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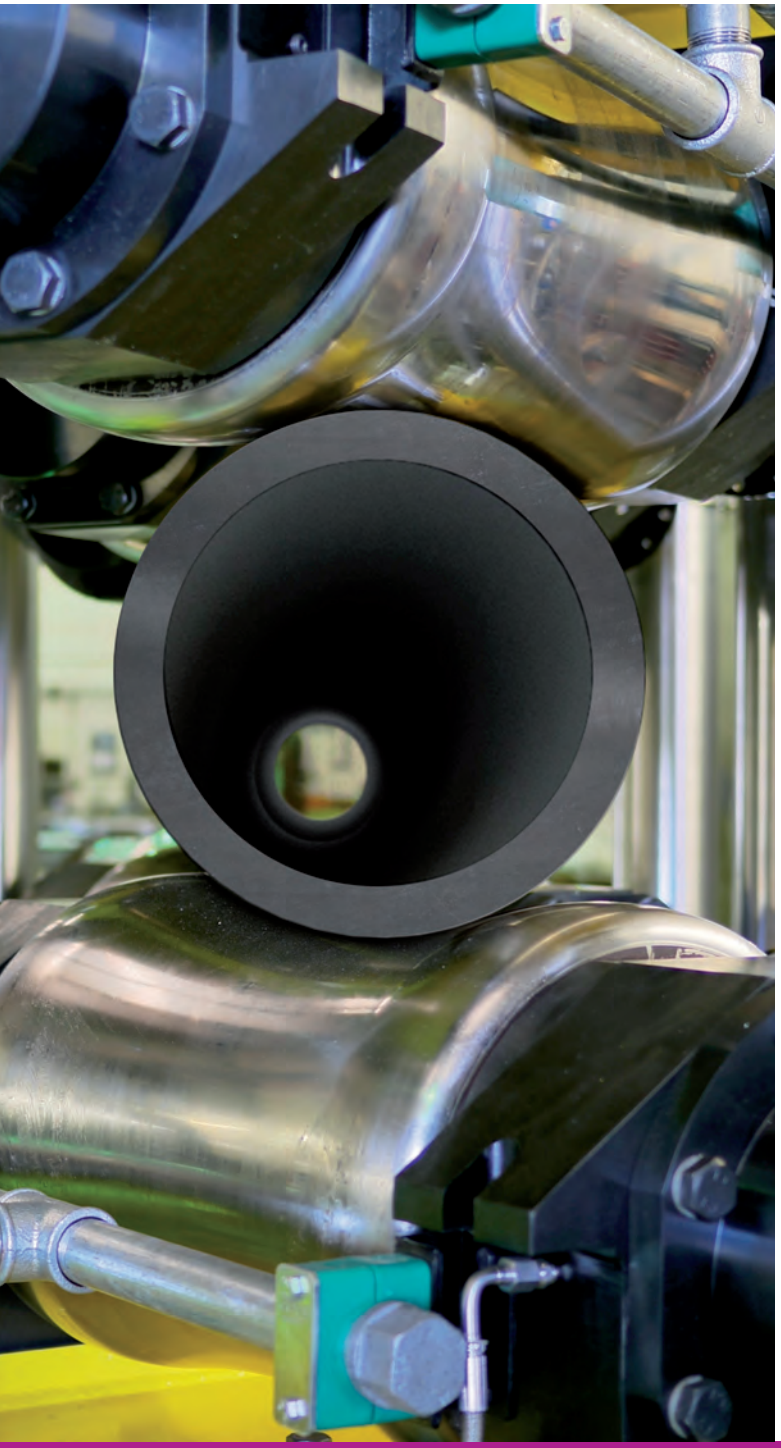

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Greetings from Dr. Gunther Voswinckel President International Tube Association

Dear Members, dear Readers,

A warm welcome to the latest edition of ITAtube Journal, the publication of the ITA, the International Tube Association.

A January article in another well-known Tube & Pipe publication pointed out that even the most careful analyses and forecasts for the metal and metalworking industries are something of a challenge, especially recently. Any solid, mid- to long-term assessment both for supply and demand must reach well beyond oil and gas, if it is to provide insights for the prospects of related industries, including tube and pipe.
On the demand side, global poverty rates have been on the decline for decades, which means bigger markets for most things; i.e. as prosperity spreads, so does the demand for energy. At the same time, however, so-called industrialized nations are faced with an entirely new set of problems as they grapple with the need to reduce fossil fuel consumption.
On the supply side, OPEC's grip on these markets is increasingly tenuous. Technology disruptions and key US policy changes have handed an advantage to non-OPEC producers, although it's too soon to tell just how much these developments will change markets and for how long.
Many companies are increasingly realizing that their long-term growth depends on their ability to competitively serve a new generation of customers in China, and emerging markets in Asia or the Middle East and North Africa.

Trade wars, the weapon of choice of the current US administration, are currently benefitting domestic markets but jeopardize their ability to make inroads elsewhere. It's a misconception that high tariffs ease trade deficits – on the contrary, escalating use of trade barriers and the prospect of tariff wars affect confidence and discourage investment.

These are all factors that make prediction an uncertain business, even though some sectors appear easy to read. It's almost certain, for example, that the global automotive stainless-steel tube market is likely to expand over the coming decade or so.

That's why the upcoming 10th International Metallurgical Trade Fair METEC (25-29 June in Düsseldorf, Germany) sees the most important trends in the "ongoing market development of key technologies, above all in the core areas of additive manufacturing and Industry 4.0." It also showcases developments in relation to the "tremendous potential offered by lightweight structures in the automotive industry."

The international trade fair quartet GIFA, METEC, THERMPROCESS and NEWCAST is a unique concept and sees itself as a leading platform for meetings and business. International buyers, users and experts from the metallurgy, heat technology and foundry industries meet here across the four events.

Also an established feature at the 'fourfold' industry meeting for top decision makers – presenting itself as the Bright World of Metals – is the ecoMetals campaign, which was established by Messe Düsseldorf in 2011 and emphasises environmentally sound operation and production in the sector.

Dr. Gunther Voswinckel
President ITA

Consolidation and adaptability in a more high-tech environment also formed the focus of the ITA Conference, Trend-setting Technologies and Strategies for Tubes & Pipes, which took place on 10 April, 2019, in Düsseldorf.

Experts and professionals convened at Messe Düsseldorf, the international trade fair grounds and home of Tube in Germany, and over the coming weeks the presentations and reviews will be made available to all participants and ITA members on the Association website.

The ITAtube Journal itself, of course, also offers a platform for the exchange of news and ideas, reviews and industry events; the electronic version can be accessed from the website:
www.itatube.org.

We hope you enjoy the read!

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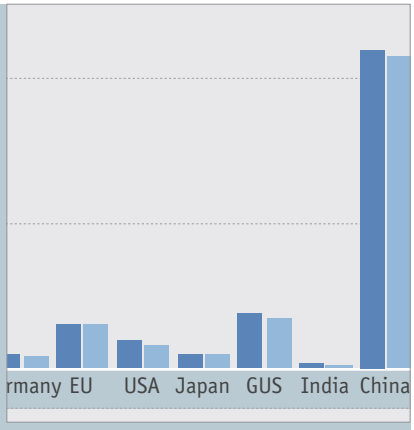

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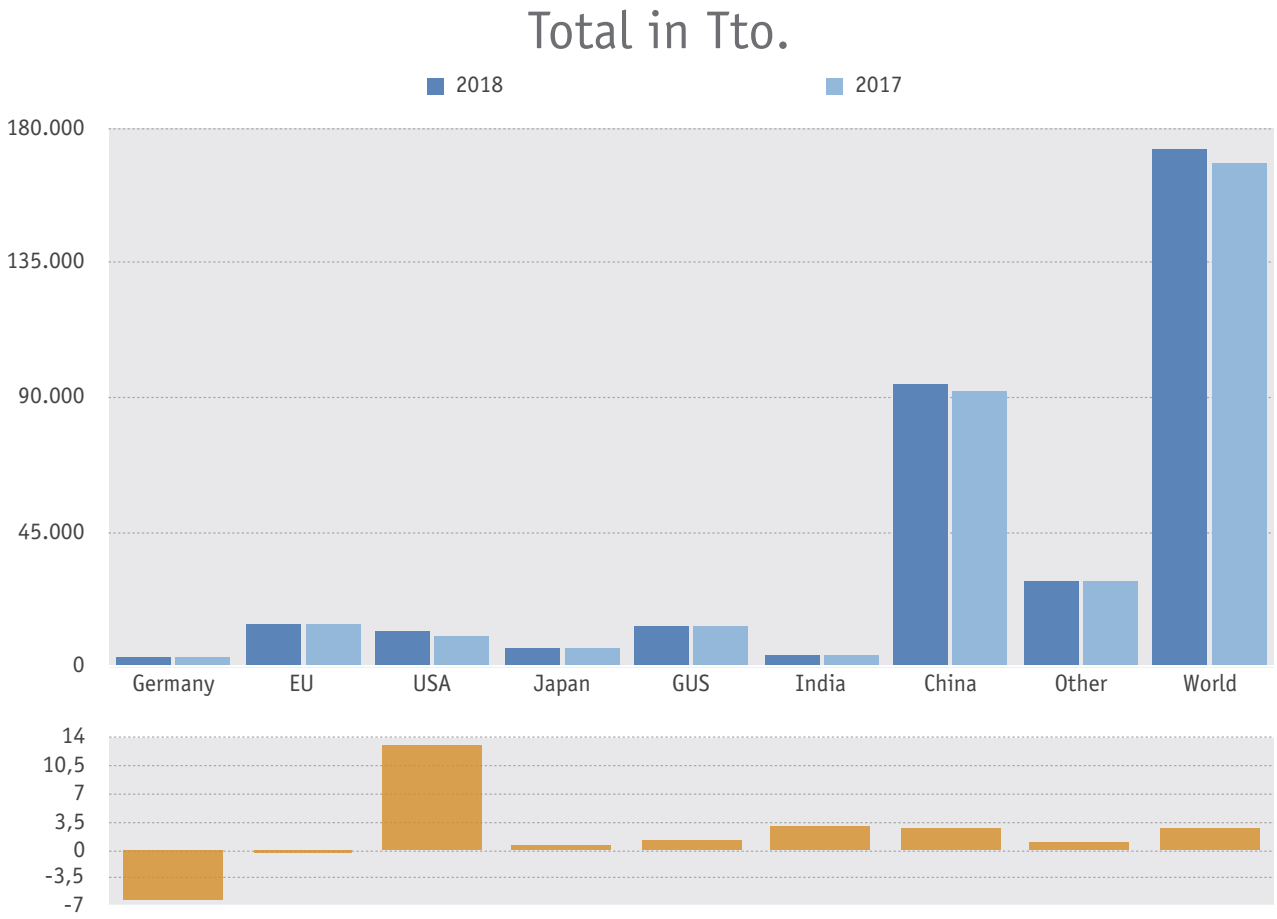
World Steel Tube Production – Forecast

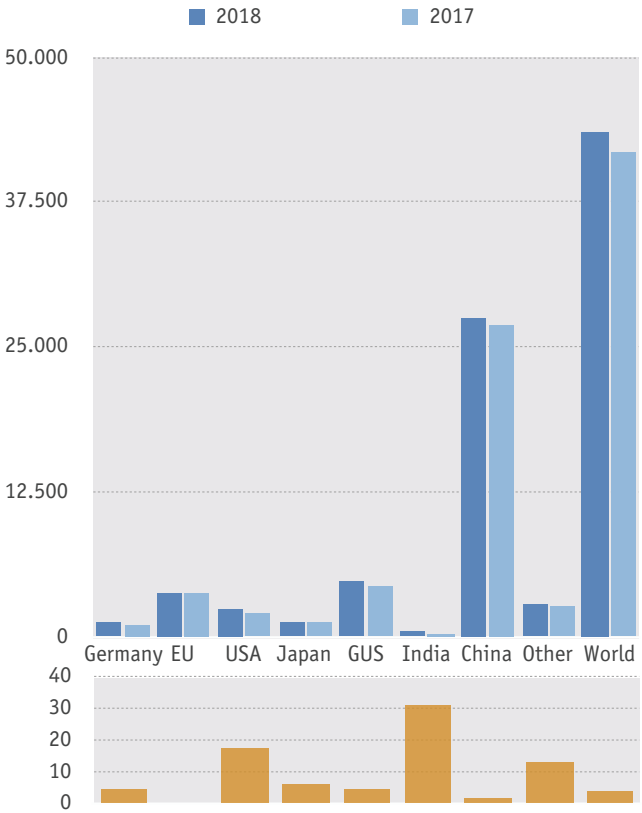
In 2018 the World Steel Tube Production reaches 172.6 million tons, an increase of 2.6%. The production of seamless tubes increased 3.9% to 43.5 Mio tons, significant is the increase in India with 31.6%. Germany reached with an increase of 4.8% a positive result in the seamless tubes market, but a minus of 19.7% in large diameter tubes. Chinese steel tube producers achieved a production of 94.5 million metric tons, a plus of 2.7 %, the USA with a production of 11.8 million tons a plus of 13.1%.



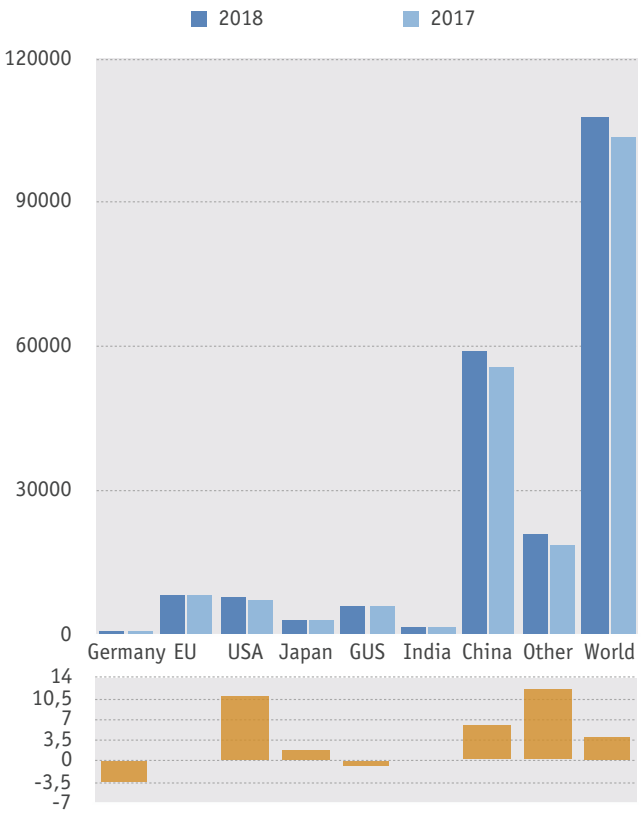
	seamless tubes			welded tubes <406			welded tubes >406			welded tubes			TOTAL		
Region/ country	**2018**	**2017**	**in %**	**2018**	**2017**	**in %**	**2018**	**2017**	**in %**	**2018**	**2017**	**in %**	**2018**	**2017**	**in %**
Germany	1,271	1,213	4.8	878	909	-3.4	936	1,165	-19.7	1,814	2,074	-12.5	3,085	3,287	-6.1
EU	3,959	3,950	0.2	8,373	8,357	0.2	1,545	1,599	-3.4	9,918	9,956	-0.4	13,877	13,906	-0.2
USA	2,423	2,068	17.2	8,135	7,319	11.1	1,334	1,123	18.8	9,469	8,442	12.2	11,892	10,510	13.1
Japan	1,372	1,294	6.0	3,457	3,394	1.9	1,333	1,438	-7.3	4,790	4,832	-0.9	6,162	6,126	0.6
GUS	4,774	4,557	4.8	5,976	6,035	-1.0	2,648	2,665	-0.6	8,624	8,700	-0.9	13,398	13,257	1.1
India	500	380	31.6	1,600	1,600	0.0	2,000	2,000	0.0	3,600	3,600	0.0	4,100	3,980	3.0
China	27,500	27,000	1.9	59,000	55,600	6.1	8,000	9,400	-14.9	67,000	65,000	3.1	94,500	92,000	2.7
Other	2,987	2,646	12.9	21,148	18,845	12.2	4,633	4,554	1.7	25,781	25,845	-0.2	28,768	28,491	1.0
World	43,515	41,895	3.9	107,689	103,466	4.1	21,493	22,909	-6.2	129,182	126,375	2.2	172,697	168,270	2.6

Wirtschaftsvereinigung Stahlrohre e.V. figures include estimations

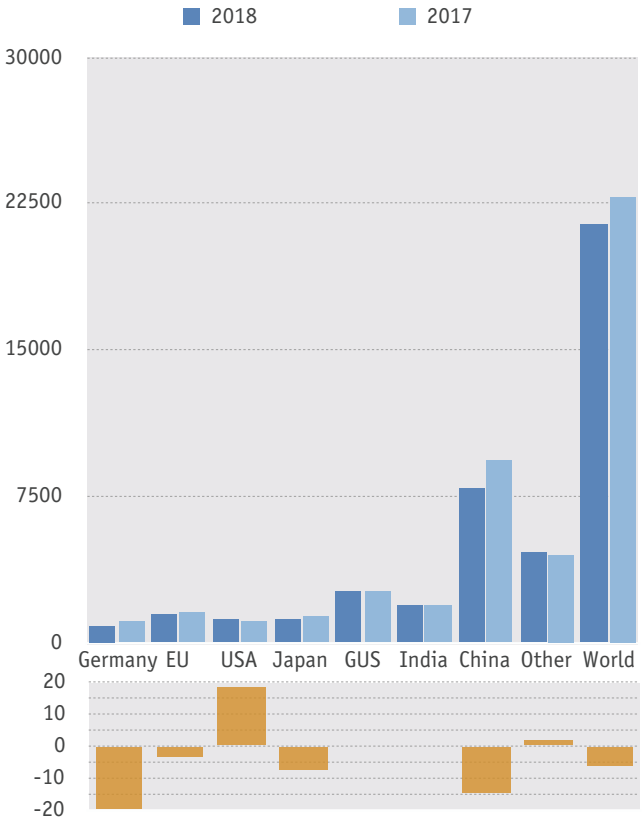
Seamless tubes in Tto.



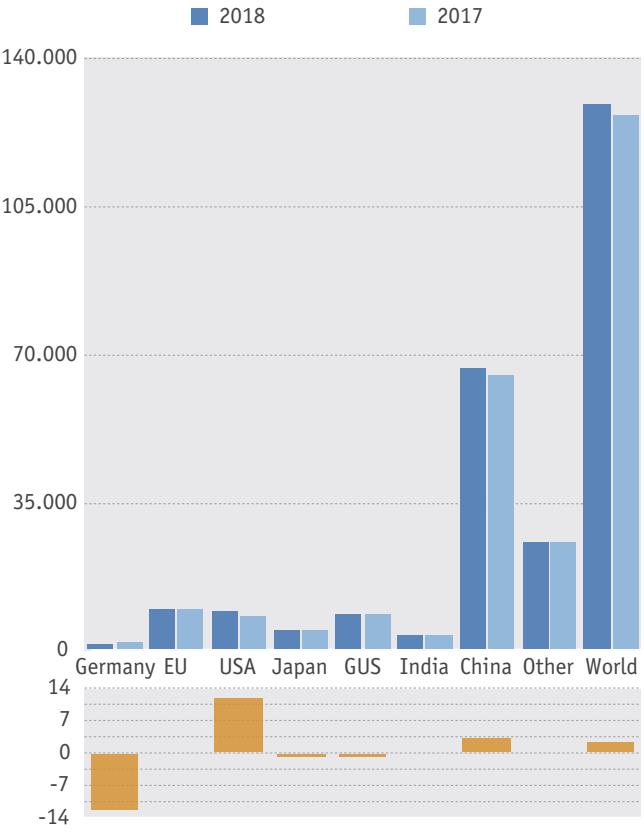
Welded tubes <406 in Tto.



Welded tubes >406 in Tto.



Welded tubes in Tto.



Dr. Gunther Voswinckel, VOSCO GmbH

World Pipe & Tube Market: Current factors influencing the present situation

Dr. Gunther Voswinckel – Update as per May 2019

Welcome once more to our regular presentation in which we discuss some of the worldwide economic factors influencing the pipe and tube industry.

Analysts will have once again realized that forecasts on oil price levels may be completely overthrown by political intervention on the part of stakeholders. The figures show that US tube and pipe producers in particular were greatly advantaged by the resulting business trends on the oil and gas market. Increased pumping and exploration activities in that part of the world are currently primary driving forces. And if we are to believe the US experts, this will remain a constant all the way through 2019. Russian and European tube and pipe producers were also able to profit, to a lesser degree, from this positive trend.

Several other economic factors affecting the tube and pipe industry are discussed here. Other tube and pipe markets such as the automotive (15%), mechanical engineering (9%) and building and construction industries (5%) are also attractive market segments for our sector.

Despite current turbulences, the world automotive market is characterized by steady growth of about 2% p.a. At the same time, the proportion of tubes used in auto design is steadily on the rise, meaning this market segment is becoming increasingly attractive.

The building and construction industry market is doing even better, growing by about 4% p.a. Here we see increasing competition between steel and tube structures and concrete elements. Lobbying activities may help to further enlarge the steel/pipe penetration for skyscrapers and bridges.

World production of steel tubes and pipes in 2018 evidenced a slight increase of 3% as markets stabilized further. In detail, growth of 13% is reported for the US, supported by political trade barriers for tubular products and the strong growth of the shale gas exploration industry.

For welded tubes below 406 mm diameter, figures showed a production increase of 5% in 2018; the US reported growth of 11% after exceptional gains in 2017 (+30%). For welded tubes of 406 mm or larger, production figures in 2018 experienced an overall drop of 5%. The US bucked this trend with a remarkable production upkick of 19%.

In seamless tubes, 2018 saw production grow overall by 4%. The US – following a boom year 2017 (+69%) – reported continued growth at the lesser rate of 17%. Even India, with its smaller production capacity, was able to report notable production gains of 32%.

This is a remarkable trend change, with US tube production experiencing impressive growth for the second time in several years. It would appear that the US trade barriers policy is having an impact. However, it should be noted experts are cautioning that this effect may not be sustainable, since some of the tube production plants taken back online to serve the increased demand are most but obsolete.

Pipe prices meanwhile continue to climb, as reflected in the pipe price index which showed an increase of 25% in 2018. Competition in saturated markets is prompting minor investment in those tube markets that display growth. However, overall plant utilization is at a low level. Demanding high-tech products are the strategic targets rather than commodity-grade tubes. Limiting factors are sometimes the available steel quality for strip, plate and billets, as well as tube plant infrastructure in terms of both machines and the applied quality standards.

Tube suppliers located in high-cost countries have successfully taken steps to counter the strong international competition. As well as seeking to specialize in products with higher technical requirements, they are globalizing into markets with increased demands, and streamlining productivity to reduce the costs of production. Agile digital solutions in the sense of “Industry 4.0” offer further opportunities to maintain success.

Finally, we also discuss the impact of currency exchange rates on the pipe market. A strong euro throughout 2017 and early 2018 was seen to cause export disadvantages. As the euro is currently falling again, markets should be able to compensate suppliers for some of the disadvantages.

The main and dominant market segment for steel tube and pipe suppliers is the OCTG industry with a 51% market share. Besides this, the automotive (15%), mechanical engineering (9%) and construction industries (5%) are also strong market segments for the sector. (Fig.1)

Let's take a look first of all at the OCTG, oil and gas, as the largest target market of steel tube and pipe suppliers. This market is subdivided into pipes used for oil and gas rigs, such as drill pipes, joints, tubing and casings and, further downstream, line pipes to transport oil and gas.

