

NEWS AND INFORMATION

to our current and prospective customers / February 2017

Editorial



parts to becoming an expert supplier of metal components – you can read more about this exciting story in this newsletter.

The topic of additive manufacturing is omnipresent in our group: in addition to 3D metal printing at ECOPARTS, it is primarily sand moulds and sand cores produced by additive manufacturing that are used in our two foundries. This enables us to produce cast parts by rapid prototyping with extremely short cycle times and without any need for investment in tools such as patterns and core boxes.

Dear Readers,

vonRoll casting's technological expertise creates direct added value for our customers.

Technological expertise represents one of the values which the vonRoll casting Group has itself committed to and which form the basis of its corporate culture. At vonRoll casting, this is created not only in the field of foundry technology itself, but also goes a crucial step further with the 50% share held in ECOPARTS, one of the most significant pioneers of the 3D metal printing method. Based on this strategic partnership we take the step from being an expert supplier of cast

During the InnoTrans, the world's leading trade fair for transport technology, we presented to our customers and other interested parties not only the perspectives of casting but also those of metal components fabricated by additive manufacturing. As a reliable partner, we are pleased to realise complex, finish-machined metal components – regardless which production technology is applied. Please submit your inquiry and challenge us!

I hope you enjoy reading this newsletter.

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vonRoll casting ltd, with subsidiaries in Emmenbrücke and Delémont, is a company of vonRoll infratec (holding) ltd. Other companies within the group are:

vonRoll hydro/vR production: The leading Swiss provider of products and services for water and gas supply systems.

vonRoll itec: An outsourcing specialist in the IT sector.

vR bikes: The Swiss supplier of electric mobility solutions.

vR handling: Roller conveyor systems for the printing and converting industry.

The Duktus Group develops, produces and markets high-quality ductile cast iron systems for water transport.

ECOPARTS stands for: Additive Manufactured Metal Solutions.

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vonRoll casting furnishes the Place La Sallaz



Place de La Sallaz is located in north-east Lausanne, on the outskirts of the city centre. When the m2 metro line began running in December 2008, the traffic flows in the agglomeration of Lausanne changed, which in turn made it necessary to redesign the urban landscape. The 2b architectes architectural office in Lausanne won the tender to redesign this square on the basis of a project which focused on the structural elements that contribute to the urbanisation of the square. For example, various items of street furniture were placed next to the covered bus stops, and rows of trees were planted to give the whole space a geometric feel which is further reinforced by a planting plan and lighting concept. After ten years of work, the square was finally inaugurated on 18th June 2016.

vonRoll casting has been involved in the project since 2008, which also included the delivery of cladding panels for the covered bus stops and street furniture, as well as tree grates. The 2b architectes office created the design for the panels. The design reflects the shapes of the leaves on the 80 linden trees planted in the square.

The first step consisted of testing whether the design was feasible, and then providing proof of this. Casting panels measuring 1 m x 1 m always entail the risk that these may deform and, since this was a project where the focus was on design, particular caution had to be taken when removing the

panels from the mould to ensure that the parts looked perfect. Thanks to the high quality and stability of the internally manufactured pattern, the risk of deformation could be eliminated.

The second critical step was to determine which material would be suitable and to calculate the thickness of the panels and ribs on the basis of the functional specifications drawn up by the city of Lausanne. For instance, the tree grates had to be strong enough to enable municipal vehicles to drive

over them. The calculations were performed using the finite element method adopted by our Engineering Center in Emmenbrücke, in close collaboration with our specialists in Delémont and the representative of the client. The selected EN-GJS-450-18 material is one of the new grades of cast iron with nodular graphite that has a reinforced ferritic matrix and therefore improved mechanical properties in comparison with standard grades of cast iron with nodular graphite; in this case, 18% elongation.



gation with a tensile strength of at least 450 MPa.

