of the valve and also minimizes waste,” Hämäläinen notes.

services for the pulp, paper and energy industries, Neles offers flow-control products such as valves used in all process industries.

Recently, Neles signed an asset purchase agreement to acquire the valve and pump businesses of the Finland-based technology company Flowrox. The acquisition will complement Neles’ offering and exposure to the mining and metals industry.

Reinventing reliability

In this article, we’ll focus on Neles. In a previous Valve World-interview with Neles-CEO Olli Isotalo in 2020, the ambitions of the ‘new’ company became clear. “Neles has a clear ambition going forward: we envision to become a leading diversified valve and valve automation company, reinventing reliability in flow control. Our mission is to provide market-leading expertise, products and services to add the most value to customers. In some way, our strategy can be described as an evolution rather than revolution, with a redefined focus on innovation and leveraging

our service capabilities. We’ll continue broadening our offering and reach, developing our multi-channel service and MRO-business supported by digitalization, and further develop our valve controls and actuators business. Coming back to our customer promise, reinventing reliability, our credo. In practice this would mean that we continuously develop more reliable, higher quality products and also in our services and expertise.”

Sustainability

Reliability is a strong driver for R&D and new product development within Neles. However, it is not the only aspect that drives end-users, Jukka Borgman, Director Technology Development, says. “Increasingly, sustainability has developed as a very strong incentive for our R&D and product development. End-users are asking for more sustainable products in terms of CO₂-footprint, recyclability, energy consumption, leakage rates. In fact, most end-users are measured against how they can improve their business on the above parameters.



Jukka Borgman: “Increasingly, sustainability has developed as a very strong incentive for our R&D and product development”



Kalle Suurpää: “Lead times for NP&D and existing products have become shorter. If we can provide better solutions faster, we are basically in the driver’s seat.”

Flexible approach

Neles has adopted a LEAN/AGILE approach to its activities, ranging from R&D/NPD to manufacturing. This method aims – amongst others – to automatize repetitious tasks to create more creative time for employees. A good example is rapid prototyping, based on computer modelling and testing, to get through the prototype faster and more effective. And time is very important for Neles's customers. "Lead times for NPD and existing products have become shorter", Mr. Suurpää states. "Therefore, we need to adapt our processes to accommodate our clients. If we can provide better solutions faster, we are basically in the driver's seat."

According to Mr. Suurpää, it begins with customer and general market input. "With this input, translated into product requirements, our teams go to work. We tend to operate in fixed length, repeatable work cycles. Typically, we iterate our development in small incremental steps to ensure that we get all details right. We need flexibility and agility to adapt our processes to changing requirements or technical/economical challenges. When we launch the product, it will then be 100 per cent right for the customer."

To develop these products, Neles employs annual 'innovation challenges', an international competition centered around a certain customer challenge that ideally is representative for an entire sector. The company also collaborates with a selective group of end-users to develop product solutions on a bilateral level. "We also engage in R&D with universities", Mr. Borgman says. "In these programs, we are focusing on technologies or concepts that are not tied directly to our products but that could have implications for our business on the longer term."

Game changer

Additive manufacturing is such a technology that could have a serious impact on the valve and actuator supply chain. "Over the last decades, AM has matured rapidly", Mr. Borgman says. "From a technology mostly employed in non-industrial applications, AM has entered the industrial era. Year by year, not only the technologies behind AM have become more reliable, but also the supply chain has matured alongside to create an AM-eco system. Various players in the industry – end-users, flow control companies such as Neles, AM-experts – are also working towards guidelines and standardization that are aimed to provide quality assurance to end-users. They should have the same expectations of an AM-machined part as of a conventionally machined equivalent."

So, what could be the implications for the valve itself from AM? Mr. Suurpää adds that the technology is not likely to dramatically change the exterior of the valve as "standardization limits the freedom of design."

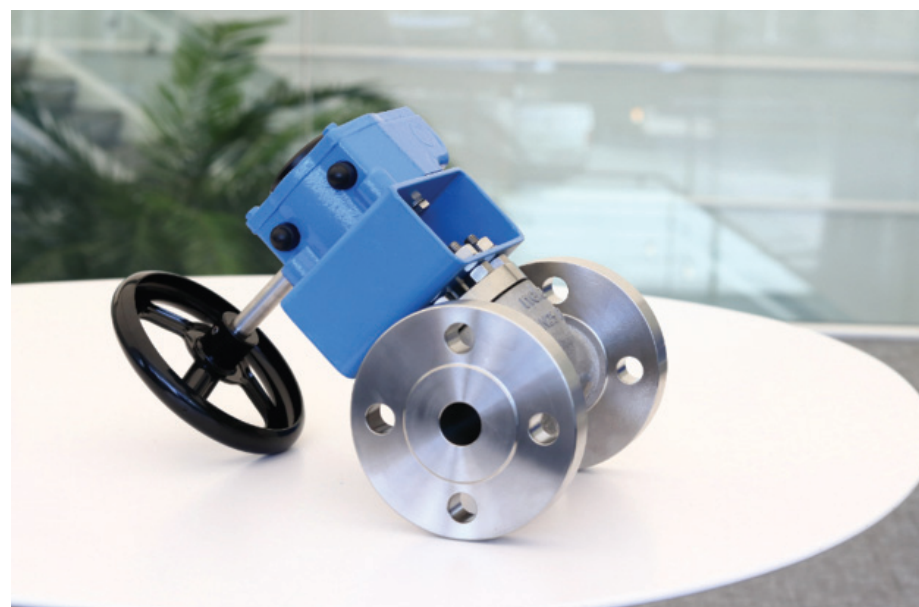
Noise attenuation trim

"However, there are more opportunities for specific parts that are less standardized,

for example the trim. We have developed a noise attenuation trim that is manufactured via AM, which allows a more complex flow path inside trim with better results", Mr. Borgman states. "In other words, we can manufacture a better performing product with also a longer life span and a more reliable performance. Admittedly, we could produce this AM-trim with conventional machining techniques but it would be so much more complicated and expensive than a 3D production route." Switching over to more demanding applications, AM has made its way into pressure-retaining parts. Neles has been among the first valve companies in the world to develop and manufacture an entire valve body.