The number of oil and gas rigs is heavily dependent on the price of oil. There is a strong correlation between the oil price and the number of oil and gas rigs in operation (see also ITA Tube Journal 2019/1). And of course, OCTG tube and pipe consumption depends on the number of rigs, as well as the depth of drilling and the capacity of the rigs.

After an extended period of steadily climbing oil prices – from early 2016 (US$30 /barrel) to October 2018 (US$85 /barrel) – the oil price fell back to US$52 /barrel in only 2 months, only to recover to about US$62 /barrel by April 2019. (Fig.2) This price volatility is quite striking and a consequence of nervous reactions to the political measures taken. Without the current political interventions, the world would be facing an oversupply of oil and gas, a situation which in early 2018 caused some US experts to warn that prices could plummet, much as they did in 2014 following the first shale gas boom.

The International Energy Agency (IEA) sounded a warning note

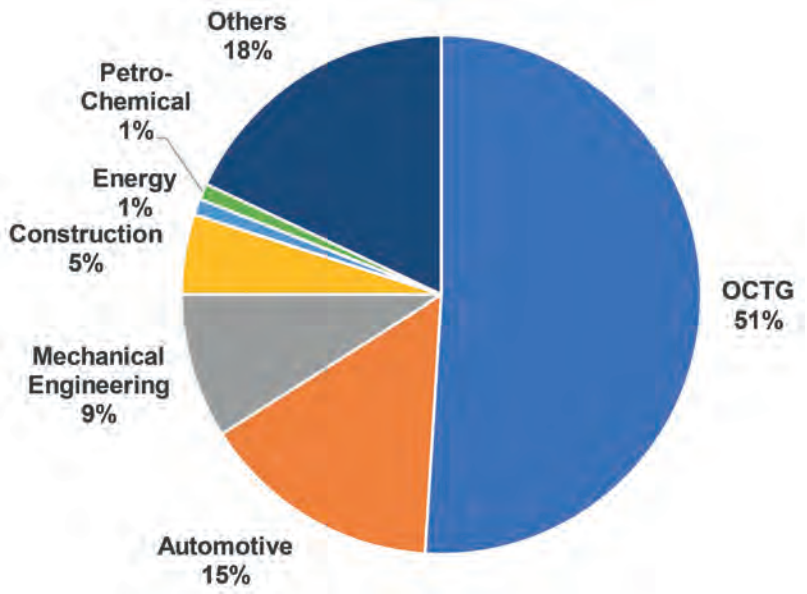


Figure 1: Markets for Steel Tube and Pipes
Source: ITATube Journal/Wirtschaftsvereinigung Stahlrohr

Figure 2: Oil Price Development 2014 to 2019
Source: Nasdaq

and backed up its warnings with figures. The organization expected growth in oil consumption in 2018 of about 1.4 million barrels/day. At the same time non-OPEC countries, particularly the US, were expected to raise their pumping levels by about 1.7 million barrels/day.

Citigroup analysts went even further and predicted a hike in output by non-OPEC producers of about 2.2 million barrels/day.

If the IEA and Citigroup predictions had been proven correct, the world would have been faced with an oversupply situation. As it is, political intervention by the US government, i.e. the sanctions imposed on Iran and Venezuela's oil exports, created an artificial mood of supply shortages, which in turn prompted the oil price rally through 2018.

In 2019, following a sharp dip in outgoing 2018 back to US$52/ barrel, oil prices recovered again, possibly due to potential political conflict in Iraq. (Fig.3)

With oil prices currently so heavily

Figure 3: Oil Price Development in 2019 - Source: Nasdaq

Figure 4: Pipeline Project Nord Stream 2 - Source: Nord Stream AG

Figure 5: Pipeline Project Keystone XL Source: CTV News

dependant on political intervention, it has become very difficult to give reliable forecasts for the consumption of steel tubes and pipes for this important market segment. Only agile management strategies can counter such challenges.

The second OCTG market is represented by oil and gas pipelines. The line pipe market is a project-based business with long planning periods and strong political determining factors. Several such projects are currently being planned in Europe, the US and Asia.

In Europe, gas pipelines are mainly built to carry gas from gas and oil fields in Russia. A major US project, the new "Keystone XL" pipeline, is planned to transport oil from Canada to US petrochemical centres. In Asia, pipelines are needed to serve the new petrochemical complexes in Malaysia and Indonesia. All these projects are intensively discussed on political and environmental platforms.

The European project "Nord Stream 2" is a good example (Fig.4), since US president Donald Trump and the Polish government are using all their influence to ban this project. The US administration is even trying to threaten the international companies involved with trade sanctions.

On the other hand, the US pipeline project "Keystone XL" (Fig.5) is supported by Mr. Trump, although environmental activists continue to fiercely oppose the project.

Again, the political issues at play make it more and more difficult to predict pipeline project developments in the oil and gas business.

Since January 2018, pipe prices have risen, as reflected in the climb of the pipe price index by about 23% from 288 to 353. (Fig.6) The positive signals throughout 2018 have also resulted in cautious optimism, with traders beginning to restock in expectation of a further price rally.

Nonetheless, it must be noted that tube producers are still facing relatively low plant utilisation, at levels of about 62% for welded tubes and pipes < 16-inch diameter as well as seamless tubes and pipes. For welded pipes ≥ 16-inch diameter, utilisation levels are even lower, at about 35%. Here we certainly find regional variations, but the overall picture is quite alarming.

Thanks to trade sanctions and support of the local oil and gas sector, the US tube and pipe industry is recovering. (Fig.7)

US tube production has increased by a massive 4 000 ktons, meaning that even previously decommissioned tube plants have resumed production. This trend may only be sustainable if US-based tube producers make good use of this growth trend and invest in productivity and product quality, otherwise the fallout may be severe once trade barriers fall again. However, some 7 000 ktons of steel tubes and pipes are still imported into the US (Fig.8), which is on average a high import volume.

On the other hand, Europe and other regions also impose trade barriers to secure the national industry against imports from other parts of the world. So the tube and pipe market does need to cope with various political interventions, a circumstance which sometimes hinders strategical management measures. At the last ITA conference in Düsseldorf, Frank Harms from the "Wirtschaftsvereinigung Stahlrohre" reported

Figure 6: Producer Price Index
Source: FRED US Bureau of Labor Statistics

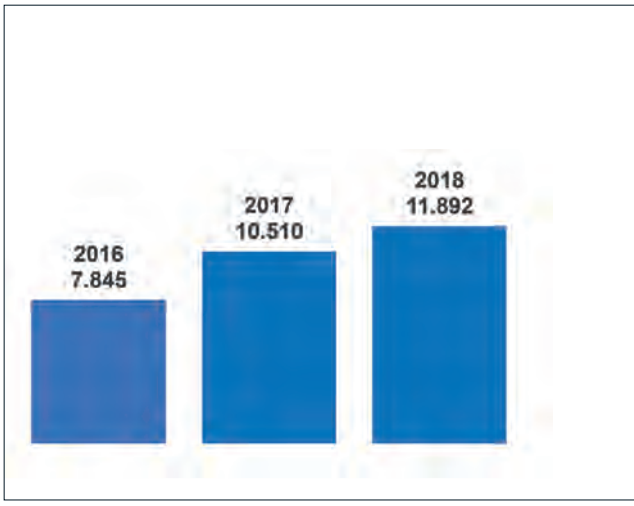


Figure 7: US Tube and Pipe Production 2016 – 2018 (ktons) - Source: ITATube Journal/Wirtschafts-vereinigung Stahlrohre e.V.

on such challenges imposed on tube producers.

The second important market with a market share of 15% is the automotive market. Tubes and pipes with a diameter up to 90 mm are the main consideration here.

Despite some weakness in 2018 and 2019, this market is characterized by relative stability and high demand growth of 2%. (Fig.9) Due to weight-saving requirements for cars, it can realistically be expected that tubes may even see their implementation share in car production increase.

The present trend towards electro-mobility may have a negative impact on pipe supplies utilized for combustion engines. As yet, alternative drive systems represent a minor percentage of new-bought vehicles, but ongoing developments should be closely observed.

As demonstrated here in the last (2019/1) edition of the ITAtube Journal, regional sales figures are quite inhomogeneous. Countries like Russia (+15%), Brazil (+13%) and India (+7%) show continued growth, whereas Japan offsets these growth trends and shows a decline in car sales of 11%. The

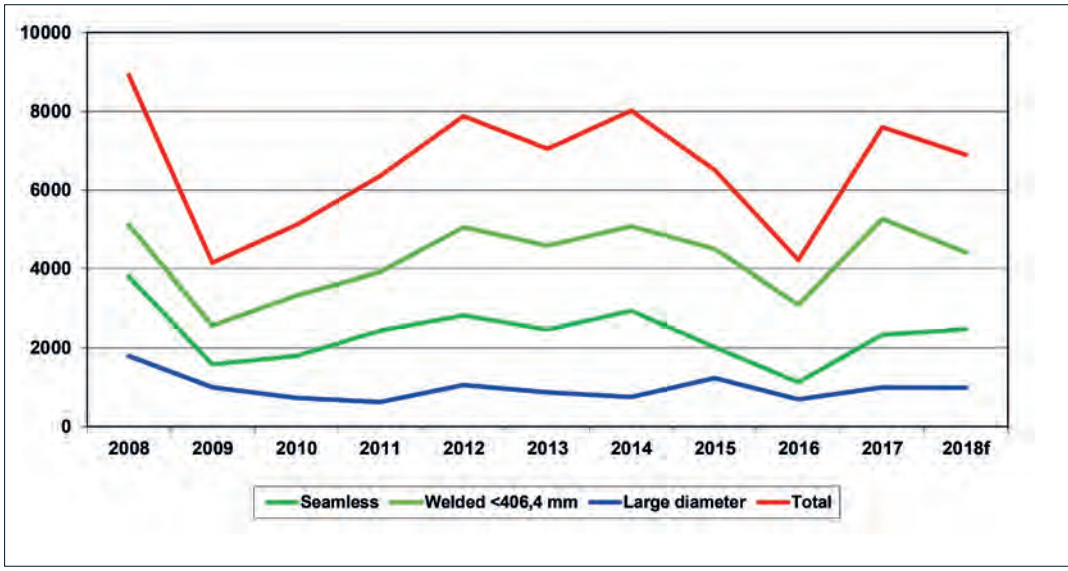


Figure 8: Tube and Pipe Imports into the US (ktons)
Source: Wirtschaftsvereinigung Stahlrohre e.V.

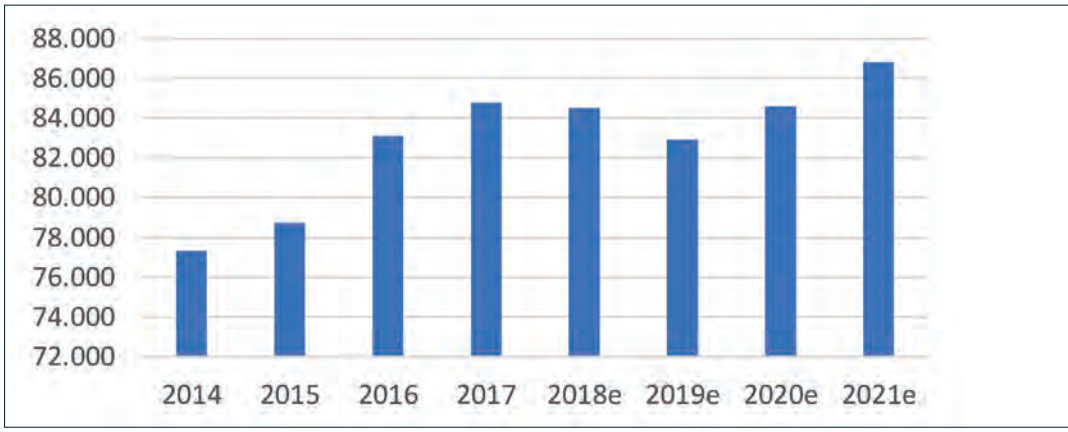


Figure 9: World Car Production (1000 units)
Source: Statista

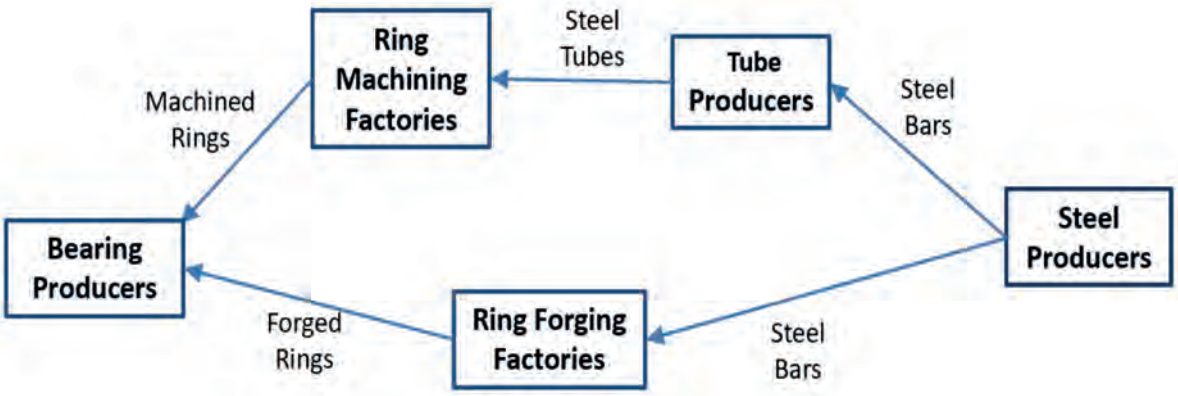


Figure 10: Bearing Industry Supply Chain - Tube vs Forging Process
Source: Sanji Steel

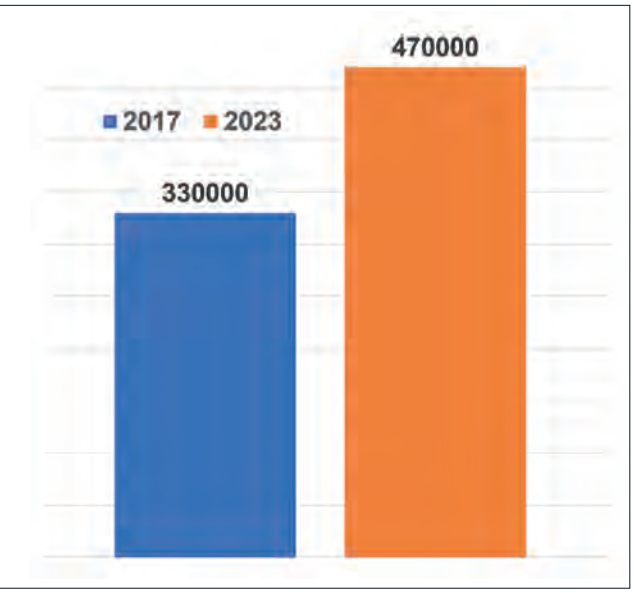


Figure 11: World Bearing Production Growth (1000 tons) - Source: IMARC

largest world car markets, China, the US and Europe, are consolidating at almost "zero" growth. Nonetheless, the automotive market, due to its technological requirements, remains an interesting one for tube producers and tube processors.

The market segment mechanical engineering, representing 9% of the total tube and pipe market, is highly diverse due to an almost endless number of potential applications. In my last article (Journal I'19) I highlighted the fast-growing hydraulic cylinder tube market. This time I would like to highlight the ball bearing market. To produce bearing rings, two competing process routes are applied: forged rings or machined rings from seamless tubes. (Fig.10) Therefore, ball bearing tube producers need to emphasise the advantages of the production process via tubes.

According to IMARC, in 2017 the global ball bearing market had a volume of 33 billion tons. This market is projected to attain a volume of 47 billion tons by 2023, exhibiting a CAGR of 6.2% during the years 2018-2023. (Fig.11)

Such substantial growth potential means the ball bearing industry market represents an attractive volume market for tubes as well. Tube producers, processors and service providers who identify the customer needs and serve best value to their customers have the best potential to maintain sustainable business. At the recent ITA conference this year in Düsseldorf, Mr. Vincent Yang from SANJI Steel reported on their strategic 4-Value Model, illustrating how they serve their bearing industry customers with optimum sensibility to customer requirements.

Another attractive market for tube producers is the construction market, representing about 5% of world tube production. The global construction market is growing in tandem with global GDP growth, as we discussed in the ITAtube Journal in October 2018. Primary market applications for tubes in the construction market are skyscrapers and bridges. Here we find significant competition between steel/tube structures on the one hand, and concrete elements on the other. With regard to skyscrapers, the trend in emerging economies to build high-rise towers is favorable toward the application of steel/tube structures. (Fig.12)

The same strong competition between steel/pipe structures and concrete elements applies for bridges. (Fig.13) The Izmit bay crossing bridge, as the 4th longest bridge in the world, is made of steel and pipe structures. Steel and pipe structure bridges such as this are characterized by a long lifetime and better maintainability compared to bridges built from concrete structures.

Both of these important segments of the construction market require major lobbying efforts on the part of the tube producing industry to further convince regulation authorities and project stakeholders about the advantages of steel/tube structures as cost effective, aesthetic and sustainable alternatives to concrete elements.

All these steel tube and pipe markets can be subdivided into

commodity volume, and high-tech requirements. For the high-tech requirements, the decisive factors are the steel quality and the tube plant infrastructure. The steel quality for many high-tech steel tube applications is demanding with regard to chemistry and homogeneity.

The availability of such quality steel – with the required uniformity for welded tubes and pipes – in the form of steel strip and plates as well as billets for seamless tubes is limited and can create a significant hurdle to the supply of tubes and pipes to such high-tech markets.

In addition, tube plant infrastructure, i.e. tube mills and finishing lines, as well as applied quality assurance is also of significant importance. And growing importance is given to agile management strategies regarding customer benefit, process and product quality enhancement by applying "Industry 4.0" measures. First interesting applications of "Industry 4.0" in the tube and pipe industry were presented by various speakers at the ITA Conference in Düsseldorf this April 2019.

Taking all of the abovementioned into consideration, it is remarkable how these industry developments make their mark on world steel tube production.

Steel tube and pipe production was characterized by steady growth until 2015 when it topped a volume of more than 171 000 tons p.a. (Fig.14) The downturn in 2016 to 167 000 tons p.a. was mainly reflected in the US, CIS and ROW (rest of world). In 2017 the market turned around again, but China as the main tube and pipe producer lost about 6000 tons p.a., whilst all other countries, especially the US, increased their production, thus offsetting China's shortfall.

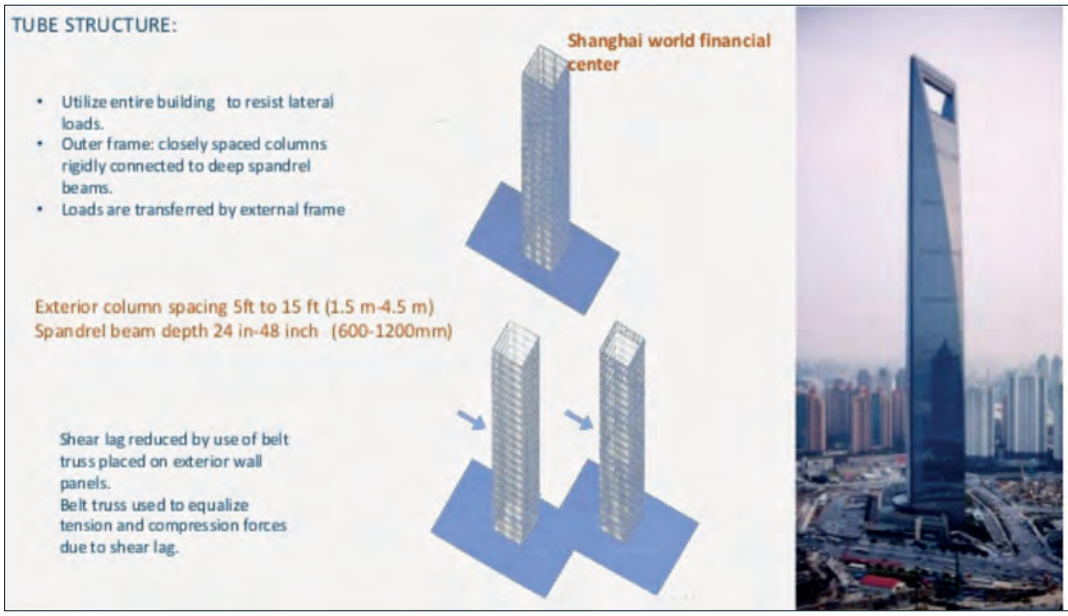


Figure 12: Steel and Pipe Structures applied at the Shanghai World Financial Centre - Source: Applied steel structures

Fig 15 shows the breakdown for the relevant regions in more detail. The US in particular, helped by the trade policy offensive of President Trump, seized the advantage and grew production by about 4000 tons p.a. (+51% since 2016). In 2018, world steel tube production was on the up once more, dominated by a fast-recovering China (+2500 tons p.a. or +3%) and, again, the US (+1350 tons p.a. or +13%). All other countries evidenced little or no growth.

More significant variations were again displayed by the market segment seamless pipes and tubes (Fig.16). This product segment is quite volatile. In just the two-year period from 2014 to 2016, global production volumes fell by about 10 000 tons (-20%). There was a modest recovery in 2018, when production increased by 4%. However, the severity of the previous decline has meant that the industry has still not managed to reach 2012 production levels.

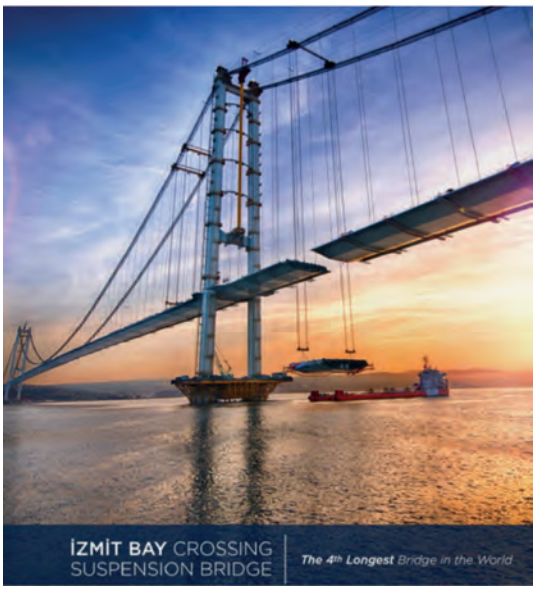


Figure 13: Izmit Bay Bridge Source: CIMTAS

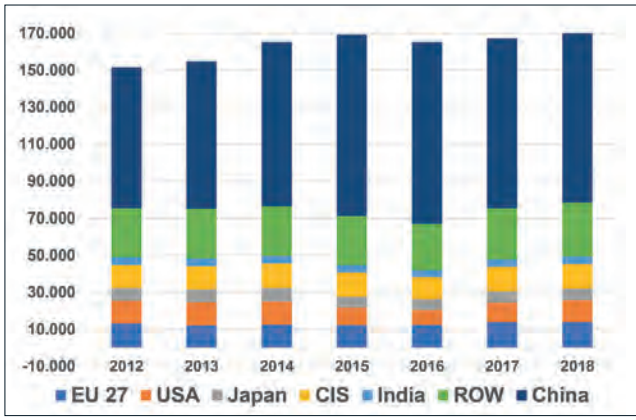


Figure 14: World Steel Tube and Pipe Production (ktons) - Source: ITATube Journal/Wirtschaftsvereinigung Stahlrohre e.V.