In parallel to this, studies on material corrosion were performed in order to ensure that the panels installed at the bus stops would not undergo any severe corrosion. The experiences gained from the delivery of façade elements for the Caixa Forum in Madrid in 2007, as well as various tests that were performed, showed that cast iron possesses corrosion properties matching those of steels with increased corrosion resistance, also known as «Corten steel». In the first stage of corrosion, steel and cast iron are equally affected, without deep pitting, and the oxide layer that forms at the beginning has an orange colour that changes to red-

dish-brown quite quickly. If the damp periods are then alternated with sufficiently long dry periods, some of the moisture is removed from the oxide layer and it becomes adhesive, tough, virtually impermeable and therefore protective – in other words, it becomes a patina. It can take from one and a half to three years for a robust patina to form.

The first parts were delivered to the construction site in winter 2015. Needless to say, factors relating to installation were checked in advance in collaboration with 2b architectes and the BCS office, which specialises in metallic façades. The panels are therefore supplied with eyelets machined in our workshops so that they are ready

for installation, and some parts are cut to size by waterjet to avoid as many working operations as possible on the construction site. It goes without saying that the aspect of logistics is particularly important here, as every panel has to be identified in order to ensure that it is fitted in the correct direction and to the correct part of the bus stop or street furniture.

vonRoll casting would like to thank the city of Lausanne and the 2b architectes office for having confidence in our expertise.

vonRoll casting participates in the world's leading trade fair for transport technology



From 20th to 23rd September 2016, vonRoll casting ag, participating for the first time with its own stand and a motivated expert team, attended InnoTrans in Berlin, the world's leading trade fair for transport technology, with our motto: «Top Model – Good casting pays off». During the four days of the trade fair and in the course of more than 100 discussions, we provided qualified responses to a multitude of questions and concerns of potential and existing customers, while at the same time presenting possible application fields of castings. The exhibits brought to the trade fair were valuable tools and provided examples of practical use.

For instance, we demonstrated to our customers how a cast part made of the material EN-GJS-400-18 LT, mechanically machined and including a special CDP (cathodic dip painting) coating, can be a substitute for an existing welded steel structure. We were also able to show how we collaborate with our customers in order to develop complex casting components for which the new material EN-GJS-500-14 is used. Another highlight at our stand which at-

tracted a great deal of interest was the presentation of additive manufacturing using the 3D metal printing method. In spring 2016, the vonRoll infratec Group became a strategic partner of ECOPARTS by taking a 50% share in the company which specialises in this method. The additive manufacturing of metals outside the cast iron spectrum

opens up completely new options for meeting a wide range of technical challenges. The trade fair provided us with the opportunity to demonstrate some impressive application examples to potential customers and other interested parties.

On the track and open-air areas of InnoTrans, which included more than 3000 metres of rails and displayed all types of transport from tank wagons to high-speed trains, various cast installation parts from vonRoll casting could also be discovered in natura, such as transmissions, axle guides, disc brakes and mounting brackets, some of which were fitted to the individual locomotives, trains and rail construction elements.

On 21st September, in the presence of the CEO of the Swiss Federal Railways (SBB), Andreas Meyer, as well as





Peter Spuhler, Group CEO and owner of Stadler, Stadler Rail finally presented the new EC250 Eurocity train (Giruno),

which will start running through the Gotthard Base Tunnel by the end of 2019 and link Basel/Zürich with Milan in record

time. Our extensive expertise enabled us to provide optimum assistance to our customer in the construction of transmission and bogie components, and we are pleased that vonRoll casting ag was able to make an important contribution to the success of this millennium project. To summarise, our appearance at the InnoTrans 2016 trade fair was an unmitigated success, which we would like to replicate in 2018 when this important international trade fair will be held again. We would like to thank all of the customers and interested parties who visited our stand at InnoTrans 2016 and would be delighted if you chose to collaborate with vonRoll casting ag again in the future.