Proof of the pudding

"3D-printing a valve body is definitely a step up", Mr. Borgman states. "It is a



Valve with 3D-printed body. The grey part of the Neles series ball valve has been manufactured via 3D-printing.

pressure-retaining component, therefore its material properties need to be well-known through extensive testing. We have tested the material in our in-house facilities on tensile strength and impact resistance to make sure it is safe and reliable in the process. Needless to say, the proof of the pudding is in the eating. In May of this year, we delivered the first AM-valve - a standard T5-series ball valve made of stainless steel – to Teollisuuden Voima's power plant in Finland. This field test will provide a lot of valuable information on the feasibility of using 3D-printing to produce pressure-retaining parts with significantly quicker delivery times. These tests will also provide valuable information to our NPD-colleagues. We are constantly looking for new ways to improve our customer's and our own business in terms of reliability, performance, and material efficiency."

Continuous improvement

Whereas additive manufacturing could be labelled as a radical innovation, having an impact on various industrial sectors, most innovations can be categorized as incremental.

"There is nothing wrong with continuous improvement, one step at a time", Mr. Borgman states. "Apart from the more visionary, long-term R&D-projects, there are current challenges among end-users that we need to address here and now." Recently, Neles launched its versatile butterfly valve range – a tried and tested concept – to offer 'superior process performance with a minimized environmental footprint.'

With the range, Neles has combined ease-of-use (see box text Modular design) with a higher degree of sustainability, the company states. "With its proven technology and state-of-the-art functionality, the product range offers superior process efficiency with a minimized environmental footprint. As Taija Hämäläinen, Vice President of Butterfly Valves at Neles, put it: "We wanted to make valve selection as easy as possible for our customers. With this range, customers can easily pick the features, functionalities, and materials they need to create a robust and reliable butterfly valve that meets their exact requirements."

Metal matrix composite materials

Going back to reliability, material science lies at base. Recently, Valve World interviewed Jussi Hellman, within Neles responsible for Materials Engineering. One of the exciting new developments within material science is the advance of metal matrix composite materials (MMC). These hybrid materials combine the superior hardness of ceramics and the toughness of metals to offer the best possible reliability and performance to end-users.

"In MMC, the ceramic addition is embedded into metal, and contributes especially the wear resistance, while the metal carries the mechanical load and improves impact resistance. We have built up expertise in technologies, such as advanced powder metallurgy, that are needed to integrate metal matrix composite (MMC) materials into products. These MMC's are then used as an inner layer in multi-material constructions where the outer layer is a standardized construction material. This combination is necessary because valves are pressured equipment, and pressure retaining parts must be ductile to meet PED-requirements."



In line with developments such as faster delivery times and sustainability, Neles will optimize its production operations at its valve factory in Vantaa, Finland. The new unit is scheduled to start operations in early 2022.

Tried and tested

Neles has implemented various MMC-based solutions in the field for more than ten years. One example of very successful implementation was at a Fluid Catalytic Cracking unit at an oil refinery. The original CrMo-material used for handling catalytic fines (at above 200 degrees C.) failed in between one and three months in operation.

The MMC-solution of Neles - in this case, a 5-15 mm MMC armoring onto wear intensive surfaces - has extended the lifetime from three to 25 months. "An inspection after six months showed that the MMC did not experience any changes in dimensions", Hellman says. "Furthermore, maintenance and HSE-activities were reduced by 90 percent. In other words, MMC's should

be rated in terms of TCO as the investment cost is only one side of the medal."

Green hydrogen

When asked about emerging markets for Neles, both Borgman and Suurpää agree on renewable energy, in particular (green) hydrogen on the European continent.

"Many countries within Europe are planning to invest billions into green hydrogen development, either powered by wind or solar. Finland is also active in this field and has established a public-private hydrogen cluster that we have joined", Mr. Borgman says.

"Safety is one of our focus areas within the cluster as hydrogen and oxygen are both volatile gases. Therefore, there are stringent demands on issues such as leakages, also from an efficiency standpoint. From what I understand, scaling up green hydrogen production needs to be more economical in all stages of the production process. Material science will also come into play as the liquefaction stage demands extremely low temperatures (-253 degrees Celsius). These temperatures will require specific testing conditions that go beyond the current 'treshold' of minus 196 degrees Celsius."

Suurpää adds: "We are and will be well-positioned with our current portfolio to serve this market, now and the near future. The same accounts for other renewable energy applications, such as biofuels. In short, we are looking forward with confidence to the new opportunities for reinventing reliability together with our customers."

Neles DNA

In 1973, Antti Nelimarkka (see image), the creative engineer behind the Neles-range of valves, came up with an idea that was fine-tuned until production commenced in 1975. For the valves to be more reliable in demanding conditions and applications, Nelimarkka designed a metallic seat ring instead of a rubber one.

Neldisc was the first triple eccentric metal-seated butterfly valve in the world and was to become the norm in the industry. "Without a doubt, our valve product portfolio is built on remarkable innovations", Kalle Suurpää, EVP Valve Controls and Actuators, states. "It is in our DNA to design and manufacture high-quality products that respond to customer demands and requirements as well as industry standards. In the last decades our company's technology has evolved along with the trends that have shaped the manufacturing sector in general."