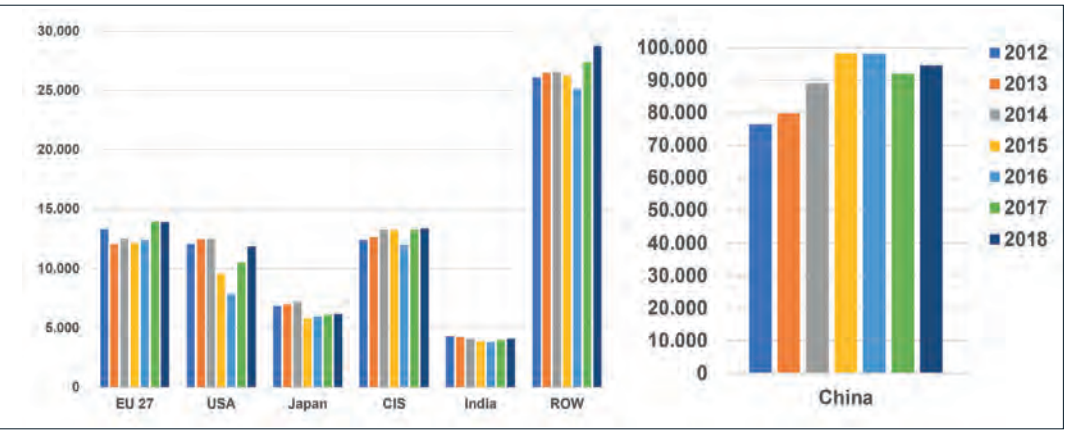


Figure 15: World Steel Tube and Pipe Production (regional) Total (ktons)
Source: ITATube Journal/Wirtschaftsvereinigung Stahlrohre e.V.

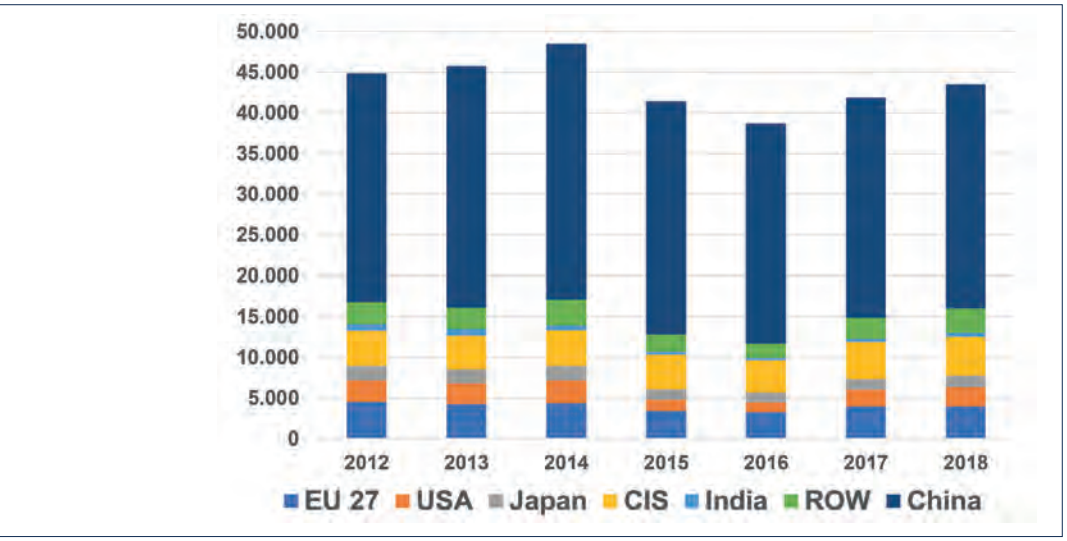


Figure 16: World Steel Tube and Pipe Production Seamless (ktons)
Source: ITATube Journal/Wirtschaftsvereinigung Stahlrohre e.V.

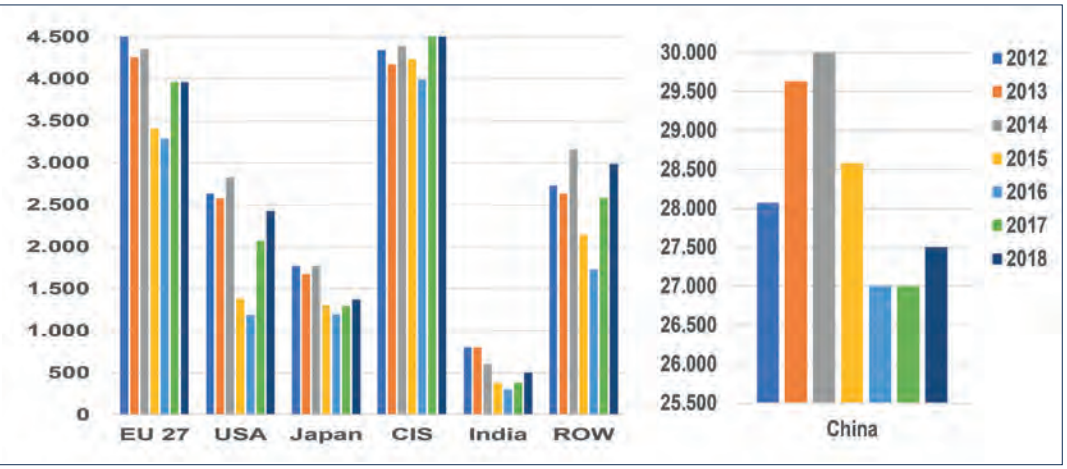


Figure 17: Regional Steel Tube and Pipe Production Seamless (ktons)
Source: ITATube Journal/Wirtschaftsvereinigung Stahlrohre e.V.

Growth in 2018 was dominated by volume gains in China (+2%), the US (+17%), India (+32%), ROW (+15%), CIS (+4%) and Japan (+6%). (Fig.17) What is remarkable is that US administration measures have meant even obsolete seamless tube and pipe mills are now back in operation. However, economists can't see such outdated plant remaining online for long, since their economic performance remains questionable without major investment

The production of welded pipes < 406 mm OD (Fig.18) saw a global production volume increase in 2018 (+5%). China, after a series of weak results, was able to report an increase (+6%). It's the US once more that has the most significant production increase to report (+11%). This tube and pipe dimension range represents by far the largest product segment, with average global growth of about 5 to 10%. Even the downturn of 2017 (-2%) was nowhere near as significant as the production volatility of other tube and pipe dimension segments. It also has the advantage of being able to serve a number of growing markets, allowing producers to capitalize on a broader range of market prospects, as we've noted in previous reports.

The production of welded pipes ≥ 406 mm OD, at about 22 000 tons p.a. (± 5%), is by far the smallest product segment. (Fig.19) Its main application is large diameter line pipe projects. As we said earlier, such projects often depend on powerful stakeholder interventions and the capability of relevant pipe producers to qualify for them. The current US government, for example, has recently begun to impose import duties on line pipe imports to protect US line pipe producers. Either way, the

average world pipe-producing plant utilization is at a very low level of only about 30%.

This political signal seems to have had the desired effect on US pipe production The 2018 production figures (Fig.20) reflect this impressively, showing that only US tube and pipe producers have been able to increase their production by 19%. All other countries/regions reduced their production, with the most significant losses in China (-15%) and Japan (-7%). Europe (-2%), CIS and ROW (-1%) show more moderate production decline.

This trend reflects the decreased demand for pipelines in these regions and political measures, such as recent import duties, taken by the US legislation. Some of the technologically advanced producers of large diameter line pipe tubes can still succeed on their unique selling points.

In this entire scenario, currency exchange rates have also had a notable impact on the trading of international pipe and pipe production equipment throughout the world.

In 2017 the euro (EUR) gained about 20% against the US dollar (USD). (Fig.21) In the months since April 2018, it fell again by about 10%, down to 1.13 in October 2018. This does, of course, lessen pressure on exports into the US.

Since early 2019, the exchange rate of the euro to the US dollar has stabilized at a rate of 1.13. It remains to be seen how and if the Brexit confusion and the European parliamentary elections will influence developments in the course of this year.

The exchange rate of the euro to the Chinese yuan (CYN) developed parallel to that of the US dollar

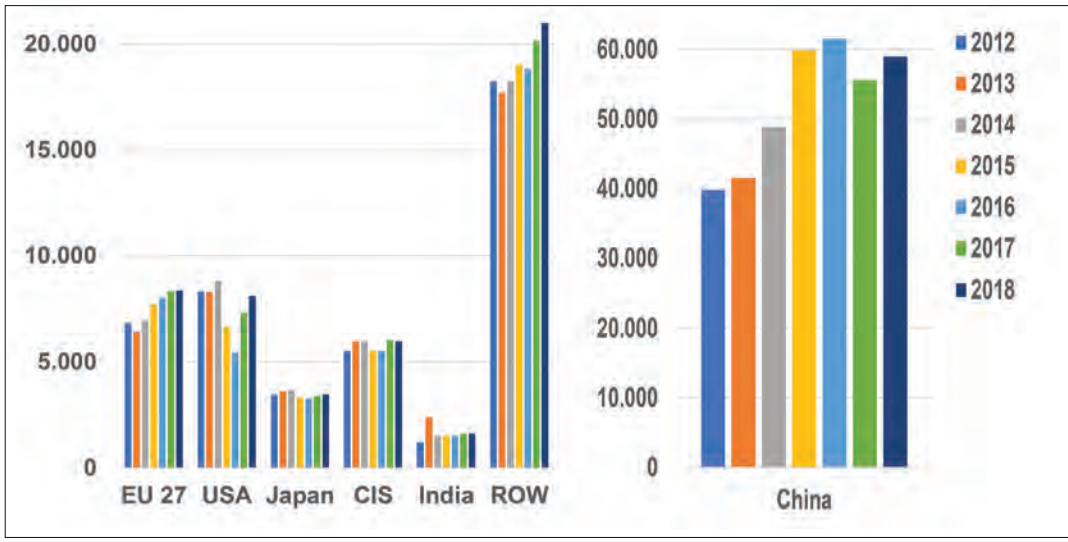


Figure 18: Regional Steel Tube and Pipe Production Welded < 406 mm (ktons)
Source: ITATube Journal/Wirtschaftsvereinigung Stahlrohre e.V.

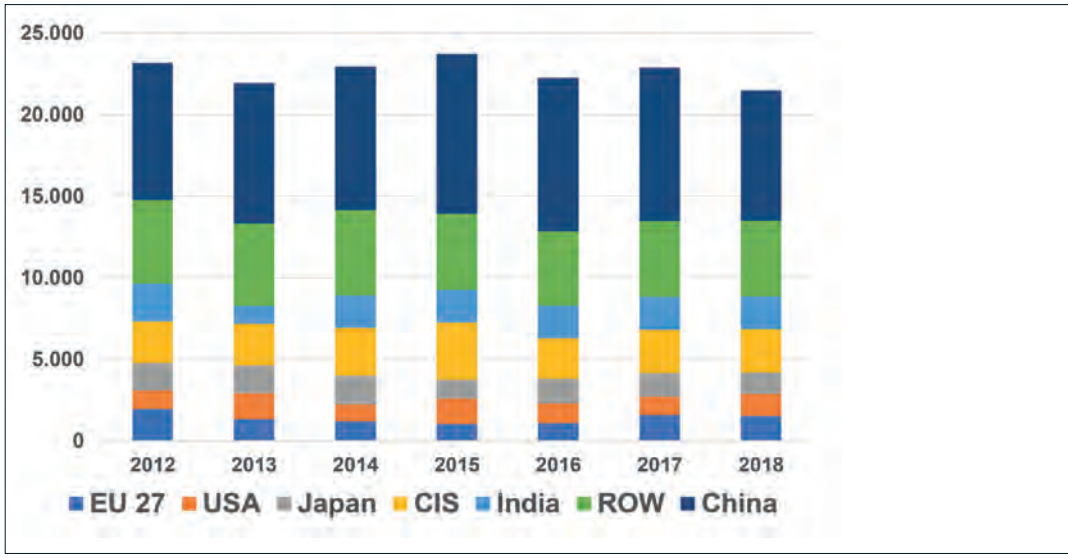


Figure 19: World Steel Tube and Pipe Production Welded > 406 mm (ktons)
Source: ITATube Journal/Wirtschaftsvereinigung Stahlrohre e.V.

and the euro gained about 21% in 2017. In 2018 the euro lost twice as much against the yuan (-22%) compared to the loss against the US dollar in the same year, encouraging imports into China. Then in 2019, the euro regained 13% against the Chinese yuan, with the result that the overall exchange rates EUR/USD/CYN are once again at the levels of early 2017. Market watchers should keep a close eye here on how the trade conflict between the US and China develops and to what extent this is reflected in the relevant exchange rates. There can be little doubt that the exchange rates of these lead currencies do impact the international trade and challenge our industry as well.

What measures are pipe producers and plant equipment suppliers taking to overcome current difficulties and to generate sustainable business?

The global increase in tube and pipe demand is leading to regionally improved plant utilization in the steel tube industry. Some pipe producing companies in the USA are even reactivating obsolete

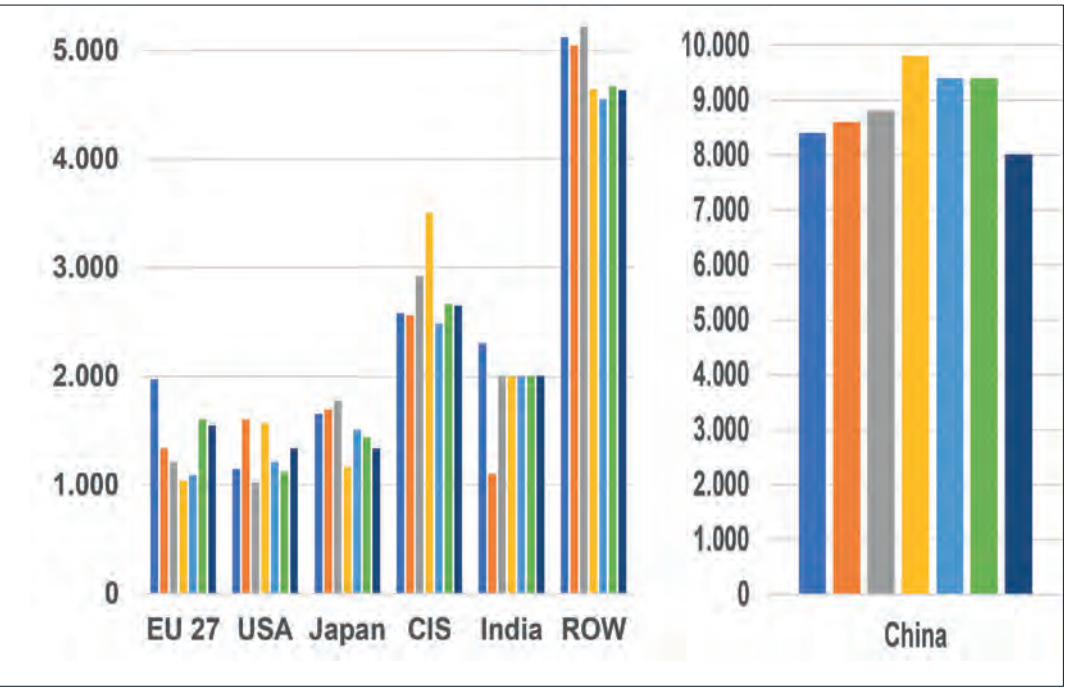


Figure 20: Regional Steel Tube and Pipe Production > 406 mm (ktons)
Source: ITATube Journal/Wirtschaftsvereinigung Stahlrohre e.V.

production facilities with a questionable economic future.

Still, despite the remarkable boom in the US, globalization into markets with increased demand remains one of the key answers. The Middle East and locations with major oil and gas exploration as well as automotive production, mechanical engineering and construction industries are to be considered. Besides this, shale gas exploration, deep-sea offshore exploration and oil sand exploration remain major challenges to our industry.

Price competition from low cost countries demands further specialization in high-tech products for higher cost countries. Producers seem to have evaluated their market approach and decided to specialize and serve commodities or high-tech products even if they only represent niches, depending on their capabilities. Some countries/regions have also installed trade barriers to control imports from other countries.

Finally, every producer should make permanent improvements to satisfy customer needs, increase productivity and reduce production costs. New information technologies, such as "Industry 4.0", also known as the "Internet of Things", can provide interesting opportunities for the establishment of sustainable future business. Such agile optimization processes may even open up new ways of dealing with the fast-varying demands tube producers are facing.

Plant builders as well as technology suppliers may find interesting business opportunities in this new market segment. Some technology suppliers have already reacted and expanded their product portfolio to include digital solutions.

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Figure 21: Currency Exchange Rates as per 14th April 2019
Source: Finance.net

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Established companies and start-ups

Stronger together: Digitisation is dematerialisation

Established companies offer the greatest potential for digital transformation. However, traditional industrial companies are too focussed in the concentration of their digitisation strategy on optimisation of the processes used in their existing business. Experts are noticing that established companies are still targeting new growth through new services too rarely. It is precisely here that traditional companies and start-ups can learn from each other successfully, as examples from the metal industry demonstrate convincingly. Such examples of successful digital transformation are being presented at the metallurgical trade fair METEC in the context of the "The Bright World of Metals" from 25. to 29. June 2019 by, for instance, the VDMA Metallurgy trade association.

In the digital transformation age, established companies are starting to take new approaches from the start-up community seriously too. A current example of this is design thinking, which is considered to be the epitome of creativity, e.g. at SMS group, the metallurgical plant manufacturer.

The long-established company is well known all over the world for the technical perfection of its machines and equipment for the production and processing of iron, steel and non-ferrous metals. For a long time now, technologies like virtual reality, augmented reality or digital twins have been proven instruments in the planning, design and construction of new steel mills, with which SMS applies German engineering skills to create machine technology of the highest quality, including electrics and automation – more recently with the help of such innovative production methods as additive manufacturing too. What is new, however, is that the machine and plant manufacturer is developing digital products and services to an increasing extent. When it launched SMD Digital in May 2016, the technology company provided itself with a start-up that gives customers from the steel and non-ferrous metal industry the appropriate tools for digital transformation. Such as software for "Industry 4.0" solutions and apps for the metal industry, which are made available via the in-house platform mySMS group. SMS group is planning to present new digital services and products at the forthcoming metallurgical trade fair METEC 2019.

As software developers with a digital mindset, the staff of SMS Digital in Düsseldorf, the city on the Rhine, are keen, entitled (and required) to live a different corporate culture than the technicians in the SMS mechanical workshop in the Siegerland, where regular working hours, time clocks and works councils are standard features of everyday operations in the industrial age. The approach adopted by the software developers is very different from the classic method of operation used by the engineers. In design thinking, development starts with the customer and his problem rather than with a meticulously compiled set of specifications. A user-based approach involves validation of ideas interactively between the digital unit and the customer, before a prototype is selected to be optimised for large-scale introduction. Once the idea has been turned into a marketable solution, it can be included in the parent company's programme. The digital unit was not established on an exclusively internal basis, however. The Munich business consultants etventure helped to structure SMS Digital and acted as a kind of "matchmaker" in the successful marriage between the "old" and "new" economies.

VDMA Metallurgy: focus on companies' overall digital strategy

Kathrin Delcuve is the expert responsible for innovation and technology development at the VDMA Metallurgy trade association. When she talks about "Industry 4.0" and IoT, what she means are instruments for digital transformation of (and in) industrial production. She explains: "For process-based metallurgical production technologies, it was crucial first of all to be able to improve process and quality control by taking advantage of big data methods". The clear objective was to be in a position to offer customers energy and cost savings in the production process and this continues to be the case now too. As an example, the VDMA expert mentions the use of data mining processes to improve the correlation of machine data and process parameters. This enables prediction models to be developed

– in metal industries, for example, for temperature regulation, more precise loading or the prediction of melting endpoints.

Delcuve goes on to specify: whereas the initial emphasis in "Industry 4.0" activities was mainly on process optimisation projects, the entire company is now becoming the focal point to an increasing extent. The VDMA expert says: "In the meantime, successful corporate exploitation of "Industry 4.0" potential is no longer determined by product and application optimisation in the production process alone; what is decisive instead is how individual, data-based innovations are incorporated in the company's overall digital strategy". Solutions for controlling and optimising production processes, such as sensor technology, data analytics, VR or AR technologies, make smart operations – and, as a result, data-based services and distinctive products – possible. According to Delcuve, implementation is frequently carried out in-house and along the lines of product development processes in start-ups. But also in co-operation with start-ups, which have based their business models on Internet-based applications and software services. In September 2018, for example, VDMA brought selected start-ups together with companies from the metallurgical machine and plant manufacturing field at the Dortmund Technology Centre.

Kathrin Delcuve summarises the progress made: "In the meantime, digitisation encompasses all levels of production and value creation – product development, customer relations and the competitive positions in supply chains and B2B business". Her conclusion: "In the meantime, successful corporate exploitation of "Industry 4.0" potential is no longer determined by product and application optimisation in the production process alone; what is decisive instead is how individual, data-based innovations are incorporated in the company's overall digital strategy".

At GIFA, METEC, THERMPROCESS, NEWCAST, the VDMA Metallurgy trade association will be highlighting numerous examples of applications from its corporate members, including a new edition of the brochure "Industry 4.0 in metallurgical plant manufacturing".

Klöckner: pioneer that has had to overcome initial difficulties

The steel distributor Klöckner & Co. is considered to be one of the digitisation pioneers in metal industries. CEO Gisbert Rühl studied the successful models adopted in the platform economy in detail and visited start-ups on-site in Silicon Valley. A particularly close examination was made of Amazon. Back in Germany, the steel distributor established the digital unit kloeckner.i in Berlin. Rühl recalls the initial difficulties that were experienced when implementation of the digital strategy began: "A major obstacle proved to be the necessary change in our corporate culture. Because our aim right from the start was to win all our staff over and motivate them to support the process of change. This is the only way for digital transformation to be carried out successfully." Rühl eliminated the internal communication barriers and ended the hierarchically organised information flow. According to Rühl, staff and their superiors now communicate non-hierarchically via the internal social network Yammer. "Another of the bigger problems was most definitely initial scepticism about the digital tools developed by the digital unit in Berlin. This meant that we needed to integrate kloeckner.i in the group more effectively, so that the classic side of our company gives active support to introduction of the digital tools. Our exchange programmes between staff from the classic operations and our digital unit have proved to be thoroughly effective here and have helped to establish a digital mindset in the core organisation".

Rühl stresses that the digitisation strategy has reached all areas of the group in the meantime. "We are digitising not only the front ends to customers but also to an increasing extent the internal processes of Klöckner & Co., in order to become even faster and even more efficient. It is, however, also correct that our digital unit kloeckner.i in Berlin is the 'hotbed' of digitisation within the group. Digital natives work there on our solutions for digitisation of the entire Klöckner & Co. supply and service chain – on behalf of all the company's locations and in close liaison with group colleagues and customers."

The strategy has proved successful: "Klöckner & Co. currently generates about a quarter of sales via digital channels. This corresponds to annual digital sales of some EUR 1.5 billion", as Christian Pokropp, Managing Director of kloeckner.i, adds. Although this is already a large percentage compared with competitors and companies in other industries, Klöckner does not intend to rest on its laurels. Pokropp promises: "We aim to increase the figure to 60 per cent by 2022".