Integrating the machining expertise of RBDH in Nuelles/France

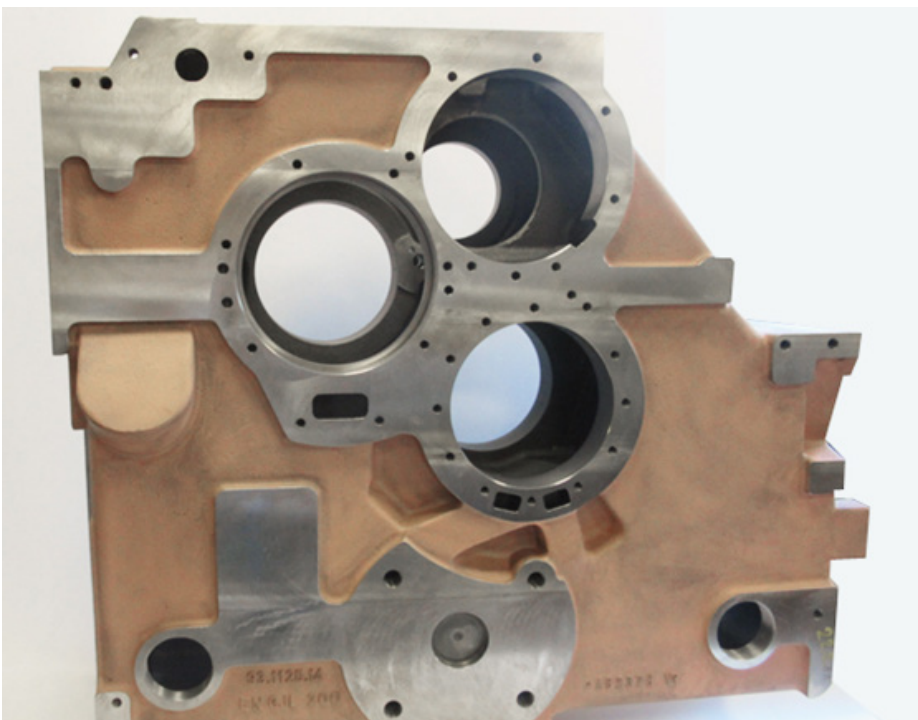
As already informed, vonRoll infratec took over vR production (nuelles) sas in 2015 (formerly RBDH, based in Nuelles). The integration of vR production (nuelles) sas is strengthening our machining skills and significantly increasing our production capacity in the Eurozone. The number of employees has already risen since the takeover as customers are increasingly making use of our extended range of services and are procuring pre-finished components from vonRoll casting. Current examples of this are our long-term customers Voith and Howden. For years now, we have been producing

raw parts for transmission housings for Voith. We are now also able to deliver finished parts from Nuelles directly to the assembly plant. The first components have been successfully released and delivered in close collaboration with the customer.

Concerning Howden on the other hand, we used to supply this customer with blades as raw parts for industrial fans. In mid-2015, we were informed that Howden was giving up its mechanical machining and would procure this service from external sources in the future. vonRoll casting, together with vR production

(nuelles) sas, subsequently competed for the takeover of mechanical machining services. As vonRoll casting was able to fulfil the complex requirements for machining, non-destructive testing, packaging and logistics successfully, it was awarded the contract. Several different projects in various versions are currently running, some of them with very short delivery times.

Looking back, it is clear that the integration of vR production (nuelles) sas was a great success and still offers further growth potential.



Application of additive manufacturing technology in foundries offers new technical solutions

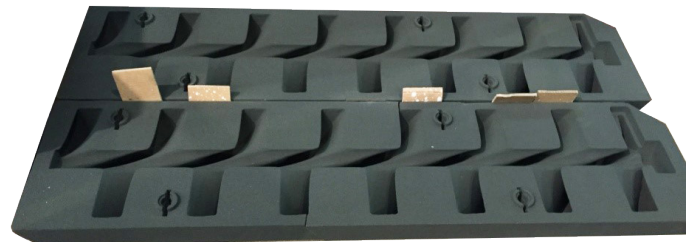
In parallel to the shares we took in ECO-PARTS, a company specialising in additive manufacturing technology for metals (see below text «Innovation in metal»), vonRoll casting launched various projects which employed the technology of additive manufacturing in sand.