Digitisation has become an area of operation of its own with digital consultancy services. New digitisation projects are also on the agenda. "We are currently expanding the Klöckner & Co. online shops, which are available in six countries in the meantime, into marketplaces", says Pokropp. He adds that Klöckner has convinced distributors of complementary products about the benefits of its platforms. These companies now distribute products that supplement the Klöckner & Co. product portfolio via Klöckner's own online shops with marketplace functions. Pokropp explains: "In view of the good progress made in the digitisation of Klöckner & Co. and increasing numbers of inquiries, kloeckner.i will also be providing digital consultancy services to external companies in future. We are in addition enabling consultancy customers to start e-commerce operations simply via integration in Klöckner & Co.'s proprietary B2B marketplace".

Digitisation means dematerialisation

What traditional companies often get wrong or misunderstand: "Digitisation does not mean abandoning old strengths that have made the company great", as Philipp Depiereux, founder and director of the digital consulting company etventure points out. In his opinion, at German companies these strengths are, above all, engineering skills, precision, perfection, many years of industry experience and an established customer base. The digital expert says: "The 'Made in Germany' quality slogan still applies in the digital age too". He emphasises that companies need, however, to continue developing and to adopt the successful formulas implemented by digital players too: speed, data expertise and an uncompromising focus on the customer and user. The conclusion drawn by the expert for digital transformation, who is very familiar with heavy industry due to the consulting services he has provided to Klöckner and SMS: "Whoever manages to combine old strengths with new ones will be successful in the digital age too".

With the systematic implementation of their digital strategy, companies like Klöckner and SMS can be considered to be something like the digital avant-garde in the metal industry. The example of the foundry industry demonstrates how reluctantly many industrial companies are still tackling the issue of digital transformation. "Most foundries are focussing too much on production", says Franz-Josef Wöstmann, foundry technology and lightweight structure departmental manager at the Fraunhofer Institute IFAM in Bremen. He adds that it is of course right to strengthen one's own processes with the help of new technologies. The potential and opportunities offered by digitisation are, however, neglected when there is too narrow a focus on improving process operations. The focus needs to change if the aim is to use "Industry 4.0" as the basis for further new activities. The foundry expert stresses: "Industry 4.0 means digitisation". And he adds that digitisation means dematerialisation. "Digitisation creates the opportunity to earn money and extend the value chain with the data about components".

Most foundries make the mistake, however, that they still think too much in terms of the material, the casting. The foundry expert Wöstmann considers this a worrying way of looking at things: "In the next few years, success will be achieved via function rather than via kilos".

(Author: Gerd Krause, Mediakonzept/Düsseldorf)

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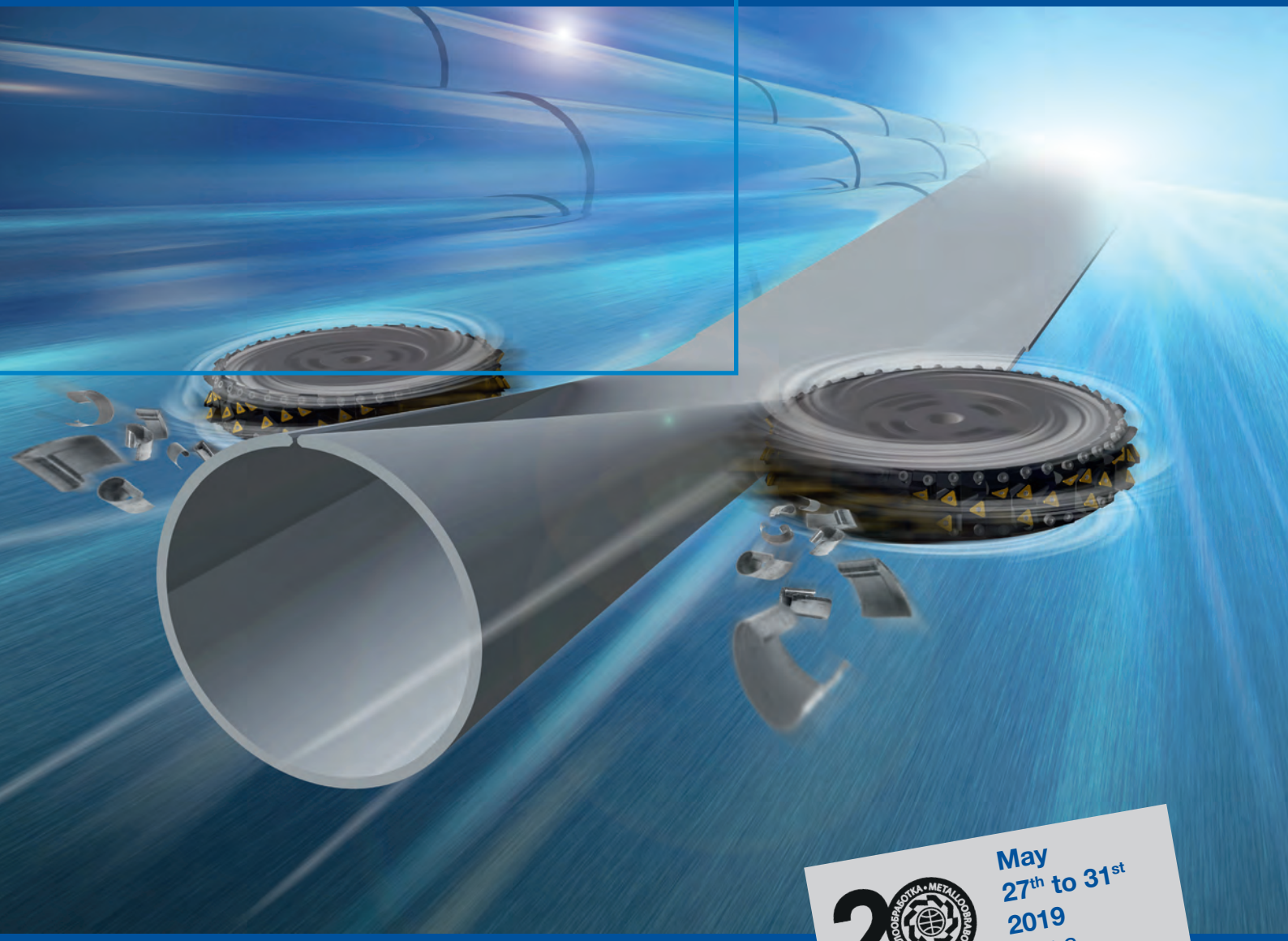

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Huntingdon Fusion Techniques

WP-309 – 3-D Printing for the Marine Industry

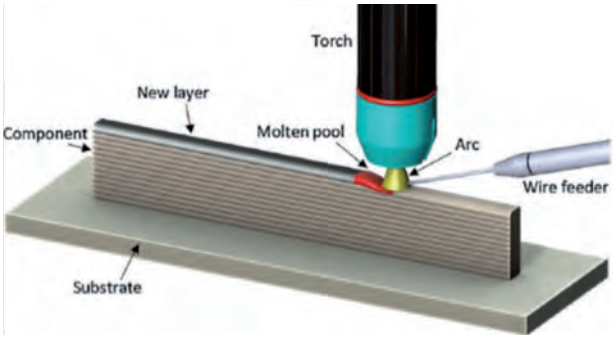

Figure 1. Illustration of the WAAM Process

Figure 2. Propeller 200 x 240 x 240 mm. Material: 1.5125 G3Si1.

Figure 3. Bell housing 230 x 380 x 380 mm. Material: Aluminium alloy.

The marine industry in general has been slow to embrace the 3D printing concept. The use of continuous liquid metal deposition under computer numerical control has created opportunities to produce complex shapes such as forgings and castings whilst avoiding the need for expensive tooling and the time delays in fabricating moulds.

Notwithstanding this slow start, development work at Delft Technical University in 2017 has led to the production of the world's first metal deposited marine propeller.

The majority of published documents on 3-D printing have been restricted to high precision applications, particularly in the medical sector. Whilst these examples illustrate the potential for producing small complex shapes the process is slow and expensive. Less well promoted are applications in which large engineering products using metals have been produced faster and less costly than using traditional methods such as casting and forging.

THE CONCEPT OF 3-D PRINTING

Several methods for 3-D printing using metals are now in regular use by specialist organisations. Essentially they involve using a targeted heat source to melt or sinter metal alloys and progressively build up a complex three-dimensional shape. A computer numerical control system, usually a multi-axis robot, guides the heat source. Solid metal in the form of wire or powder is fed into and is fused by the heat source.

One version uses a laser or an electron beam as the heat source in conjunction with metal powder, Direct Metal Laser (DMLS) or Electron Beam (DMEBS) sintering. This powder technique is most effectively applied where smaller, delicate objects are required. An example is the production of body implants [1 – 3].

The welding version of 3D printing, Wire and Arc Additive Manufacture (WAAM), is performed by laying down progressive beads of metal, [Figure 1]. This technique is more suited to the production of larger and heavier engineering components as evidenced by the manufacture of marine components and airframe structures [4 – 6].

In terms of applications for WAAM and DMLS/DMEBS the welding version is most suitable for heavier and larger products whilst the powder alternative is best applied where smaller, delicate objects are required. In other words, welding is essentially a bulk deposition technique and powder is a precise and highly controlled process.

EXAMPLES OF WAAM MANUFACTURE

Several applications of 3-D production have been made and are appropriate to illustrate the potential in the marine industry. These are illustrated in Figs 2

DRIVING FORCES BEHIND WAAM DEVELOPMENT

The primary driving force behind the development is the potential to make huge savings in materials and therefore costs .

One specific area of application is in airframe manufacture. Many components are made currently by machining from a solid billet or forging, but over 50% of the original stock is lost as swarf. Another area under consideration is landing gear production where a cost saving of 70% is expected by using additive manufacturing.

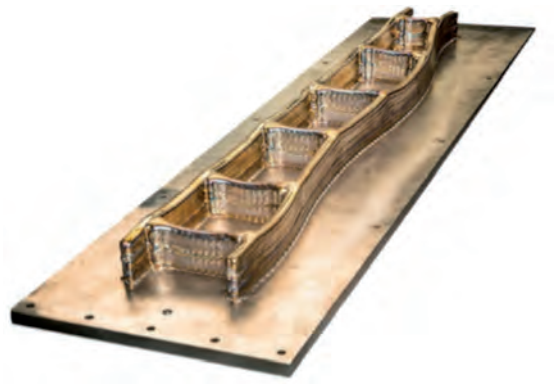

Figure 4. Main structural element of aircraft wing.

Current Activity

Additive layer manufacturing offers several advantages for certain structural components such as a vast reduction in material wastage, especially when producing many heterogeneous parts, and the ability to produce a great variety of part designs for prototype work quickly.

There is also the key benefit that it allows the consideration of unconventional designs that otherwise would not be practical because of manufacturing or cost constraints due to, for example, complex or unusual geometries, bringing with it many different opportunities and challenges.

Early work at Cranfield University for Rolls-Royce targeted aero engine applications. Researchers here developed the wire + arc deposition process to examine the use of Inconel, titanium, aluminium and various nickel alloys. Since then the focus has shifted to airframes. Although laser and powder methods are useful for certain applications such as rapid prototyping or for small highly complex parts, this technology is limited by its speed and the size of component it can accurately manufacture. In contrast, the processes being developed at Cranfield are designed for high deposition rates.

Figure 5. 1300 mm, 180 kg Bronze Propeller

To put this difference into context, the Cranfield centre is currently targeting a deposition rate of 10 kg/hr, compared with a typical 0.1kg/hr using laser + powder methods, which can also potentially carry the risk of the material not being fully consolidated if fusion has not occurred between grains. Additive arc + wire systems are also capable of producing parts several metres in size and simplify the process of producing single piece linear intersections.

The Damen Shipyards Group entered a cooperative consortium with RAMLAB, Promarin, Autodesk and Bureau Veritas to develop first class approved marine propellers.

The early work terminated in the production of the world's first WAAM manufactured propeller in 2017 [8]. It is based on a Promarin design typically found on a Damen Stan Tug type 1606 [Figure 5].

Cost of Equipment

Powder deposition technology requires a substantial metal enclosure within which all the operating system including laser (or electron beam) heat source, computer numerical control equipment and powder dispensing. A typical cost of a production system is $750,000. Wire deposition is undertaken with standard arc welding equipment coupled with a 5-axis articulated robot costing a total of $120,000. [9]

Cost of Consumables

Only a limited number of metallic alloy systems are currently available for additive manufacturing using powders principally Ti-6Al-4V, some stainless steels, Inconel 625/718, and Al-Si-10Mg. The cost for many

Figure 6. Small flexible system. The robot/ enclosure interface is effectively sealed against leaks using an adaptable occlusion. Enclosures up to 27 m3 volume have been manufactured to accommodate large systems

Figure 7. Small flexible system. Advanced oxygen monitor includes full colour touch screen control. The instrument supports data logging and weld certification. Readings are accurate down to 10 ppm.

stainless steels is in the region of $400/kg. Few problems remain when it comes to fusion welding and consequently an extensive variety of wire electrodes is available, most of which can be used for arc deposition. Because of the quantity of wire manufactured the cost is not high. Typically, stainless steel filler wire is readily available for $30/kg.

Deposition Rate

Powder deposition rates are very low and average 0.1 kg/hr. With advancing technology this may well increase but at the present time this severely restricts applications. The wire arc process is capable of laying down 10 kg/hr of a wide range of metal alloys. [Table 1.]

	WAAM	DMLS/DMEBS
Available Range of Filler Metals	Wide All standard filler wire compositions are readily available	Limited Powders generally need to be specially manufactured
Cost of Filler Metals	Low	High
Cost of Equipment	Low Standard GTAW plant coupled with low cost purging equipment	High Specialist precision instrumentation necessary
Deposition Rate	High 10 kg/hr	Low 0.1 kg/hr
Applications	Larger and heavier parts over 5 kg and above 400 mm	Small precision objects typified by prostheses and auto/aerospace components
Strength	Generally equal to parent material strength	Limited information available but generally good
Advantages/ Disadvantages	Low cost, but post-deposit machining often necessary	High cost, but precision deposition produces near-finished parts

Table 1. Comparison of Wire and Arc Additive Manufacture (WAAM) and Direct Metal Laser/ Electron Beam Sintering (DMLS/DMEBS)

PROCESS LIMITATIONS

Many alloys may be used during the WAAM process simply by using the welding torch inert gas shroud as protection. However, some materials are much more prone to reaction with residual oxygen and this can lead to fusion zone and surface oxidation. Titanium alloys are particularly sensitive but stainless steels. and many low alloy steels also demand additional inert protection.

With the electron beam process, protection is assured since operations are carried out in a vacuum. Nevertheless, this is an expensive alternative to arc welding.

Overcoming the Problem of Oxygen Contamination

The issue of adequate protection has been resolved by developing flexible enclosures that can be purged with inert gas, usually argon. These can accommodate the entire welding equipment and robot and provide inert gas protection throughout the deposition process.

Flexible Enclosure Technology

There have been considerable advances in enclosure development since the concept was introduced over two decades ago. Huntingdon Fusion Techniques Ltd [10] for example has spearheaded a drive to design systems specifically for the welding industry. These innovative products offer significant attractions over both vacuum and glove box alternatives not least a significant reduction in cost.

The largest facility to date has a volume of 27 m3, adequate to accommodate all work-pieces, welding equipment and even a programmable robotic system. By purging the enclosure with inert gas an operating oxygen content is low enough to prevent oxidation during welding and cooling.

Monitoring the Oxygen Content

Control and real-time monitoring of the oxygen content of the purge gas is crucial if discolouration and loss of corrosion are to be avoided.

Techniques for measuring oxygen content have been available for decades but only recently have instruments been developed specifically for welding applications. Users increasingly demand complete absence from discolouration and no loss of corrosion resistance and this implies purge gas oxygen content to be as low as 20 ppm (0.002%). Very few oxygen purge monitors are capable of meeting this sensitivity but the PurgEye [Figure 7] instruments cover all requirements.

CONCLUSION

A crucial benefit of 3-D printing is that it opens up possibilities for the production of complex designs that otherwise might not be practical or economic.

In terms of applications for WAAM and DMLS/DMEBS the welding version is most suitable for heavier and larger products whilst the powder alternative is best applied where smaller, delicate objects are required. In other words, welding is essentially a bulk deposition technique and powder is a precise and highly controlled process.

Many alloys need to be protected from contamination during the welding operation. The formation of metallic oxides can reduce corrosion resistance and affect mechanical properties. The use of an effective oxygen-free inert gas environment is essential.

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Acknowledgements

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Figs 2, 3: FIT Prototyping GmbH Germany

Fig 4: Cranfield and WAAM3D ltd waam3d.com

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Figs 6, 7: Huntingdon Fusion Techniques Ltd, UK

About the author

Dr M J Fletcher is a qualified metallurgist with extensive experience in welding and non-destructive testing. He works as an independent consultant, providing support to a wide range of manufacturing industry on a global basis

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Protem SAS

Flange facing machines applications

I) DEFINITION AND USE OF A FLANGE FACING MACHINE

A Flange Facing Machine also called Portable Lathe is made to mechanically polish a disk, collar or ring connected to a pipe in order to form a link with other piping elements (valves, other pipes, etc.) or to block off a part of the piping. This machining operation is done by successive strips to ensure face flatness and regularity.

A company needs a Flange Facing Machine when flanges are deformed or corroded due to flows inside a network (water, steam, oil & gas, etc.) and even damaged from outside due to vibrations or bad handlings.

Quality of a flange facing is fundamental because sealing and pressure resistance depend on it.

II) A FLANGE FACING MACHINE FOR WHICH INDUSTRIES?

Flange Facing Machines are needed wherever you can find a flange or a valve, including the following fields:

- Nuclear Industries
- Fossil Industries: Oil & Gas (drilling platforms, refineries, offshore, onshore, spool base, etc.)
- Petrochemical Industry (manufacturing plants of various chemicals)
- High Purity
- Diesel Engines
- Shipyards
- Tube Processing
- Defense
- And generally speaking all industries where mechanical device whose function is to control the flow of fluids in piping systems are present.

Cracks of a flange

III) HOW OFTEN IS IT NECESSARY TO REPAIR A FLANGE?

There is not a common answer. Indeed, a flange is subject to many preexisting or evolving threats due to:

- Effect of corrosion
- Normal and, sometimes, abnormal stresses about bending, pressure, vibrations, etc.
- Low quality materials
- Defective fabrication and defective preparation before welding
- Unadvisable addition of welded attachements or details to stressed sections
- Weld of incorrect shape
- Welds containing internal defects or associated with residual stresses

- Unsatisfactory application of allied processes

In consequence, periodic examinations of their facilities by our customers, and also by building technical control offices, which can be legally required, enable to point out defective flanges and lead to a specific need of repair for each of them.

legally required, enable to point out defective flanges and lead to a specific need of repair for each of them.

IV) RISKS WHEN FLANGE OBSOLESCENCE IS TOO OLD

Waiting too long to repair pittings, scratches, cracks and other failures can cause serious accidents in case of flanges breaks.

Moreover, a business interruption means a lack of turnover and, finally, harm a company. That is why it is so important not to neglect a flange repair.

V) WHY PORTABLE MACHINES ARE SUITABLE FOR ALL TYPES OF FLANGE FACING?

Portable machines allow to repair flanges with numerous diameters without having to replace them.

Portable lathe – flange facing and boring machining units

Portable lathe – flange & valve facing and boring machining units

VI) CASE STUDIES: A LONG EXPERIENCE OF ON-SITE FLANGE FACING

1. Combined turbine inlet flange

Flange OD: DN250
No. of bolt hole: 12
Seal face type: flat
Machine: TU600

Procedure:

- Clean surface
- Re-welding the corrosion part
- Machining with cutting tool
- Fine machine with insert bits

Conditions:

- Seal face corrosion
- Upside
- Working above ground

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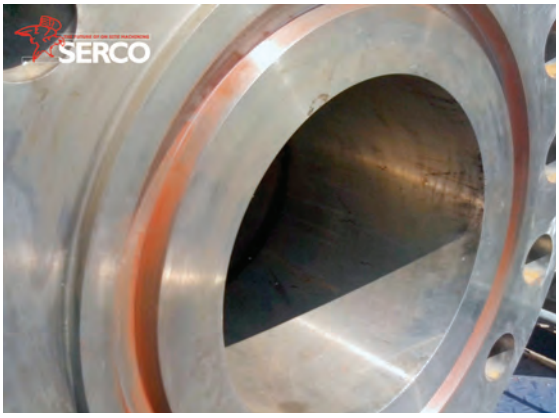
Before machining



2. Combined reactor pipe flange
Flange OD: DN400
No. of bolt hole: 20
Seal face type: flat
Machine: TU600

Procedure:

- Clean surface
- Machining with cutting tool
- Low rotation, low feeding
- Fine machine with insert bits

Conditions:

- Seal face corrosion
- Cutting Depth: 0.3mm the machining cutting depth determined depending on the corrosion situation
- Surface tolerance: Ra1.6

3. Heavy oil hydrogenation filter flange
Flange OD: DN400
Num. of bolt hole: 16
Seal face type: RTJ
Machine: TU1100RTJ

Conditions:

- As the width of the seal groove is too big, the ring gasket hardly has any effect.

4. Residuum oil hydrogenation reactor cover
Seal MD: 1090mm
Num. of bolt hole: 24
Working temp.: 340 °C
Working pressure: 170 MPa
Seal face type: RTJ
Machine: TU1100RTJ with extended support arm

Conditions:

- The seal surface deformed due to the hardness of the gasket and incorrect tighten method.
- The mounted dimension has beyond the max. clamping OD of the machine, we have to use extended arm. But we don't know what will follow once we use non-standard accessory.

5. Slur oil heat exchanger cover

Seal MD: 1100mm
Num. of bolt hole: 44
Working temp.: 390 °C
Working pressure: 3.5 MPa
Seal face type: RTJ
Machine: TU1100RTJ with extended support arm

Part view

After machining

6. Reforming reactor cover

Seal MD: 1100mm
Num. of bolt hole: 40
Working temp.: 540 °C
Working pressure: 1.8MPa
Seal face type: RTJ
Machine: TU1100RTJ with extended support arm

7. Heat exchanger outlet flange
Seal MD: 410mm
Num. of bolt hole: 18
Working temp.: 350 °C
Working pressure: 4.1MPa
Seal face type: RTJ
Machine: TU600RTJ

8. Reforming reactor body flange
Seal MD: 720mm
Num. of bolt hole: 28
Working temp.: 320 °C
Working pressure: 8MPa
Seal face type: RTJ
Machine: TU1100RTJ

Procedure:

- Re-welding the corrosive spot, and grind it.

After re-welding and grinding

After machining

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SICP – Software Innovation Campus Paderborn

WindCORES – Digital Transformation with Renewable Energy

Figure 1: View inside the tower of the wind turbine

Using renewable energy for data centers is a well-known challenge and topic. Plants that use biogas, geothermal heat or water are already in operation. A novel idea where innovative and obvious fusion of wind energy with the service of IT hosting are combined laid the foundation for the project WindCORES. The purpose of wind turbines can be more than generate ecological and renewable electricity. Wind turbines provide the flexible, economical and sustainable solution for operating IT systems that is often lacking. Thus, wind turbines are becoming an important element in the digital transformation of companies and administrations that need or want to operate their IT safely, easily and cost-effectively.

To address the before mentioned challenges, the joint patent-pending concept WindCORES has been developed in cooperation of the Software Innovation Campus Paderborn (SICP) of the University of Paderborn, WestfalenWind IT, InnoZent OWL e.V., Innofactory GmbH and the dtm group. The IT Systems are located within the pillar of a windmill. WindCORES offer IT systems a secure location and the supply of renewable energy. From single racks spread among independent WindCORES upto exclusive use– your benefit: According to any customer specification requirements WindCORES can be newly developed and individually configured within a very short time. The strength of the patented WindCORES architecture is an innovative flexibility that fulfills all standards with its customized modular solutions.

Based on the WindCORES concept, in Lichtenau Germany's first computing node and data storage could be built in a wind turbine, which is in operation since October 2017. In Lichtenau, WindCORES reconciles renewable energy and the increasing energy requirements of computer systems: four fireproof IT safety cabinets are installed at the foot of the 13 meter wide and 150-meter high reinforced concrete tower of the wind turbine, each housing 62-height units (see Figure 1). The wind turbine supplies the computers with electricity directly on site and thus has a further benefit in addition to the generation of green electricity. In addition, the operating costs

are lower, because the electricity costs can be reduced by up to 50 percent to 15 cents per kilowatt-hour.

In addition, the data stored in IT security cabinets is protected against unauthorized access and electromagnetic compatibility (EMC) faults. This allows a nearly lossless, multiple connection to other renewable energy producers and the necessary communication networks.

Another strength of WindCORES: companies that use the concept know exactly where their data lies and where their computing processes take place. In addition, a company can network directly with the computing node and data storage in the wind turbine. In addition, it is possible to virtually connect several plants equipped with WindCORES in one wind farm. This allows the data to be scaled as desired and the service availability to be actively configured via the application layer.

Advantages through WindCORES:

- Low operating costs: Why only 15 ct/kWh? The deep, highly secure integration of your IT in our wind parks allows a direct, multiple connection to our power supplier and communication networks. Moreover, we pass on price advantages to our clients. Thus, we can beat market-based prices up to 50%.
- Flexible Scalability: Why flexibility? You use all advantages of our distributed WindCORES architecture. Determine the physical degree of distribution along racks or WindCORES. Individual definition of scaling and availability – for IT systems or applications – to your need!
- Distributed architecture: Why not a traditional building? A high availability is difficult to reach with a traditional colocation infrastructure. Sustainable power supply, needs-based cooling, distributed location and a high degree of efficiency – all this will be usable for your IT hosting in the WindCORES architecture.
- Efficient Sustainability: What's our sustainability? We use synergies! Direct energy supply by renewable sources in all WindCORES! Existing, access protected rooms of our reinforced concrete towers will be upgraded and racks will be additionally secured by safes. All infrastructure elements will be integrated to maximize availability, efficiency and profitability.

The first critical customer of "WindCORES" is the Center for Information and Media Technologies (IMT) of the University of Paderborn. The IMT will carry out a test operation in the wind energy plant in Lichtenau starting from commissioning of computational nodes and data storage in order to determine all important performance values.

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SMS group GmbH

Simulations, Virtual Reality and Augmented Reality in mechanical engineering

Time-saving, cost-cutting and exciting

Dr. Mark Haverkamp
Plant Simulation Tube Rolling,
Section Rolling and Forging
SMS group GmbH

Every plant operator or mechanical engineer would be thrilled about being able to move freely about a factory and look into the interior of all the machines. How exciting would it be to be able to watch what exactly is happening inside a machine processing, for example, red hot material. Taking a bird's eye view of a works' entire logistical activities is another fascinating experience, the simulation team of SMS group can offer their customers. Not less appealing is the idea of being able to see one's new plant or machine in operation before it has actually been built. All this has become possible thanks to virtual reality technology.

Four types of simulations and what benefits they provide

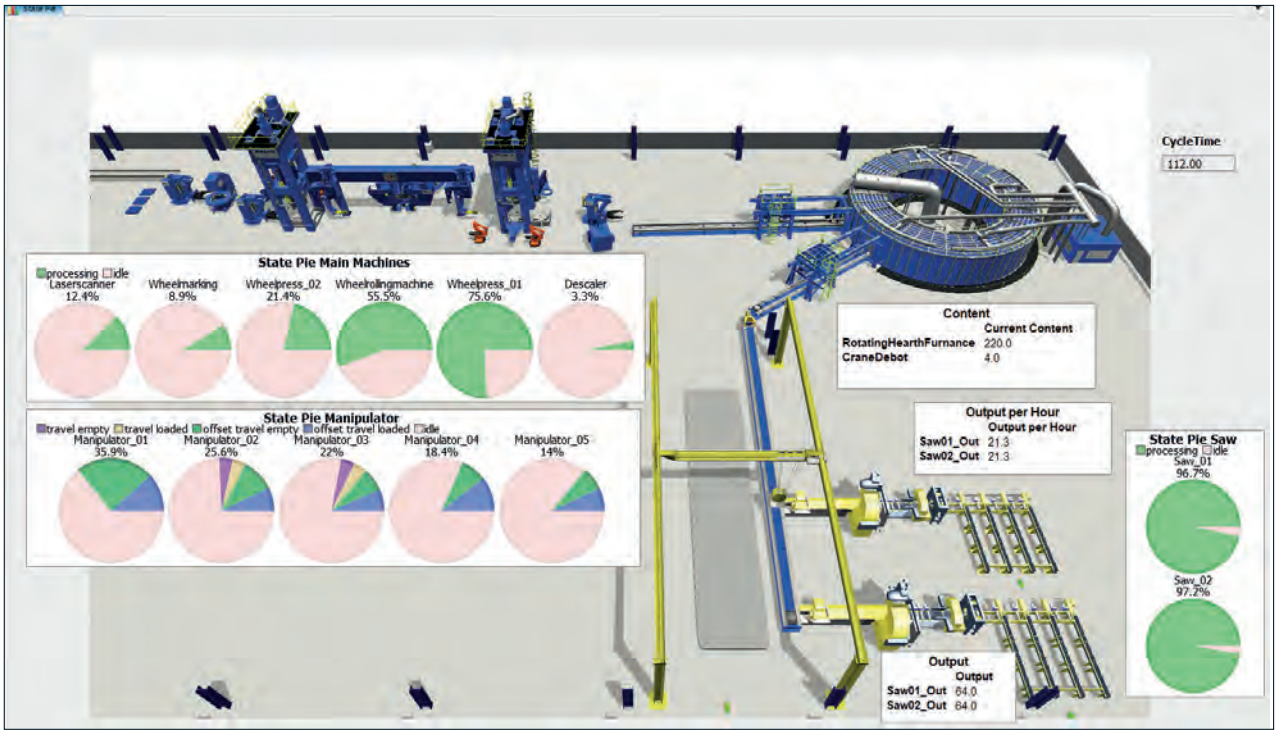
However, all this is not just done for the sake of excitement. It rather provides our customers, developers and engineers a number of important economic and process-technological benefits. Dr. Mark Haverkamp, Head of the SMS group's RDLP Unit, explains: "We save a lot of valuable time through what we call simultaneous simulation. This allows us to examine important functions, processes or logistical flows at a very early stage in a virtual plant set-up and make use of the thus identified optimization potential in our planning and design processes. All subsequent activities down to the commissioning of the plant will be accelerated as a result. Moreover, preliminary technical discussions with the customer become much more effective as we can explain technical solutions based on the realistic look of the virtual machine. With digitalization becoming increasingly widespread in industry, digital cloning or the generation of digital twins of a plant are becoming key issues also in the operation of existing plants. For some of our customers, we have already implemented digital clones of their plants. This allows them to test new processes, new products and process optimizations very cost-efficiently and transfer those variants that have turned out to be successful in the tests to the real plant. Additionally, digital clones are excellent training means for the operating and maintenance staff."

Within SMS group, the RDLP Unit is responsible for simulations in connection with forging, tube making and long product processes and plants. "We focus on four types of simulations, and four corresponding packages, which our customers and our own departments may use in support of their activities," states Mark Haverkamp.

- Package 1 includes physical process and plant simulations.
- Package 2 relates to simulations of logistics, which we perform to analyze and determine the layout of our plants.
- Package 3 covers HIL (Hardware in the Loop) simulations, which relate simulations to real automation systems in order to optimize the process and establish trigger parameters for controls.
- Package 4 comprises the areas of virtual reality, augmented reality and digital cloning. Here the main objectives are to provide the customers state-of-the-art digital support during running operation and new interactive approaches to maintenance and repair procedures.

Physical process and plant simulations

The process and plant simulations performed by the RDLP team are, simply put, representations of our plants and the processes they perform. They support the experts of SMS group, for example, in determining the appropriate drive layout for a plant, trying out up to which maximal forces the process chains would still work properly and understanding under which conditions it would be necessary to install higher-power motors. Mark Haverkamp: "Our models make cost-intensive experiments redundant. There is no risk of damage and we can examine and test out each individual process parameter separately."



Capacity utilization analysis of a wheel rolling plant as part of a simulation of logistics.

The simulations can be used for a wide range of tasks: feasibility studies, identifying resource and energy saving potentials, process chain optimization and trouble shooting. Simulations are often used to find answers to specific questions arising in the works.

Simulation of logistics

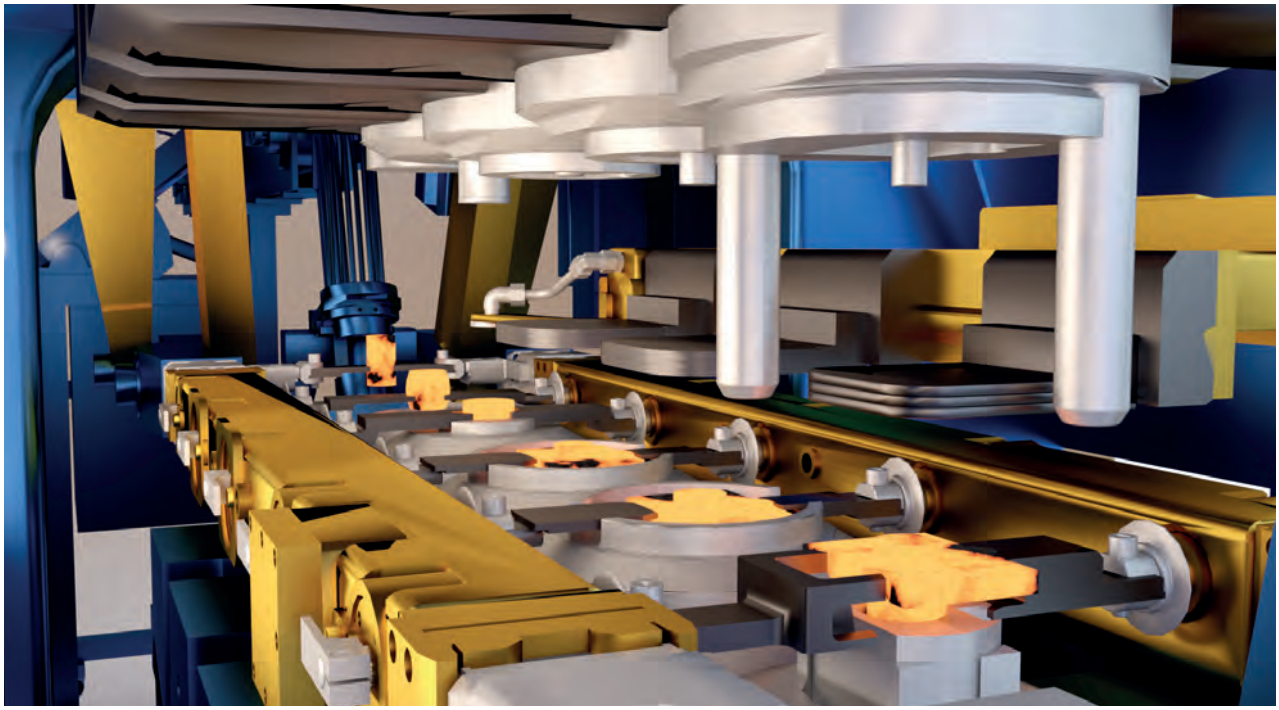
If the task at hand is to analyze the logistics processes within a plant, tools capable of simulating the material flow are needed. In this case the simulation process entails the definition of individual events by time and distance covered, and their interconnection via networks. The simulated period can be freely defined. The calculation of a plant's annual production, taking into account the product mix and the shift schedule, is a matter of minutes. In this way, bottlenecks limiting the yield can be identified and optimized until, for example, the simulation results are in line with the performance data specified in a plant offer. The simulation tool also allows to integrate the 3D data of the planned plant. In this way, it is possible to recognize in the realistic 3D model of a plant very early whether the planned cycle times will collide with the identified logistics flows. Simply put, one can watch on a monitor, projection screen or via VR goggles as a product is travelling through all machines and process stages from A to Z and whether the process runs smoothly all the way through. Already at that stage, any problematic areas or bottlenecks in the production flow will become obvious – early enough to adapt the plant layout without running into significant extra costs.

HIL simulations

Simulations are not only planning tools. They also render support during running operation. In this area of application, SMS group mainly uses HIL simulations. HIL means 'hardware in the loop'. In other words, here real elements, such as the automation soft and hardware and the control equipment, are linked with the simulation process in order to examine and check their performance.

Mark Haverkamp explains this by way of an example from practice: "At a customer's forging press, the spray heads for cooling the dies used to collide with the upper die. This caused the mechanical parts of spray heads to warp, causing new problems later on when the press was to be set up for a different product. The customer tried everything possible to change the set-up of the machine and made all kinds of adjustments – but without success. We reconstructed the affected components of the press in the simulation model and analyzed the processes. The simulation revealed that the collision between the die and the spray head was a matter of a fraction of a second. Based on this finding, we were able to solve the problem."

Additively manufactured, 3D printed spray heads made of plastics or metal weigh ninety percent



HIL simulation for collision analysis in a drop forging plant.

less than conventional spray heads. This dramatic weight saving allows the spray heads to be retracted and moved out much faster, increasing the overall productivity of the press. In order for this to work without a hitch, it is crucial to simulate beforehand the movements of the articulated support arms to find out how exactly the support arms should move to achieve the shortest possible cycle times. The thus determined optimal values can be readily implemented into the process control systems of the real plant.

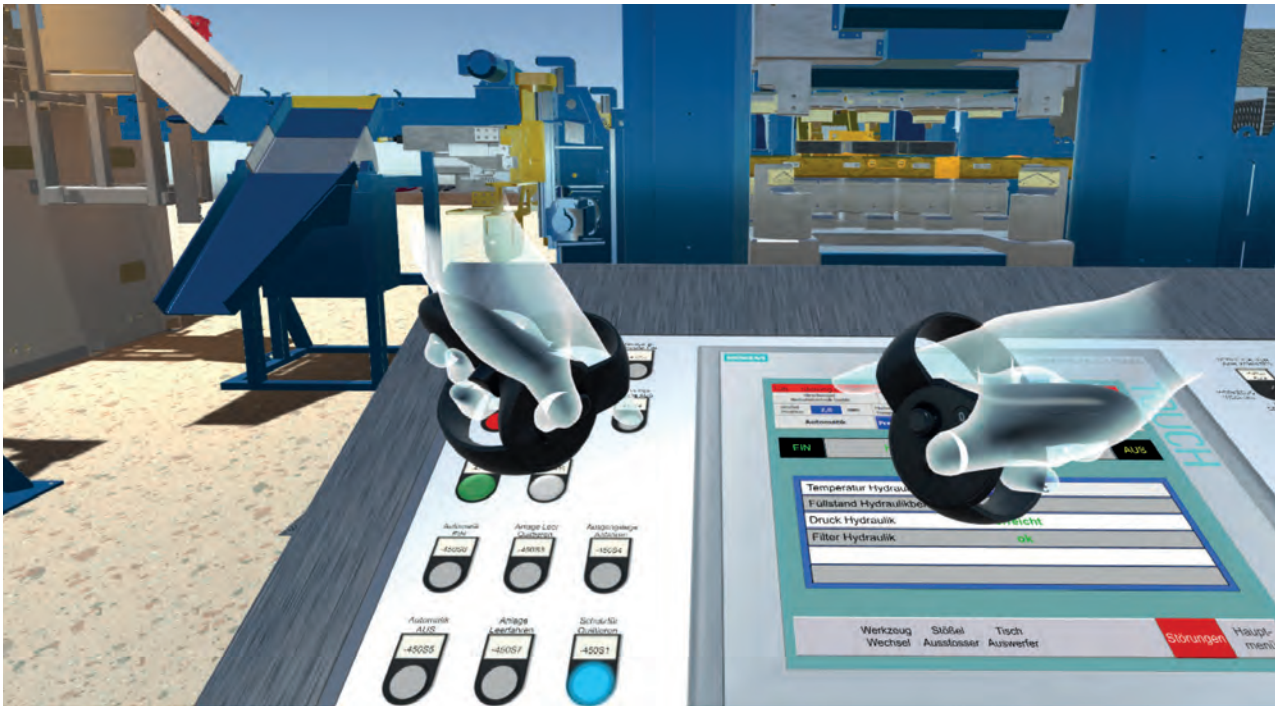
Simulations using virtual reality and augmented reality

With digitalization being meanwhile omnipresent in industrial plants, digital cloning has become an increasingly important issue. Digital clones of a plant are used, among others, for virtual reality simulation. They may play a key strategic role in determining a company's future competitive standing and result in a significant competitive edge. Virtual reality simulations create a 3D model of the plant which can be viewed via VR goggles, on a monitor or a large screen.

Mark Haverkamp: "The customer uses digital clones to test out plant and process optimizations on a virtual model of the plant without interfering in any way with running production. We have also set up digital clones for training purposes, which the customer uses especially for their maintenance and operating staff. A digital clone also allows plant operators to train their personnel on a new plant long before it will be started up."

In addition to experiencing the virtual 3D space of a plant as a passive observer, SMS group enables those watching a plant process via VR goggles to also actively intervene. In the 3D simulation of a plant, it is possible to modify the operating process by pushing the virtual buttons of the automation environment or of the control pulpit. Marco Koepe, Plant Simulation Developer at SMS group, explains why everything looks so astonishingly real: "For many VR applications, we use high-end gaming engines. This has the advantage that features of the physical world, such as gravity or simulation of movements, have already been implemented in this type of software, which is extremely powerful. It relieves us from work and makes our activities more efficient. However, wherever physical phenomena play a crucial role, we cannot rely on that software alone. In such cases, we develop our own models which will run in the background and feed their data into the computation in parallel to the runtime."

A second development, also applied at SMS group, is AR (Augmented Reality). Projections on AR glasses connect the real world with the virtual world. Animated images, 3D models or machine data can be projected onto the lenses, supporting the technician or the maintenance staff with augmented reality



Clones of plants used in operator training.

information as they perform their respective activities. Marco Koepe: "With our augmented reality solutions and AR glasses, a maintenance specialist may look, let's say, at a pump and call up an image showing the interior of the pump with the filter in place. With the image projected onto the glasses, it feels as if was actually looking into to pump. If he desires so, he may call up instructions guiding him through the individual steps of the filter changing process.

Partnering with the customer in the digital age

Process and logistics simulations, HIL simulations, and applications using virtual reality or augmented reality features are not a new arena for SMS group. In many areas, they have become daily routines. The engineers use such high-end simulations for their work, and in discussions with customers they are extremely helpful when it comes to explaining technical details. However, this is no reason for Mark Haverkamp and his team to sit back. On the contrary. Taking advantage of the new opportunities provided by digitalization, SMS group is currently pursuing a host of new developments and innovative fields of application.

Mark Haverkamp: "For me, our slogan Leading Partner in the World of Metals means that we discuss key technologies at eye level with our customers. I believe that we are excellently positioned to live this motto."

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Messe Düsseldorf GmbH

When the pressure is on

High-pressure valves work on top form under high pressure. When the pressure is on, their resilience and flexibility is needed.

Pressures can shoot up very quickly in industries such as oil and gas, process engineering, chemicals and pharmaceuticals. High-pressure valves can alleviate this. They also contribute to the success of the energy transition; when wind power and solar energy drop off, an alternative source of power, such as a combined-cycle power plant, is needed to supplement the power supply. To fill energy gaps, the power plants need robust and powerful high-pressure valves.

Flexibility is a high priority for combined-cycle power plants. "Due to their efficiency and their ability to react quickly to load changes, they are particularly suited to energy generation applications characterised by an increasing proportion of renewable energies," explains Axel Mücher, owner and managing partner of Schroeder Valves. In this context, as weather-independent generators, they have to compensate for load fluctuations in the electricity grid caused by changing wind and weather conditions.

High demand for minimal flow valves

"The boiler feed pump is one of the core components of these combined-cycle plants," explains Axel Mücher. It provides the water for the power plant's steam circuit, bringing it to a pressure of approximately 200 to 250 bar before evaporation. Since it often has to operate in the partial load regime due to the pronounced changes in load due to the system operation conditions, "the minimal flow valve is also working in very demanding conditions. In this partial load operation, it must constantly discharge the pumped media via the bypass, in order to keep the pump in a stable operating range, at the same time reducing the pump pressure of 200 to 250 bar back to values close to the ambient pressure," says Mücher. Schroeder Valves develops valves especially designed for long-term operation in these wear-intensive conditions.

There is much to be said for the use of combined-cycle power plants, just on economic grounds. Due to the relatively low price of natural gas, combined-cycle power plants are an attractive option to meet increasing energy demands in emerging industrial economies.

Combined-cycle installations are therefore, "currently being built in large numbers worldwide," according to Mücher.

Combined-cycle power plant for Malaysia

The rapidly advancing industrialisation of this ambitious emerging economy is having an impact on electricity demand: on average, this is increasing by around four percent year-on-year. In order to keep up with the power demands of its population of 31 million, and the growing number of industrial facilities, Malaysia is investing in the construction of new and efficient power plants.

The Prai combined-cycle power plant is in the town of Seberang Perai in the Penang region. With a capacity of around one gigawatt and an efficiency of over 60 percent, according to the operator it is one of the most powerful and efficient gas-fired power plants in South East Asia. It produces around seven percent of all Malaysia's electricity. The plant is operated by Tenaga Northern (TNBP), a fully-owned subsidiary of the Tenaga Nasional Berhad electric utility company.

High-pressure valves protect pumps

The 50 Hz H-Class power plant built by Siemens comprises two so-called power trains, each consisting of one state-of-the-art gas fired turbine, one water-cooled generator and one steam turbine with auxiliary systems. Two units, each with three centrifugal pumps made by the Korean pump manufacturer Hyosung Goodspring are in use here. These pumps are protected by six high-pressure valves from Schroeder Valves. The valves can withstand the highest pressures, in order to protect the

pumps in the Malaysian power generation facility from the damage that could occur if the minimum flow is not maintained, according to Schroeder Valves' owner, Axel Mücher. The design of the automatic recirculation valve ensures that pumps and installations are protected from the effects of highly fluctuating pump loads and extended operation under partial load conditions. "This is achieved through a special, fully automatic minimum flow control system, which ensures a matched minimum flow."

Combined-cycle power plants gain in importance

The state-owned electric utility Electricity Generating Authority of Thailand has also ordered a combined-cycle power plant. This facility some 40 km south of Bangkok, with a total installed output capacity of 1,200 megawatts, should start supplying around 1.5 million Thai households with electricity from 2019. Siemens is constructing this power plant in a single shaft configuration. "In this construction, the core components (the gas turbine, the generator and the steam turbine) are connected to each other via a single drive shaft," according to Siemens. This plant will be characterised by a high efficiency, short start-up times, and by its flexibility in responding to rapid changes in load. Thailand is dependent on imports of liquefied petroleum gas, so modern, high-efficiency combined-cycle power plants are gaining in importance.

Combined-cycle plants are enjoying increasing popularity worldwide. Siemens has received an order from Panama for six SGT-800 gas turbines. The industrial gas turbines, together with a steam turbine as part of a combined-cycle power plant, will produce around 440 megawatts of electrical power. This will cover the electricity requirements of approximately 1.9 million of Panama's residents.