After Axima, a subsidiary of the energy group ENGIE, which specialises in air-conditioning and cooling technology and fire protection, sought consultation from us with regard to the delivery of screws for ventilation in a radioactive atmosphere, vonRoll casting was awarded a contract to supply 26 parts in just two and a half months. These screws are made of EN-GJL-250 and designed for use in the ventilation

system of a storage facility for radioactive waste. They are 1400 mm in length and 295 mm (+0/-0.3 mm) in diameter, with a unit weight of 257 kg, resulting in a major technical challenge for us, both for casting and for mechanical machining. To comply with the extremely tight deadlines and also offer the most cost-effective solution, the cores required to produce the screws were manufactured using a sand printer. We could thus avoid fabricating expensive core boxes and were at the same time able to considerably reduce the development time for the tools since only a single wooden pattern, mounted on a panel, had to be produced manually in our pattern shop. Acceptance and approval of the samples, including machining, could be re-

alized already five weeks after the order was received, immediately followed by 24 serial parts, which were delivered by the agreed deadline. It goes without saying that every detail of the required documentation was taken into account so that the high requirements of the energy industry could be met in all aspects. vonRoll casting is currently implementing various projects that use this method, for instance the casting of cylinder heads for engines in sand moulds, likewise produced using the 3D printing process.

Are you planning innovative projects too? We look forward to hearing from you!



Technical conferences

We cordially invite you to attend one of this year's interesting symposiums which will be organised, as every year, in German or in French:

- Symposium in Emmenbrücke (German): 7th-8th June 2017
- Symposium in Delémont (French): 21st September 2017
- Workshop in Emmenbrücke (German): 7th December 2017

Registration for any of these dates is now open – secure your place and register by e-mail at: info@vonroll-casting.ch

We look forward to seeing you there!

Registration form:

<http://www.vonroll-casting.ch/de/%C3%9Cberuns/Kontaktformular/tabid/1949/language/de-CH/Default.aspx>



Our vision of innovative, single-source metal solutions for various manufacturing processes is becoming a reality. By becoming a shareholder in ECOPARTS, we are entering another area of metal manufacturing. ECOPARTS is a true pioneer in 3D printing, also known as additive manufacturing (AM). With more than ten years of experience (the company was founded in 2006) in the additive manufacturing of metal, new skills and possibilities have been added to our expertise in metal.

Layer by layer (> 20 μ m), components made of metallic pulverulent materials (e.g. DIN No 1.2709, 1.4404, 1.4542, titanium, Invar, aluminium, etc.) are produced. The material properties of components produced using additive manufacturing are equivalent to the physical and chemical properties of conventionally produced materials. Thus, «real parts» are created. The parts are used for prototypes, individual parts, small and medium-scale series production and spare parts. Additive manufacturing

offers new solutions for product development, e.g. components with complex geometries for lightweight constructions or applications with hollow spaces and bionic structures. The components produced by additive manufacturing can be mechanically reworked in the same way as «normal» components. Profit from our experience in metal and put us to the test – check without any obligations if this new manufacturing technology is just the right one for your product idea.

Parameters of SLM technology

Surface quality

Raw state from AM machine:	N10
After radiation:	N8 to N9
Various processes:	N5 to N7
High-gloss polishing:	Possible up to N1

Process accuracy: +/- 0.02 mm (repetition accuracy)

Component accuracy: According to DIN/ISO 2768-1f

Geometry:	Component size	250 x 250 x 300 mm
		400 x 400 x 400 mm (in the future)
	Minimum wall thickness	0.2 mm
	Minimum clearance	0.3 mm