Supporting renewable energy

A natural gas-fired combined-cycle power plant with a capacity of 1,000 megawatts is being constructed in Lawrence Country, Pennsylvania by Kiewit Power Constructors Co. The North American power plant is designed for rapid, flexible operation, and is intended to support the integra-

tion of renewable energies. The inauguration is planned for early 2020. The power plant will provide approximately one million households with electricity.

An existing plant in Marcos Paz in Buenos Aires Province, Argentina will be converted into a combined-cycle power plant in a project called Genelba Plus. The conversion will increase the capacity of the power plant from 168 to approximately 364 megawatts. It is scheduled to come into operation in mid-2019. In 2021, a new combined-cycle power plant in the Republic of Tatarstan in the Russian Federation will start generating electricity. It is planned to have an available capacity of 495 megawatts.

As a replacement for old coal-fired power plants

The Scottish energy company SSE Plc. and Siemens have announced that they are working together to construct the Keadby 2 combined-cycle power plant in Lincolnshire, UK. Siemens will deliver the power plant ready for use. The equivalent of approximately 400 million euros is being invested by SSE in the construction of the new power plant, which will have a capacity of 840 megawatts and an efficiency of 63 percent. Commercial operation of Keadby 2 is planned for 2022, as coal-fired power plants are shut down.

The new combined-cycle power plant in Lincolnshire fits in with the SSE's objective to strengthen its activities in offshore and onshore wind energy. "Combined-cycle power plants will help to flexibly support the electricity grid. "They provide an important contribution to support the United Kingdom in developing renewable energies and thus achieving its carbon dioxide reduction targets," Martin Pibworth, SSE's Wholesale Director, points out.

Renewable energies are also important for the energy revolution in Germany. According to the government, the share of renewable energies in power generation should increase to 80 percent by 2050; its current share is approximately 20 percent. "This energy revolution will only succeed with a restructuring of the whole energy concept," emphasises the German Aerospace Centre's (DLR) Institute of Propulsion Technology. At the same time, a secure energy supply is essential for Germany as an industrial centre since the economy depends on it. "With significant increases in naturally-fluctuating renewable energies such as wind and solar power, state-of-the-art conventional power plant concepts are needed in order to guarantee security of supply." The institute favours combined-cycle power plants, which could fulfil the role of fossil fuel support for the energy transition. With over 60 percent thermal efficiency, they are already the most efficient conventional power generation technology on the market.

High-pressure valves for various sectors

Furthermore, electricity from modern combined-cycle power plants produces only half as much carbon dioxide as electricity generated by modern coal-fired power plants. The construction times are also shorter in comparison, and the construction costs considerably lower. Combined-cycle power plants produce both electricity and heat. Manufacturers of high-pressure valves are thus part of forward-thinking power generation technology.

However, combined-cycle plants are not yet running at full capacity. The price of electricity can sometimes be a problem. If the market price is higher than the cost of generation, operation of the power plant can earn positive profit margins. "If not, the power plant remains shut down and is virtually in standby mode, because otherwise we would have to pay more," explains Martin Buschmeier, director of the Trianel gas-fired power plant in Hamm. It is calculated that the economical operation of gas-fired power plants on a full-cost basis is not yet possible in the current electricity market.

But this situation will not cause manufacturers and dealers of high-pressure valves any major headaches. There are just too many ways to use them. That is why AS-Schneider designs high-pressure valves for measurement and control technology applications in a wide range of sectors, including chemical and petrochemical plants and the crude oil and natural gas industries. "Pressures here can often reach several thousand psi (several hundred bar), and the process media can be aggressive and harmful to people and the environment," the company explains. Most valves very quickly reach their limits under these conditions.

Variable modular design

This is how the high-pressure valve is designed: the spindle sealing (packing) is made from the polymer PTFE. "Furthermore, the high-pressure valves benefit from a metallic rear seat, which provides an additional seal against the outside environment, reducing the demands on the packing," according to AS-Schneider. This

results in both reduced wear and in the valve being blow-out proof.

The modular design allows many configuration options for the high-pressure valves in terms of function, material choice, type of connection and application area, explains Göpfert AG. In addition to shut-off valves, examples include control valves, non-return valves, strainers, valves for panel mounting, valves with cutting ring fittings or with welding ends, and valves with an external spindle thread. "As well as traditional hand wheel operation, our high-pressure valves can also be fitted with actuators for use as automated valves," the company states.

The tightness is also important, Bürkert adds. The pre-controlled valve with servo piston and two way pre-control has an additional radial seal and "enables very good tightness", according to the company. The high pressure design covers pressures up to 250 bar.

Fossil and nuclear power generation

Schroeder Valves is active as a manufacturer of high-pressure valves in the areas of fossil and nuclear power generation, as well as descaling in steelmaking. The company's high pressure range starts at the PN250, or class 1500 lbs, pressure rating. In classic (minimal flow valve) applications, this corresponds to operating pressures from approximately 140 bar, and goes up to approximately 400 bar. There are even application areas for high-pressure valves with operating pressures of several 1000 bars. The materials typically used in Schroeder Valves' application areas are hardened martensitic steels.

"For minimal flow valves, the classic application is in the boiler feed water areas in fossil fuel and nuclear power plants, where to increase efficiency, the water is first brought to a high pressure before it is vaporised by the addition of heat and discharged through a turbine," owner Axel Mücher explains. Other fields of application are the descaling of rolled metal in steelmaking, which involves using a high pressure water jet to blast the unwanted scale layers off the steel, and water injection, whereby high pressure water is injected into an oil or gas field to increase the pressure inside the well and thus increase the flow rate.

Weight reduction as a target

Particular situations require special measures: high pressures cause very high forces on the walls of the pressurised parts of a valve, which in itself requires a thick construction. "The amount of material used and weight reduction therefore play a role for purely cost-based reasons," says Mücher. Therefore, in terms of the geometrical design, one tries to enclose the pressurised volume in the most efficient and material-saving way.

One must also remember that valves must be integrated into pipelines, where their weight sometimes causes high operating forces, which must be borne by appropriate supporting structures. Mücher continues: "Any possible material-efficient design is also in the interests of the user here."

Users therefore pay close attention to quality, costs and criteria such as weight reduction. Manufacturers of high-pressure valves who do not want to come under pressure themselves must prepare for this. Then your business can run at full speed. Innovations in the fields of valves and associated products will be presented at the world`s no 1 fair for industrial valves, VALVE WORLD EXPO, from December, 1-3, 2020 at Düsseldorf Fairgrounds.

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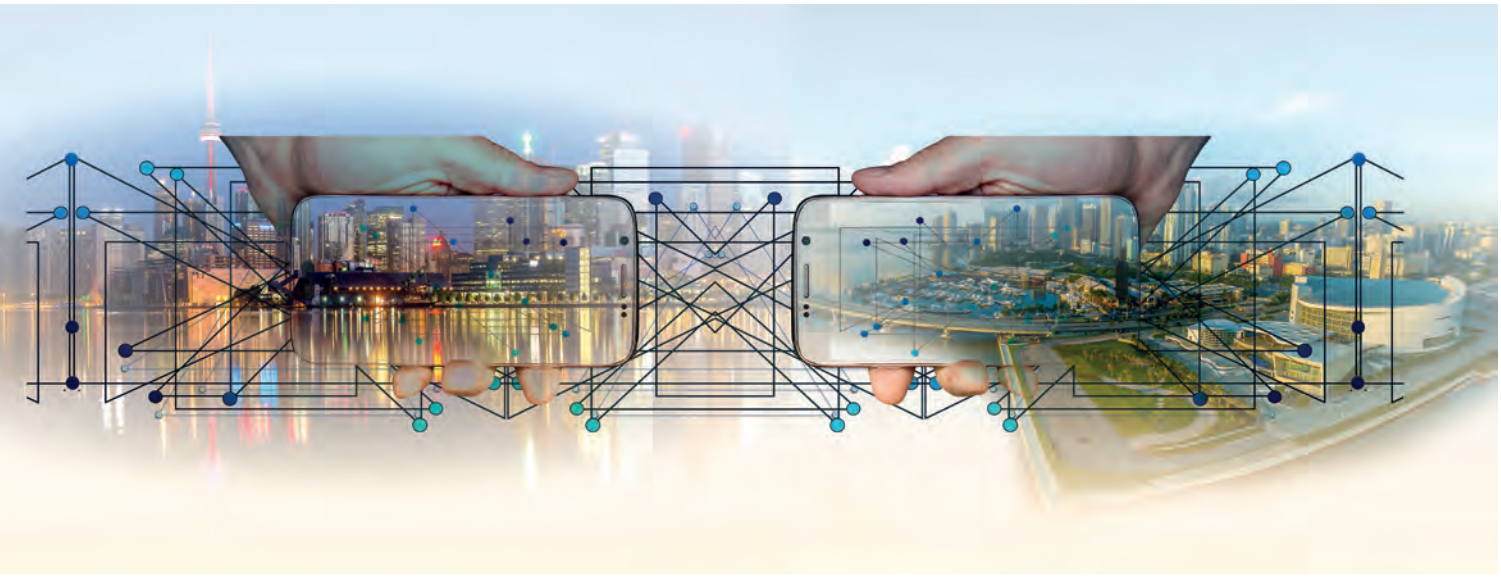
VALVE WORLD EXPO 2020: A journey to Data Utopia



Thanks to digitalization and industry 4.0, valve manufacturers can look forward to a promising future. A future with extremely decreasing defect rates, higher cost savings and most importantly improved competitiveness.

Digitalization and industry 4.0 have picked pace long ago. Many companies in the valves sector have already jumped onto the bandwagon enthusiastically. And while on it, they want to strengthen their competitiveness – with big impact and most importantly huge volumes of relevant data. This ride into the future is moving fast nearly all across the industry. Even though no one exactly knows what to expect from industry 4.0. But it seems promising and encouraging. Is there really a Utopia waiting out there?

Digital is better – and will come out on top. According to TÜV Nord Group, this express train zooming towards the future is unstoppable. "Digitalization is a key concept of the future of our economy and industry". It is a trend just like globalisation or urbanisation, emphasises Christian Ziegler, Manager Marketing, Communication and Digitalization at SMC.

Increased revenues, decreased costs

The implementation has begun long ago. The large plant and engineering construction sector is working purposefully to leverage industry 4.0 "to increase revenues, shorten product development time and decrease costs," explains Jürgen Nowicki, spokesperson for the Large Industrial Plant Manufacturers Group (AGAB) citing the 2017 study "Potenziale von Industrie 4.0 im Großanlagenbau" on industry 4.0 potential for the industrial plant engineering and construction sector that was conducted by the German association VDMA ("Verband Deutscher Maschinen- und Anlagenbau e.V.")

along with management consultants maexpartners.

72 per cent of the respondents in the study described the potential to increase revenues and profits through digital products and services as "very relevant" to them. 14 per cent of the participants in the survey, based on this optimism, expect an additional profit of over 10 percent in the coming five years. A perspective that could help resist the increasing competitive pressure from developing countries like China.

Real-time data processing

A development that the valve manufacturers will join, if they wish to keep up with the trend. Because in the future of manufacturing, "information technology will play a big role – not only in the operations and control of production plants but also in bringing together and analysing machine data or information on energy consumption," forecasts Festo, provider of automation and control technology solutions. Real-time data collection and processing are becoming increasingly possible. New analysis options are getting created, for example for predictive maintenance or acquiring a holistic view of energy flows and consumption.

Integration is not limited to within one's own factory, but according to Festo, is increasingly supporting data transfer and data synchronisation with external systems. In the future, production sites, suppliers and customers will work increasingly closer with each other, predicts Festo. "To enable this, it is crucial to have standardised interfaces and data formats as well as high performance networks and connections".

Increasing decentralised automation

Valve manufacturers are on the move. "In the past years, there has been a significant increase in decentralised automation of process valves, precisely in step with digital communication," confirms Sebastian Kundel, Product Manager Automation Process Valves at Bürkert. The benefits that can be reaped in the design, planning and construction of plants are in the forefront. Decentralised Artificial Intelligence for the diagnosis and digital transfer of data have been relatively less implemented. In the meanwhile, technical possibilities and software features would become more self-evident. There is a critical shift of thinking in using status data beneficially, says Kundel. "A transparent view of plants, machines and production processes will be possible and enable new business models for operations, service and maintenance".

Digitalization of control valves

According to Samson, to start with, sophisticated valves are fitted with position controllers. On the other hand, there are simple valves – for example On/Off valves – that are still equipped primarily with solenoid valves and/or limit switches. Their digitalization may not be that advanced, although Samson also offers solutions here too. "On the one hand the valves must pass on information to the entire system, and on the other hand they must be capable of receiving information from the system". In case of Off/On valves, we are still a "long way" from reaching the high level of digitalization that we see in control valves.

Higher plant availability

Samson is absolutely convinced by digitalization too. It enables round the clock monitoring of valves. Directly ascertainable values like set point, actual value, control deviation and driving pressure can be recorded continuously and additional information can be added to these in the future.

The position controller notifies the user in advance of an error condition in and on the valve. Notifications like "internal leakage" or "actuator defect" require no further data interpretation by the user. Digitalization along with the valve diagnosis feature integrated within the position controller enables increased plant availability "as potential error conditions can be early detected and rectified". According to Samson, the future goal is to completely avoid error conditions, which could be achieved with approaches like feed forward control and practical maintenance management.

Software equipped field devices

Significant drivers are the general rise in the automation level, plant availability and productivity along with high quality standards. In parallel, software equipped field devices have become the norm and many devices in the market now come with digitised operations. "The share of digitally automated process valves has strongly increased and has now reached a significant level". With developments like the IO-link, a communication system used for connecting intelligent sensors and actuators to an automation system, the growth has not quite stopped. The definition of properties that are important for process technology in the specification, particularly with respect to func-

tional safety, is still under way," explains Sebastian Kundel.

Digitalization of control and switch-based valves, according to Bürkert, signifies decentralised plant design. The company is developing solutions. An example is the valves system with integrated position or process controllers and control heads in process valves. Only in this manner can process data, for example, on valve position and process dimensions and diagnosis data for functional safety and maintenance requirement, be made available continuously to the process through sensors and related analysis. And transferred in digital form from the field level to the master level.

Industry 4.0 as a philosophy

Digitalization and industry 4.0 surely influence customer products, in the sense that they must be ready for industry 4.0, but they also influence the internal processes of valve manufacturers. SMC illustrates this with the example of its paperless assembly operations. "Earlier we used to have printed drawings and instructions. But today our employees in assembly operations have a Tablet-PC from where they access the latest and up-to-date instructions and bills of materials. This reduces error rates and media breaks," says Christian Ziegler, Digitalization Manager at SMC.

Ziegler thinks that Digitalization and industry 4.0 are neither about products or services, but a philosophy. An industry 4.0 solution for one customer looks completely different than that for another customer as their requirements are completely different. "Of course, there are a few fundamental trends that we all follow". One of which is horizontal and vertical integration. We can derive more product requirements from such integration. Because integration needs appropriate interfaces. It is important that such interfaces are manufacturer-independent and work across manufacturers. According to Ziegler, such standards are emerging and taking shape in the market.

Product data management is essential

A basic element in the implementation of digitalization at Bürkert is Product Life Cycle Management (PLM). PLM is the holistic, companywide management and control of all product data and processes related to the complete life cycle across the extended supply chain – from design and production to sales right up to dismantling and recycling. "To do this we need organised data structures, that can ensure that the data is stored in such a manner that it can be accessed quickly when needed, for example product tables," explains Sebastian Kundel, Product Manager Automation Process Valves. The key enabler for this is Product Data Management that stores data from product development and makes it available for the downstream phases in the product life cycle.

A quantum leap of possibilities

Digital switch-based and regulator-based valves represent a quantum leap in the possibilities they offer for process automation.

The advantages are diverse, says Bürkert. The switch from analogue to digital signal transfer provides many benefits. Amongst them are enhanced resolution, signal reliability and reduced wiring effort and costs by bringing together several field devices. It simplifies plant construction. Other benefits are ease in project planning, time savings in wiring, mapping and commissioning. "If you look at the operational safety of the plant, users benefit from higher transparency, better machine availability through important information on preventive maintenance, faster and safer device exchange as well as device specific documentation," explains Kundel. Organised and easy to access data structures of automation components up to process valves, play a key role in achieving this. "Process management itself becomes more transparent and helps focus on improving efficiency".

Varying digital-standards

But how successful can implementation of the required technology be? Varying standards in digital communication are often the obstacles for data exchange from smart valves to process control. "On one side there are fieldbus standards such as PROFIBUS. and then we have rapid developments on the Industrial Ethernet front such as for example PROFINET, EtherNet IP, Modbus TCP and others," says Kundel. The challenge lies in meaningfully dealing with diagnostic data, which means using and interpreting it correctly. Digitalization also implies new tasks and responsibilities for people working in plant planning, construction, installation, commissioning and operations.

Digitalization for highly automated processes

"Particularly important is digitalization of highly automated processes. Products with high quality standards demand validation of process operations," explains Kundel. This can be particularly seen in the food, pharmaceutical and biotechnology sectors. In this regard, it is important to avoid machine down time not just for reasons of cost, but also to ensure product quality and safety. "In sectors with lower levels of automation, the significance of digitalization is also lower".

In spite of all the advantages, industry 4.0 has its risks. IT safety solutions are a must, according to Festo, not just for system reliability but also as protection against attacks from outside. "Requirements for data safety, protection of intellectual property and other statutory requirements must be adapted and further developed".

No one size fits all solution

Bürkert is certain that digital valves – whether regulator or switch based – will be the norm in many application areas. Ease of use and functional reliability will be at the forefront for the user, but information volume "will be at a significantly higher level".

But there will be no universal solution. "We must each think carefully on the possibilities of digitalization," highlights Christian Ziegler of SMC. "Which aspects of digitalization can I use in my products, processes, tools and services? How can I use them? It is important to think about this. It cannot be done in passing. It is too important to be treated superfluously. Top Management must provide the freedom and space for this. It is only then that one can be creative".

Destination unknown

In Ziegler's view "we are still at the beginning of our journey. No one knows, where the journey will end. The horizon we see as we begin a journey is not quite the same horizon, once we have been for two hours into the journey". The only one thing we can wish for is a great journey!

Innovatations in the fields of valves and pumps will be presented at VALVE WORLD EXPO, No 1 fair for industrial valves, from December, 1 to 3, 2020 in halls 1, 3 and 4 at Düsseldorf Fairgrounds.

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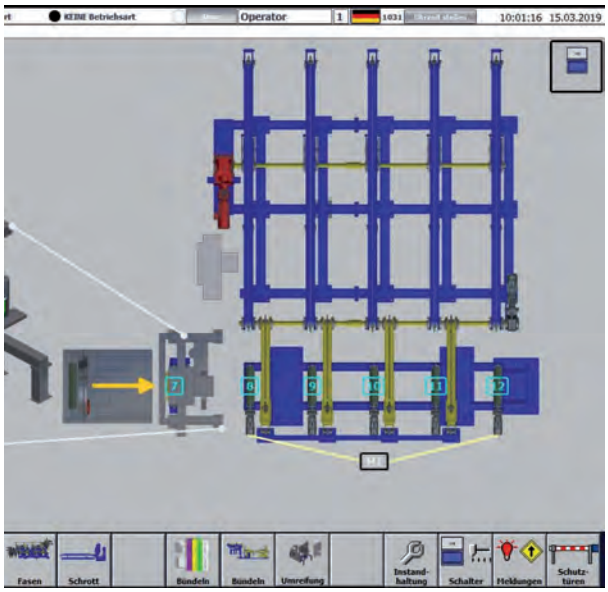
Bültmann GmbH

New generation of BÜLTMANN bundling and packing lines



Increased demands on product quality also involve increased demands with regard to bundling and packing long products in the tube, bar and profile sector.

For example, there is a demand for increased surface-protecting handling of sensitive products in the packing sector.

In order to meet this demand, BÜLTMANN has developed several concepts that are different from those used so far, which work with layerwise transport of the products.

Now the focus is on the very careful feeding of individual tubes or bars into the bundling area.

Already separated tubes or bars are not reassembled in layers for bundle forming, but are fed

individually to form the bundle. This is done by means of a concept already successfully used in other applications, in which the tubes or bars are positioned by specially designed feeding arms. This avoids relative movements or line contact between the tubes or bars. As an additional positive effect, this solution results in a very low noise emission.

Moreover, it is possible to bundle the products in either rectangular or hexagonal bundle shapes. The bundling line is automatically set to the pre-selected bundle shape by means of the machine control system.

For this purpose, the operator is provided with a clearly structured visualization system, which makes it possible to pre-select individual bundle, shape and quantity specifications.

The programs created in this way can be saved as a recipe and can therefore be reproduced at any time. In addition, data interfaces enable the linking to higher-level production control systems and thus also fulfil further requirements with regard to the ubiquitous topic “Industry 4.0”.

The BÜLTMANN bundling and packing lines can be individually combined or enhanced, e.g. with automatic strapping, labelling, plastic wrapping and bundle storage equipment.

Two basic systems of this machine concept are available: a standard version and a heavyduty version, especially for larger, heavier products.

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Danieli S.p.A.

OMK contracts Danieli for a new pipe complex for the production of oil and gas seamless pipes

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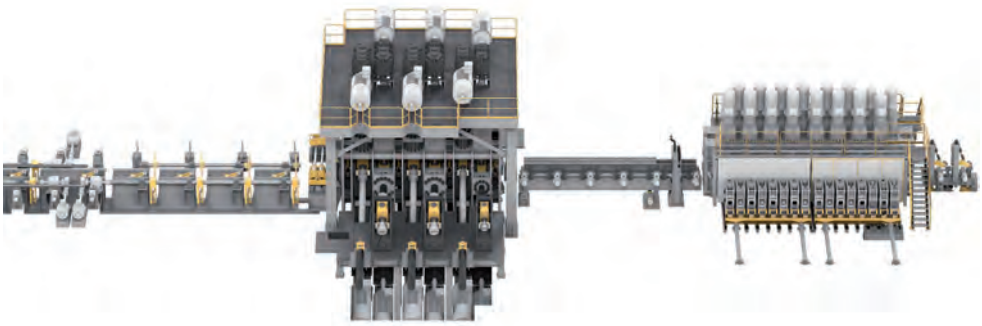

The hot mill will feature innovative Danieli FQT - Fine Quality Train technology

To be installed at Vyksa Steel Works, Russia, the new seamless pipe complex of OMK will produce 500,000 tpy of OCTG seamless pipes (casing and tubing), linepipe and industrial pipes from 2" 7/8 to 10" 3/4. The plant mainly consists of a hot rolling line based on innovative FQT - Fine Quality Train technology and a finishing center featuring heat treatment, quality assurance and finishing lines.

Fives Bronx Ltd

Bronx straightener for the ship building industry

Bronx section straightener press

Fives further cemented their position as a world leader in the supply of Bronx straightening equipment to the ship building industry, when they were awarded a contract by a Chinese client, based in Jiangsu Province.

The Bronx 13-roll straightener is designed to process bulb and flat steel sections up to 220mm wide, which feature heavily in the construction of cruise ships and form part of a fully integrated sheet metal and profile-preservation line. The motorized machine is fully automatic. It is utilizing the COMPASS system (COMPuter Aided Setting System) for automatic precision setting of all work rolls.

The equipment will be designed and pre-assembled in England, where the group has been designing and manufacturing Bronx straightening machines for tubular and long products for more than 76 years. It will be delivered to China and put into production in 2020.

Fives has already supplied several high-performance Bronx bulb section straighteners for the ship building industry in Europe, in recent years. Overall, more than 800 Bronx straightening machines for tube, pipe, bar, section and rail applications have been installed in more than 50 countries.

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Fives OTO S.p.A.

OTO complete tube mills for a leading steel producer in Europe

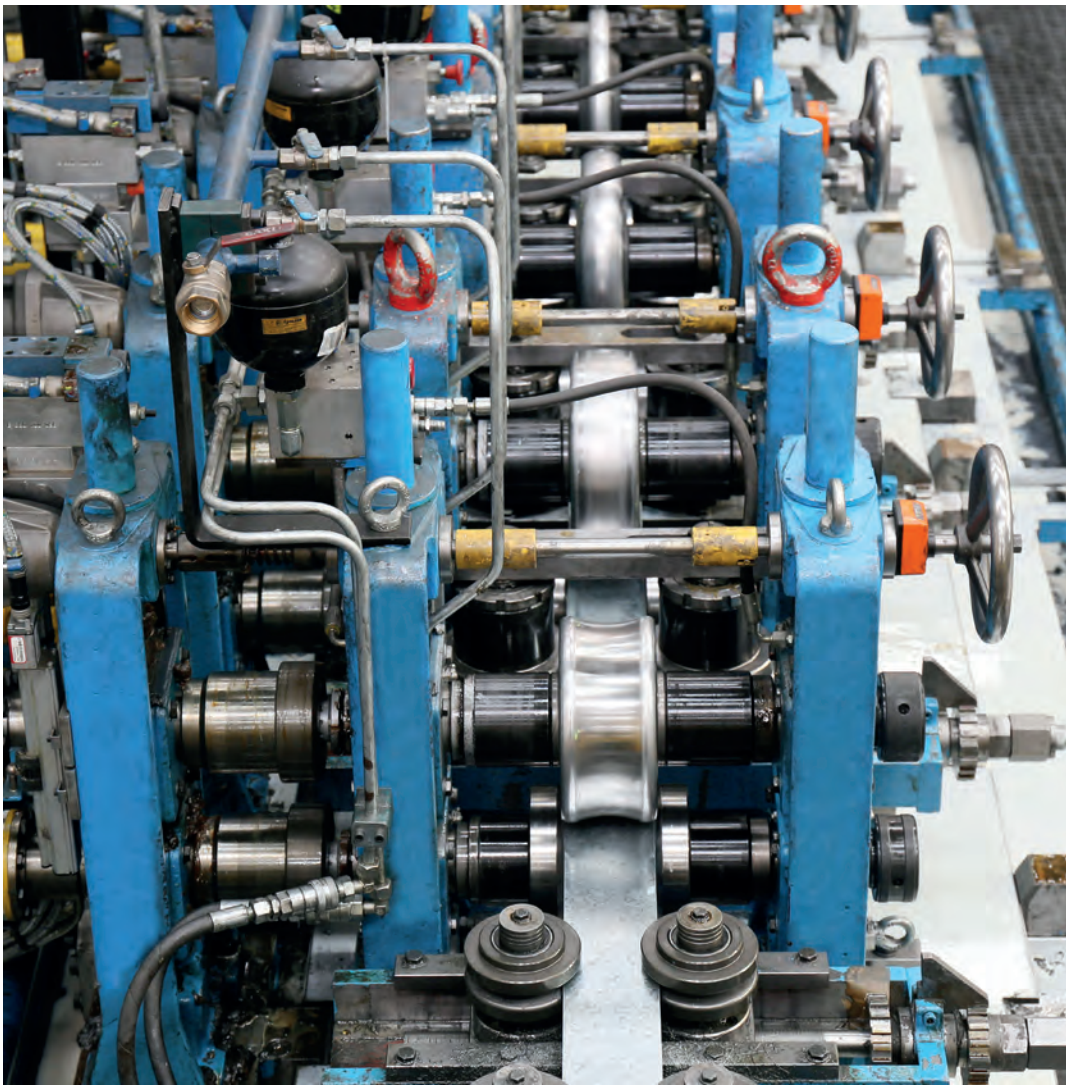
SSAB Europe, a leading steel producer of high-quality strip, plate and tube products, has entrusted Fives, a global engineering group, with design, production and supply of two complete OTO tube mill lines.

Aimed at efficiency improvement, SSAB Europe has been investing to modernize tube production lines at its Hämeenlinna facility in Finland to widen its product range and increase premium tubular output.

Fives will design, manufacture, supply and commission two complete OTO tube mill lines for welded tubes, ranging from 16mm up to 130mm in diameter. The mill lines will be designed to process high grade yield carbon steel to produce tubes with 8mm maximum thickness for automotive applications. The scope of supply includes fully automatic entry lines, forming and sizing section with quick change, tools and cut-off units.

Fives' proposal featured innovative technical solutions and production flexibility to meet highly customized advanced technology equipment requirements, as well as tight scheduling. OTO tube mill lines will be designed and preassembled at Fives' plant in Boretto, Italy and delivered to Hämeenlinna's in 2019-2020.

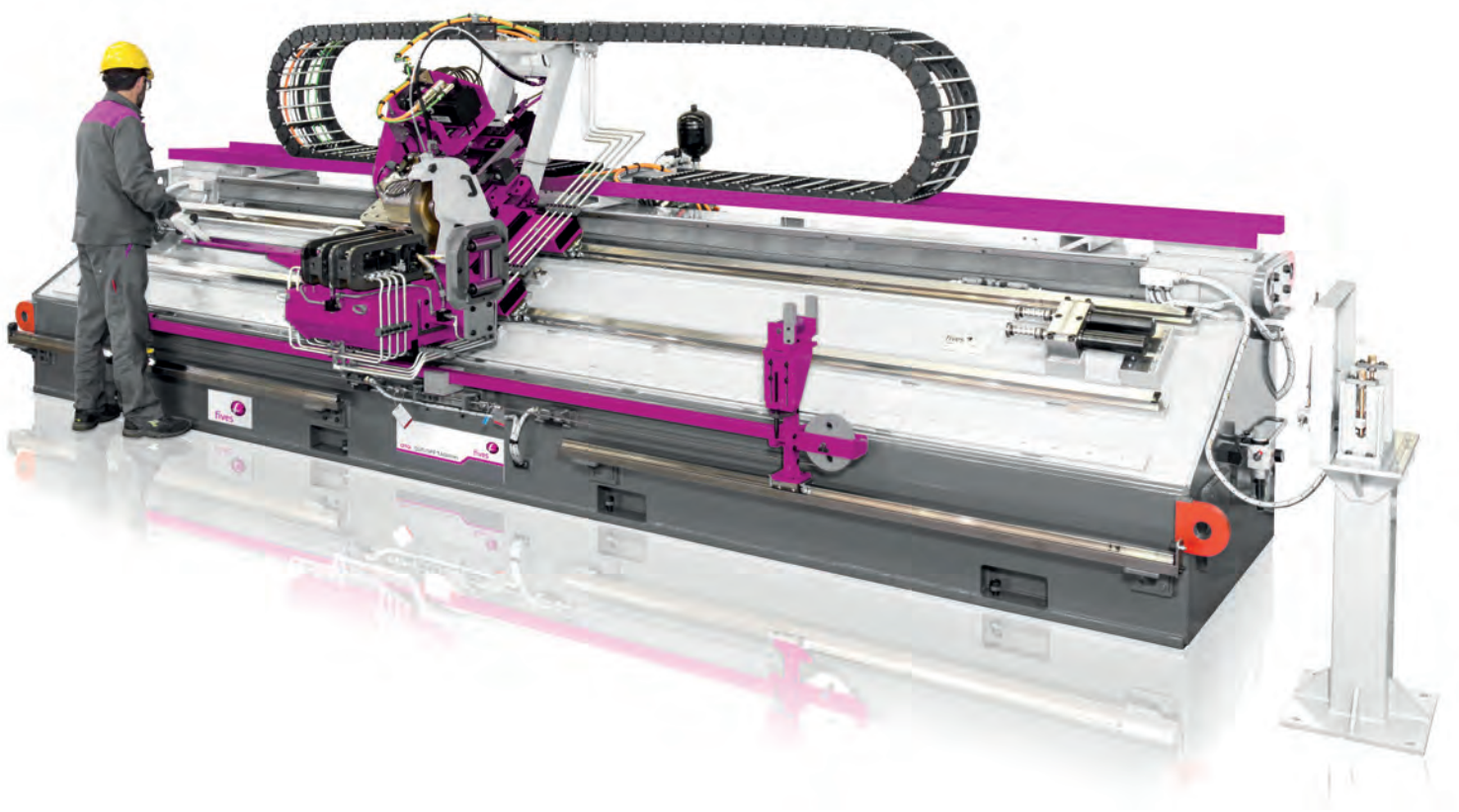
Fives has been a long-term partner of SSAB, and recently has been contracted to modernize the continuous annealing line in SSAB's Borlänge plant in Sweden. More information https://steel.fivesgroup.com/news/news/capacity-and-efficiency-increase-for-ssab-with-fives-technology.html.



Fives has been specializing in design and supply of high-performance OTO mill lines, featuring robust and safe design and advanced manufacturing techniques for almost 40 years.

Fives OTO S.p.A.

Immediate productivity increase with OTO flying cut-off



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Flexometal, a privately-owned company in Mexico specializing in tube and profile production, aims to boost its production output for more competitive markets, such as mechanical and automotive tubing. As part of its strategic program, the company contracted Fives for a high-speed OTO cold saw cut-off unit for its tube mil line.

Since OTO cut-off's commissioning at the Guadalajara plant in January 2019, Flexometal has immediately achieved 30% productivity increase. The new unit also features important technical innovations which allow to stabilize precision length in 1.5mm as maximum tolerance, at any working speed. This cut-off belongs to single blade cold saw cut-off family with a range coverage from 6mm to 130mm. It's equipped with extremely versatile and user-friendly software, enabling an operator to optimize speed and type of blade for any production size.

Fives has been specializing in OTO flying cut-off units for over 25 years, offering a wide range of models, specially designed for inside scarfed tubes and special profiles, with special attention on high precision and perfect clean in-line cut without distortion.

Huntingdon Fusion Techniques

Oxidation Free Weld Beads with Weld Backing Tape™

Welders are often faced with challenges where high quality stainless steel, duplex and chrome steel welds are required, but where the use of purge gas is not always possible.

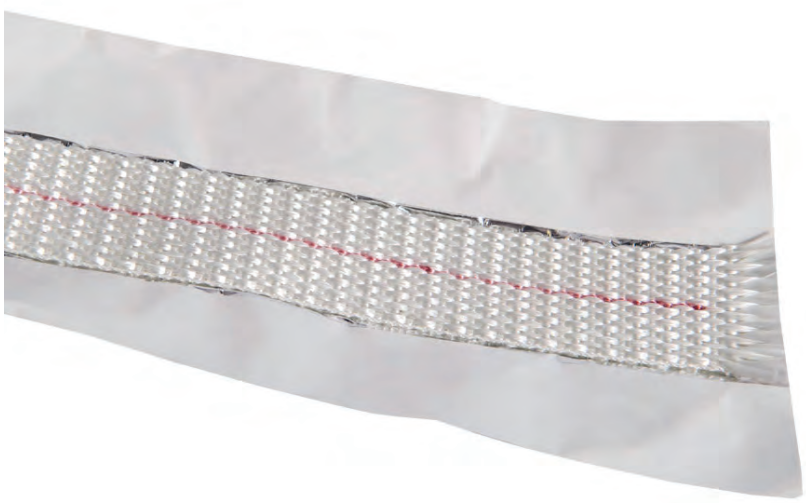
One solution to this problem is the use of Argweld® Weld Backing Tape™ from Huntingdon Fusion Techniques HFT®. This high temperature resistant glass fibre tape supports weld roots and eliminates the creation of slag, while removing contact with air to dramatically reduce the amount of oxidation.

Luke Keane, Technical Sales Manager for HFT® said: "Weld Backing Tape™ is a common material used for manual and automatic welding to achieve higher welding speeds and dramatically reduce the amount of post weld cleaning.

The HFT® glass fibre Weld Backing Tape™ has no true melting point so it works satisfactorily with TIG or MIG welding (GTAW or GMAW) where temperatures can reach up to 6,000°C. This overcomes the concerns associated with ceramic fibre versions that have a melting point of 1,800°C,

HFT® manufactures four grades of Weld Backing Tape™ for use up to 80, 160, 240 or 600 Amps.

Each tape comprises a 3" (75mm) wide aluminium adhesive tape, in the centre of which is a 1" (25mm) wide band of woven glass fibre. The glass fibre matting has differing thicknesses to match the welding current in use.



Backing Tape ABT PHO 17C 600 Amps

Backing Tape ABT PHO 18C Rolls 600 Amps

Once the tape is positioned with the glass fibre matting under the centre of the weld joint, the welders can start their arc. The welding torch argon flow has plenty of space to move between the pores of the matting, which allows the welding arc to stabilise and start forming the weld root.

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Huntingdon Fusion Techniques

Weld Purging Post Weld Heat Treated (PWHT) Pipework

HotPurge APSH PHO 10C 18 Inch

Welding processes can weaken metals by imparting residual stresses into a material, leading to a reduction in corrosion resistance properties. Post Weld Heat Treatment (PWHT) is regularly used to retain the strength of a metal when welding certain materials including high strength stainless steel and chromium-molybdenum (chromoly) steel such as P91.

Temperatures during PWHT might reach as high as 760°C (1,400°F) for many hours, during which time the insides of the pipes need continuous purging using Pipe Weld Purging Products. Many purging materials cannot withstand these temperatures, nor resist damage during the time at temperature.

HotPurge® Pipe Purging Systems have been designed and developed by Huntingdon Fusion Techniques HFT® for Heat-Treated Chrome and High Strength Stainless Steel Pipe Joints.

Ron Sewell, Chairman for HFT® said: "To ensure welds are free from oxidation which could otherwise lead to joint imperfections, they must be welded in an environment free from oxygen that has to be maintained during the lengthy high temperature post weld heat treatment process."

"It is not practical or cost effective to fill whole pipe lengths with Inert gas and restricting the weld purging zone has proven most effective. Argweld® HotPurge® Systems allow the purge to be safely continued for up to 24 hours whilst pre-heating, welding and post weld heat-treating with the purge system remaining in place."

The Argweld® Tube and Pipe Purging Systems are positioned inside the pipe with one dam each side of the joint and inflated with an inert gas supply. Once a System is fully inflated and sealed in a pipe, the inert gas displaces the oxygen from within the weld purging zone ready for pre-heating and welding. Each HotPurge® System is manufactured as standard with a Weld Purge Monitor® connection for viewing the oxygen level throughout the whole heating and welding processes.

Each HotPurge® System includes PurgeGate®, a revolutionary device to prevent over inflation of, and damage to the inflatable dams. No matter how high the user increases the pressure, in order to deliver more gas flow, PurgeGate® prevents pressure rise in the inflatable dams but allows an increased inert gas flow, to achieve a lower oxygen level and/or faster cooling of the weld zone.

In addition, each HotPurge® System incorporates an innovative central band for easy positioning inside the pipe. This band, known as RootGlo®, will illuminate inside the dark pipe, for up to 20 hours, with only 10 minutes previous exposure to daylight.

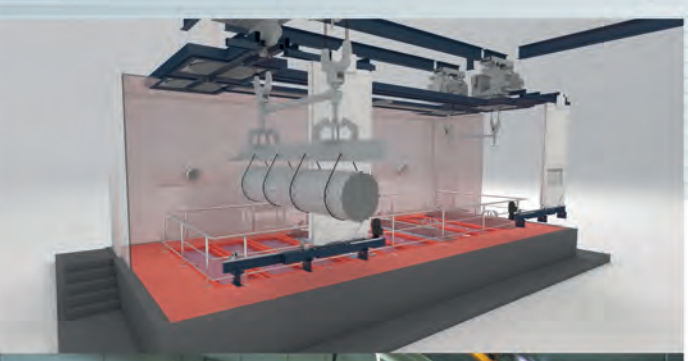
HotPurge® Systems are manufactured to suit pipe diameters from 6 to 88" (150 to 2,235 mm) and both inflatable dams have pull handles securely sewn with high temperature resistant Kevlar thread that will withstand a pulling force of 1,000 lb.

These HotPurge® Inflatable Pipe Purging Systems can be used repeatedly for weld purging and will keep the oxygen levels below 100 parts per million (ppm) throughout the welding cycle, ensuring oxidation and coke free welds, without the metallurgical imperfections caused by exposure to too much oxygen.

Pickling tank with a length of over 20 m are produced in one piece by KVK KOERNER and delivered to the customer

KVK-Pickling Plants

Customised, ready to use and with the highest level of environmental protection.



KVK pickling plants for pickling iron, high-grade steel and non-ferrous metals.

- Planning and construction of complete pickling plants
- Particularly solid design for pipe pickling
- For hydrochloric, sulphuric and nitric/hydrofluoric acid pickling media
- Pickling tanks with integrated fume-extraction channels and scrubber systems
- KVK enclosure panels totally separate the pickling plant from other production areas, thus avoiding corrosion of steel construction, cranes etc.
- KVK pickling plants meet all environmental conditions and work to the cycle principle.

Fire resistant

Scientific test reports from official test institutes have confirmed the significantly higher fire resistance of the kvk-panel, in comparison to PP and PE panels.

KOERNER kvk®

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Huntingdon Fusion Techniques

Zero Colour Titanium Welds with the PurgEye® Desk

Titanium is the metal of choice in a variety of industries due to its excellent corrosion resistance to acids, chlorides and salt. Titanium has a wide continuous service temperature range, from liquid nitrogen (-322°F) to 1,100°F and the highest strength-to-weight ratio of any metal.

Titanium is a reactive metal, so when heated it will react with surrounding oxygen, discolour and lose its corrosion resistance properties. In critical welding applications, it is therefore crucial that the oxygen level surrounding the weld is purged of oxygen to 50 ppm or lower.

The innovative PurgEye® Desk, a new Weld Purge Monitor® designed and manufactured by weld purging experts Huntingdon Fusion Techniques HFT®, is leading the way in inert gas purging technology by reading oxygen levels from 1,000 ppm, right down to levels as low as 1ppm (highly accurate to 10 ppm), ensuring titanium welders achieve perfect oxide free, zero colour welds time and time again.

Ron Sewell, Chairman for HFT® said: "Titanium parts are often welded inside a welding enclosure, where the entire atmosphere surrounding the weld can be kept at a controlled level of oxygen. The PurgEye® Desk is ideal for use with Welding Chambers, cabinets and flexible enclosures, as well as with Orbital Welding Machines and other Automatic Welding Systems."

The PurgEye® Desk is manufactured with HFT®'s revolutionary PurgeNet™, for the in-line connection of additional accessories that allows the Weld Purge Monitor® to control welding systems based upon oxygen level as well as to provide indications of high and low oxygen levels.

The rugged, high frequency proof PurgEye® Desk has automatic fault finding diagnostics that can detect and report a number of possible faults. It also features an OLED (organic light emitting diode) display giving brighter, sharper readings at longer distances.

With a unique, fast response, long-life sensor having little maintenance requirement, the PurgEye® Desk Weld Purge Monitor® comes complete with an integral pump to deliver the exhausting purge gas to the measuring sensor on a consistent basis to allow precision control of the welding systems.

Applications for the PurgEye® Desk can be found in ultra clean conditions, such as in cryogenics, food, drinks, semi-conductor, aerospace, pharmaceutical sectors as well as other industries where titanium is used for its light weight, strength and high strength-to-weight ratio.

Kinkelder BV

New generation Kinkelder TCT CX saw blades for solid (stainless) steel

In order to help customers achieve the highest production rates, best cut quality and lowest cost per cut, Kinkelder has further developed its TCT product range for solid cutting applications.

The new generation of Kinkelder CX series saw blades makes use of the latest insights in design, materials and production technology, leading to optimal squareness and surface finish.

New saw body design

In applications with poor chip evacuation, the chips often get intertwined and clog the sawing machine. By updating the saw body design, a significant increase of up to 50% blade life has been achieved. The new design is being used in the CX 1, CX 6, CX 7 and Champion SL saw blades for tooth pitches higher than 12 mm.

Optimized tooth geometries & carbide grades

Many years of extensive testing have proven that the large diversity of applications requires fine-tuning of tooth geometries and carbide grades. Depending on the steel grade and material diameter, the optimal geometry and carbide grade are being used for dedicated products. Solid carbon steels with a tensile strength up to 900 N/mm2 are being cut with a more negative geometry and lower clearance than carbon steels with a tensile strength > 900 N/mm2. Also the carbide grade is different for both applications. Kinkelder has specifically developed the CX1-M saw blade for cutting solid carbon steel with a tensile strength up to 900 N/mm2. The CX1-H saw blade is being recommended for cutting steel with a tensile strength of 900 N/mm2 and higher, as well as large diameter ferritic-, martensitic- and duplex stainless steels.

For large diameter austenitic steel (> 35 mm), the CX6-L saw blade is being introduced, incorporating a newly designed geometry. The carbide grade is especially suitable for cutting sticky materials. The CX6-S blade is dedicated for high performance cutting of all stainless steels (ferritic, martensitic, duplex and austenitic) with diameters up to 35 mm.

Coating

A new generation PVD coating is applied to the CX1-M and CX1-H series for cutting solid carbon steels. This multilayer coating is ultra-smooth, leading to less side pick-up and low friction, while keeping the benefits of a high temperature resistant hard coating.

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Magnetic Analysis Corporation

Mac Introduces new Echomac® 25mm UT Rotary Tester

Echomac® 25mm Ultrasonic Rotary Test Unit for high speed precision testing of small diameter, thin wall tube.

Magnetic Analysis Corp. has just received customer pre-acceptance on its latest Ultrasonic Rotary Tester, the Echomac® 25mm. Designed for high speed flaw and dimensional ultrasonic inspection of tube in high precision applications, the Echomac 25mm Rotary provides 100% coverage at high throughput rates on thin wall product ranging from 5 to 25mm diameter.

This 25mm Rotary is especially well suited for challenging applications requiring high performance such as tubular product for nuclear and aerospace installations. The 630mm overall length of the Rotary allows for ease of installation when upgrading existing inspection lines. Wall thickness as thin as 0.3mm and tubes as short as 1 meter can be successfully tested. Features include a transformer design which ensures improved signal to noise ratio, enhanced bandwidth, zero channel cross-talk, 8,000 RPM running speed, precision test blocks and transducer holders, convenient adjustment of the transducer angle, and optimum operating safety. The 25mm Rotary joins MAC's line of UT Rotaries which range up to 500mm capacity.

When used with MAC's Echomac FD-6/6A instrumentation, the Rotary system provides outstanding inspection of ID/OD, longitudinal and transverse flaws, wall thickness and dimensional evaluation including conditions of eccentricity and ovality. The Echomac FD-6/6A achieves a high signal to noise ratio, includes a wide range of selectable band pass filter settings, precise thickness resolution (1 µm) and excellent repeatability and reliability. Features include Echohunter® software which provides a versatile, intuitive operation with convenient set up and control of all key test parameters on one screen, the ability to move thresholds by selecting and dragging on screen, and a global key to adjust or copy a group of test parameters from one channel to another. The Model 6A also holds GE Qualification for P3TF31 and P29TF82 Class A and B, typically required to meet high level quality standards for aerospace and other critical applications. The Echomac® series is being used for a variety of applications ranging from full body testing of spinning tube and weld zone inspection during production, to 500mm Ultrasonic/Flux Leakage multi test systems for large diameter OCTG pipe.

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Olimpia80, Tube Mills

Olimpia installed three complete tube mills in India

Olimpia 80 srl Italian manufacturer of tube mills, installed successfully in India to the company APL APOLLO three complete tube mills with the patented technology “cage forming for square and rectangular tubes” for carbon steel materials.

The smallest can cover the section range from 20x20 up to 60x60 mm, up to 4 mm max thickness.

The medium line, can cover the range form 30x30 up to 80x80 mm, up to 6 mm max thickness.

The biggest, can cover the range form 80x80 up to 200x200 mm and the max thickness 10 mm.

All of these lines are fully automatic and are a part of the complete range of products of Olimpia 80 manufacturing program.

Others different installations are recently finalized in Mexico, Chile and Romania for different sizes of carbon steel tube mills.

Particularly a tube mill mod. 60/90 can produce hot & cold rolled carbon steel tubes having a yield strength of max. 1200 MPa and an ultimate strength of max. 1600 MPa, in accordance of standard specification ASTM 513 has recently installed in Mexico.

The mill covers a production range from OD 12.7 mm up to OD 63.5 mm, WT 0.6 => 4.0mm, max. and speed up to 140 m/min. Mentioned tube mill is equipped with Automatic cut-off machine by friction saw and cold saw (HSS & TCT). Thanks to the innovative gear box the passage from cold saw cutting process to friction saw is extremely rapid and fast in total safety execution without replace nothing except the kind of blade and select on operator desk control.

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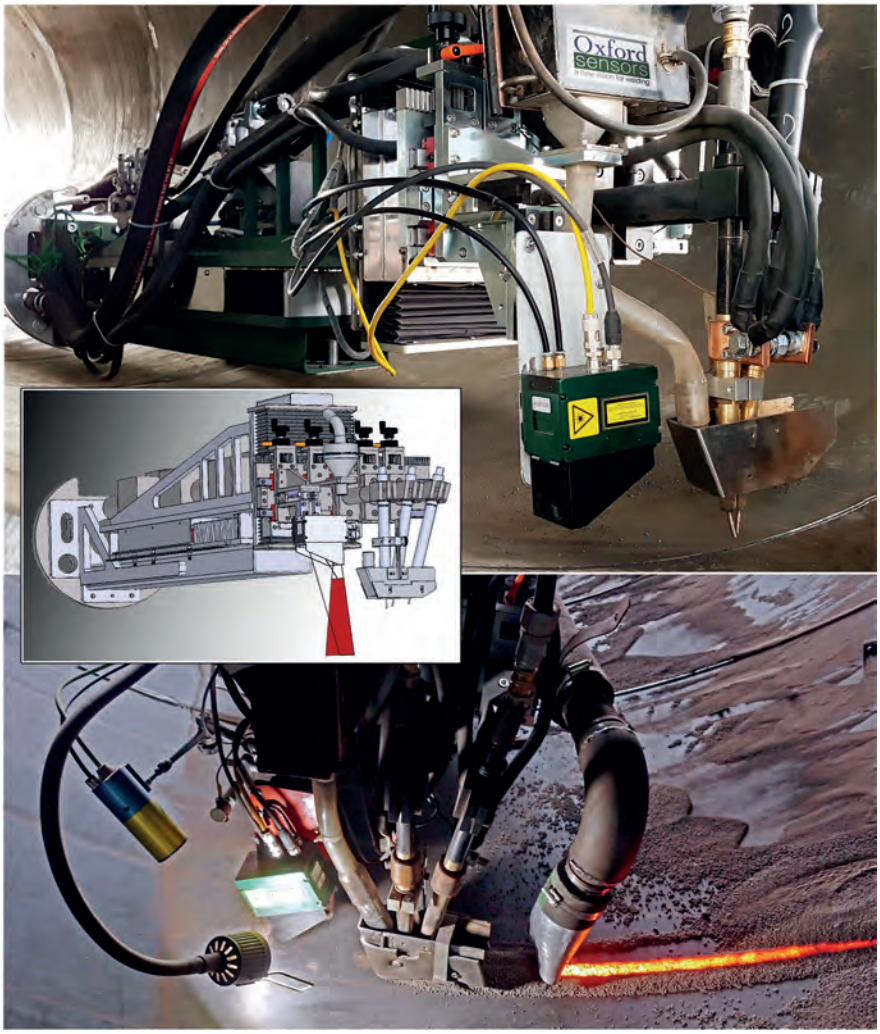
Oxford Sensors Ltd

Oxford Sensors announces a new head and controls for Submerged Arc Welding



Oxford Sensors announces a new head and controls for Submerged Arc Welding

Oxford Sensors Ltd (OSL), Bicester, UK announces the release of a new fully integrated system for tandem or triple submerged arc welding, with particular applications on spiral pipe mills.

The new system incorporates several innovations:

- A completely new weld head design which is easy to set up and adjust, and which integrates up to three torches together with flux delivery and recovery, video camera and laser seam tracking.
- Modular design for ease of using the key components in different applications. The new head has already been installed on several pipe mill locations. For spiral pipe offline ID welding, it can be mounted on a new OSL compact boom-end frame incorporating fully integrated horizontal and vertical slides with space for up to three wire feeders. For spiral pipe OD welding or other similar applications, the new head can be mounted on an OSL slide assembly together with up to three wire feeders for single, tandem or triple arc operation.
- A new integrated control system allows all parts of the system operation to be controlled from a single location. The new control system can be used for simultaneous control of ID and OD weld heads for spiral pipe offline welding from a single operator station.
- The new system includes weld control and is based on a network architecture, allowing it to be easily used with welding power sources from leading manufacturers.

According to Bob Beattie of OSL, "Over the last twenty-five years, we have accumulated a lot of experience in pipe mill welding and other similar applications. So when we had the opportunity to put that experience to work in designing this new system we were very excited by the possibilities. After intensive effort in design and following detailed proving trials, we are very pleased with the results."

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Quaker Chemical Corporation

Reduced drying time with water based coating replacement

Challenges

A tube and pipe manufacturer wanted to replace the solvent based paint coating that was used on their couplings inserts due to the hazards associated with that coating including fumes and flammability risks. By switching to a water based technology, the company wanted to:

- Reduce workers' exposure to solvent health hazards
- Benefit from the environmental friendly properties
- Reduce drying time

The replacement coating had to be evaluated under the current handling and drying process conditions to determine if it could deliver a similar performance compared to the existing coating.

The Solution

Quaker Chemical Corporation ("Quaker") selected the water based coating, QUAKERCOAT® 856 GREEN for evaluation. The formula was customized for the coating process to match the color tone, appearance, and flexibility; and to work with the limitations of the existing equipment. Additionally, the product properties were modified to be able to comply with downstream process requirements including the forming press.

Application tests were performed to fine tune the properties of the coating with the goal of achieving a faster drying time than the 45 minutes needed with the solvent based coating. Two drying approaches were tested with the QUAKERCOAT® 856 GREEN providing the following results:

- Oven assisted drying at 40° C = 10 minutes
- Ambient air drying with ventilation = 15 minutes

The switch to QUAKERCOAT® 856 GREEN resulted in:

- Reduced drying time to 15 minutes which was 66% less versus the solvent drying time
- Similar color finish as the solvent coating with minimal differences in brightness
- Improved coating appearance with no foaming and no runoff
- Less fumes as reported by line worker feedback
- Reduced insurance costs due to the elimination of the hazards involved with low flash point coatings
- Approved coating flexibility performance as tested in the pressing application

The product

QUAKERCOAT® 856 GREEN is a non-flammable, water based paint coating with low VOC emissions. It is applied without diluting or adjusting viscosity. QUAKERCOAT® 856 GREEN provides uniform coverage during application and excellent durability and performance. In addition, it has high flexibility for press conditions after painting.

The expertise

Quaker is a worldwide developer, producer and marketer of custom formulated Tube & Pipe process chemicals and coatings. From first coil to final cut, Quaker is capable of providing process chemicals for all operations in welded and seamless mills, and delivers the in-depth process expertise to help maximize your productivity.

Quaker's product line includes fire-resistant hydraulic lubricants, high-temperature greases, cleaners, forming & sizing coolants, drawing & forming compounds, sawing lubricants, hydrotesting compounds, corrosion preventives, and a complete line of high-value coatings (including solvent, waterbased and UV coatings).

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Roll-Kraft

ROLL-KRAFT name new vice president

Roll-Kraft is pleased to announce the appointment of Chaz Rau to the position of Vice President of Precision Process Performance. Mr. Rau has been with Roll-Kraft for 18 years and has held various engineering positions within the company, including Engineering Manager of Tube and Pipe and Roll Form Tooling.

This newly created position will involve the handling of all Corrective and Preventive Actions (CPAs), as well as using the 5 Why method for evaluating root causes. Rau will be responsible for in-depth audits throughout the company and enlisting audit teams at Roll-Kraft's various locations. A major emphasis will be placed on improving existing processes, or standardizing new processes, reducing waste, and developing training documentation for onboarding new employees, as well as for daily use. By employing available technological resources, detailed training instructions, complete with photos, will be readily accessible on the company's intranet for immediate reference. This will ensure that the latest procedures will be used, first and foremost, in performing the manufacturing process.

Roll-Kraft expects the addition of this position and the implementation of these procedures will aid in providing quality tooling to the tube and pipe and roll forming industry that meets on-time delivery requirements and the ultimate goal of first-time performance.

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Roll Machining Technologies & Solutions (RMTS)

RMTS installs new state of the art saw

RMTS is proud to announce the installation of a new Amada CNC Controlled Automated Band Saw as we continue our infrastructure upgrades and improvements. RMTS president Rick Olson says, "There's no question how much of an improvement this makes to our customers. Our in-house ability to cut allows us to strive for even better deliveries and tighter quality control with less vendor reliability." RMTS can now cut up to 16" with the new CNC controlled saw allowing for even quicker emergency roll replacements when the unexpected happens. The ability to cut larger diameter steel quicker and send to heat treat is a game changer for RMTS.

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Schuler AG

Schuler focuses on new markets and digital business models

Incoming orders increase by ten percent in 2018

Continued pressure to make adjustments in Germany negatively impacts sales

Joint venture with Porsche to be launched in 2019

In the 2018 fiscal year, Schuler increased its order intake by ten percent with successful sales in new markets and digitized applications. However, ongoing pressure to make adjustment in Germany, international trade conflicts and special effects had a significant negative impact on the Göppingen-based press manufacturer's sales. "We will consistently focus Schuler on new markets, digital business models and profitable core businesses", said CEO Domenico Iacovelli, in office since April 2018, when speaking to journalists on Wednesday. In mid-2019, Schuler and Porsche plan to start building their joint high-tech press plant, which has now finally been agreed.

Sales just maintained, 2018 sales down compared to previous year

Schuler's incoming orders rose to € 1,255 billion in 2018 (previous year: € 1,141 billion). Despite the rather low order backlog at the end of 2017, Group sales remained virtually unchanged at

The corporate headquarters in Göppingen.

The new press shop as part of the joint venture with Porsche will set new standards for the automotive industry both in terms of performance in industrial manufacturing and in the digital networking of data streams in the production process.

Schuler intends to gain new market shares through consistent digitalization.

€ 1,212 billion (previous year: € 1,220 billion). The regions of Europe and China grew, while business in North America suffered significant losses.

Sales margins were subject to multiple burdens. The challenges posed by the new WLTP test procedure for automobile manufacturers led, particularly in Germany, both to the abandonment of new capacities and to the postponement of already agreed projects. At the same time, costs rose due to the collective wage agreements from recent years. Customer business in China suffered from the trade conflict between China and the USA.

In 2018, Schuler had extraordinary expenses in the low double-digit million range due to capacity adjustments within the Group and write-downs on the capitalized goodwill of the die manufacturing subsidiary AWEBA. EBITA fell to € 45.3 (111.9) million. Schuler achieved consolidated earnings after tax of € 13.5 (67.4) million.

Schuler Group figures (IFRS)		2018	2017*
New orders	€ million	**1,255.1**	1,141.0
Order backlog	€ million	**926.1**	913.7
Sales	€ million	**1,212.1**	1,220.0
EBITDA	€ million	**71.5**	136.2
EBITDA margin	%	**5.9**	11.2
EBITA	€ million	**45.3**	111.9
EBITA margin	%	**3.7**	9.2
EBT	€ million	**18.0**	101.1
EBT margin	%	**1.5**	8.3
Group profit	€ million	**13.5**	67.4
Total statement of financial positions	€ million	**1,233.9**	1,302.5
Shareholders' equity	€ million	**495.0**	496.0
Equity ratio	%	**40.1**	38.1
Cash flow from investment activities	€ million	**-16.4**	18.3
Employees incl. apprentices	persons	**6,575**	6,570
- Germany		**4,195**	4,237
- In foreign countries		**2,380**	2,333
- China		**1,337**	1,341

* figures adjusted in accordance with IFRS 9 and 15

Cautious optimism for 2019 and beyond

At the end of 2018, Schuler's equity capital ratio of 40.1 (38.1) percent of the balance sheet total was still above average in the German mechanical and plant engineering sector. The company employed 6,575 (6,570) people worldwide, 4,195 (4,237) of them in Germany – which is barely any fewer than in the previous year.

CFO Norbert Broger said: "2018 was a very challenging year in terms of operation and strategy. This is why it was all the more important that we were able to reverse the negative trend in incoming orders and achieve an increase of ten percent for the first time. We therefore entered the new year with a decent order backlog of € 926 million. Therefore, and thanks to the cost reduction measures already initiated, we are confident that we will be able to show medium-term earnings improvements".

Concentration on the profitable core business

Irrespective of the positive order development, the pressure to adapt remains high, especially in Germany, said CEO Iacovelli. "In 2018, we therefore began making Schuler more dynamic and bringing customer-driven innovations to market more quickly. The aim is to concentrate on the Group's

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profitable core business and increase profitability in the coming years. This includes the consistent segregation of loss-making business areas wherever necessary".

In recent months, Schuler has developed new product strategies for each business division. Expensive "over-engineering" needs to be a thing of the past. Schuler has already decided to withdraw from the unprofitable production of packaging machines and lines for the production of large-diameter pipes in 2019.

Expansion of service business and value creation in China

Cost benefits in production in China and Brazil are to be exploited to a greater extent and the global service network is also to be expanded in Germany. The locations in China will receive additional engineering positions.

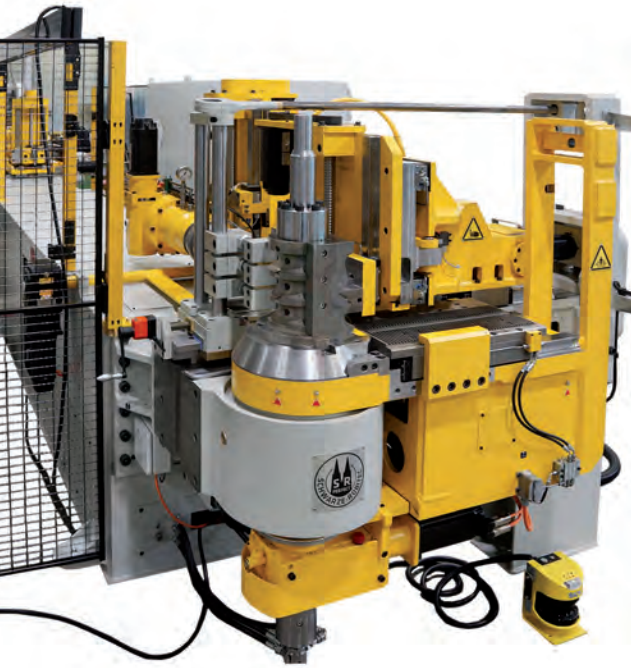
"Smart Press Shop" with Porsche sets new standards

From 2019, Schuler and Porsche will build what is probably the world's most modern press plant for the digitized automobile production of the future in Germany. Operation is scheduled to start in 2021. "The establishment of the corresponding joint venture between the two companies under the name Smart Press Shop is perfect", said Schuler CEO Iacovelli. "The new press shop will set new standards for the automotive industry both in terms of performance in industrial manufacturing and in the digital networking of data streams in the production process", he explained.

The new Smart Press Shop will supply the Porsche plant in Leipzig in particular with body parts at low logistical cost and with the lowest possible ecological impact. For Schuler, the joint venture is an example of close cooperation with the world's leading automobile manufacturers. "At the same time, we are focusing on new markets and digital business models", said CEO Iacovelli. Schuler intends to gain additional market shares from 2019 with new mechanical presses in the mid-price segment and consistent digitization of the main product lines. "For Schuler and our customers, digitization is not a vision, but a reality. And it is above all a great opportunity for all of us – not a risk", explained the Schuler CEO.

Schwarze-Robitec GmbH

Compact and high performance – Eberspächer banks on Schwarze-Robitec at site in Portugal



Eberspächer utilises two fully electric multiple-radius CNC 80/60 E TB MR tube bending machines supplied by Schwarze-Robitec.

The capacity of a large tube bending machine with the compact dimensions of a smaller one – For particularly challenging components, Schwarze-Robitec combines the benefits of two different machines in the CNC 80/60 E TB MR. The Cologne-based manufacturer of tube bending machines has successfully commissioned two of these fully electric multiple-radius tube bending machines featuring transport boost technology at automotive supplier Eberspächer's site in Portugal. As one of the world's leading system developers and suppliers of exhaust technology, Eberspächer utilises the energy-efficient machines from Schwarze-Robitec's High Performance series to manufacture tubes for complex exhaust systems.

International emissions standards require manufacturers to lower fuel consumption and CO2 emissions, reinforcing the need for increasingly efficient systems to reduce pollution from cars and commercial vehicles. It's a challenge that Eberspächer faces at its Exhaust Technology product unit. The company designs efficient systems for exhaust gas post treatment – ranging from conventional mufflers to highly complex purification technology. In manufacturing, this not only requires the use of lightweight and thin materials, but also the short cycle times and high speeds that are typical for the automotive industry – and on top of that a large degree of process security. With the two new CNC 80/60 E TB MR tube bending machines supplied by Schwarze-Robitec, the company is now perfectly equipped to tackle these challenges at its production site in Tondela, Portugal.

Intermediate size delivers high bending performance and process security

With the CNC 80/60 E TB MR, Schwarze-Robitec is combining two special requirements in one machine: As an intermediate size, it features the bending head transmission and thus the bending capacity of a CNC 80. In addition, its vertical multiple-radius construction matches that of a more compact CNC 60 – as Eberspächer processes tubes with diameters of no more than 50 millimetres (1,97 inch). This enables the company to produce its challenging exhaust technology components with a sufficient level of machine performance and high process security yet in a cost-efficient manner. By supplying tube bending machines like these, Schwarze-Robitec is displaying its flexibility in addressing the individual requirements of its clients.

When it comes to purchasing new machines for its sites in Europe, Eberspächer has been placing its trust in Schwarze-Robitec for years. Its production facility in Tondela is now for the first time equipped with machines featuring cutting-edge NxG control systems – these are up to 35 percent faster in operation than machines without NxG control systems.

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Schwarze-Robitec GmbH

Schwarze-Robitec delivers powerful machine to Portugal

Thermal waste treatment is a complex process. At the centre of the process is the boiler consisting of several tubes welded together to what is known as a membrane tube wall. Before those walls can be used in boiler construction, they first need to be bent. In early 2019, Schwarze-Robitec delivered an FL 2000 membrane wall bending machine to Portugal to perform this task with maximum precision. The machine enables MARTIN Caldeiras, a manufacturer of boiler spare parts and a subsidiary of Germany-based company MARTIN GmbH, to bend entire membrane tube walls up to 2,000mm wide in a single step.

To ensure a perfect fit with the boiler design and adjacent supply line segments in modern power plant construction, the membrane tube walls first need to be bent with millimetre precision. The Munich-based company MARTIN GmbH is therefore banking on the FL 2000 membrane wall bending machine supplied by Schwarze-Robitec, the leading expert for tube cold bending machines, for its Portuguese subsidiary MARTIN Caldeiras.

Process optimisation and operational safety

MARTIN GmbH designs and constructs waste-to-energy plants, while its Portuguese subsidiary specialises in the manufacture of boiler spare parts and in robot cladding. 'We wanted to optimise our processes and bend the membrane tube walls directly on site at our own facility,' says Peter Alpiger, managing director of MARTIN Caldeiras. Looking for a manufacturer of tube bending machines with good references, MARTIN GmbH turned to Schwarze-Robitec. The traditional German business is one of just a small number of companies that supply membrane wall bending machines. The machines in the Boiler & Power series are perfectly suited to the requirements of boiler and power plants. The 27-ton membrane wall bending machine FL 2000 offers maximum stability and durability. MARTIN Caldeiras uses the machine to process walls consisting of tubes with a diameter of up to 70mm and a wall thickness of up to 5mm. 'Continuous and safe operation with zero downtime is of major importance to us,' Alpiger underlines. That is why the membrane wall bending machine FL 2000 is the perfect choice – it is both efficient and powerful, and comes with an integrated remote maintenance service.

Entire membrane tube walls up to 2,000mm wide can be bent with maximum precision with the aid of the Schwarze-Robitec membrane wall bending machine FL 2000.

The company MARTIN Caldeiras in Portugal is a subsidiary of Munich-based MARTIN GmbH and specialises in the manufacture of boiler spare parts and in robot cladding.

Sikora AG

SIKORA at METEC 2019 (3A58)

The RADAR SCAN 6000 is based on radar technology and delivers precise diameter measuring values independent of environment conditions, such as heat, dust and steam.

Online quality control of metal pipes, strips and plates with innovative measuring technologies.

SIKORA is a manufacturer and global supplier of advanced measuring technology for the metals, hose and tube, wire and cable, optical fiber and plastics industries. At METEC in Düsseldorf from June 25 to 29, 2019, the company presents a broad portfolio of innovative systems for non-destructive quality control and process optimization of steel tubes, strips and plates at its booth 3A58.

With the RADAR SCAN 6000, SIKORA presents a system for non-contact inline measurement of the diameter and ovality of metal tubes and rods. The system is based on progressive, high-resolution radar technology and records measuring values over 360° of the circumference of the product to micron accuracy. The measurement is carried out by radar transceivers simultaneously from several directions and is insensitive to heat, dust and steam. Typical measuring ranges of 300 to 2,500 mm are covered. The RADAR SCAN 6000 requires no coupling media and continuously delivers precise measuring values, which lead to a high reliability and availability for the user. Due to the slim design, the system can easily be integrated in the production process for hot as well as cold measurement. The technology measures regardless of the surface roughness in typical tube applications. The measuring values are clearly displayed graphically as well as numerically on the display of the processor system ECOCONTROL 6000. Furthermore, extensive trend and statistical functions as well as comprehensive data logging are available. The RADAR SCAN 6000 contributes to the highest product quality, process optimization and cost saving during tube manufacturing.

Another highlight at the SIKORA booth is the PLANOWAVE 6000 M, a non-contact measuring system that is used for non-destructive thickness measurement of slabs, strips and plates. The system offers a precise thickness measurement independent of material, temperature and surface of the product. An external calibration on the material is not needed. The measurement of the product is also based on radar technology. Transceivers above and below the material continuously send and receive frequency modulated millimeter waves. The thickness – typically centerline thickness – of the product is precisely determined from the runtime difference. By using a traversing set of transceivers, the cross-section profile of the product can be optionally determined. The PLANOWAVE M is designed for a typical measuring range of up to 500 mm. The system is used directly in the production line or at the end of the line for final quality control. This system is also combined with the display and control system ECOCONTROL 6000 for the visualization of the measuring values, the display of trend and statistics as well as data logging.

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Furthermore, SIKORA presents the LASER Series 2000 for non-contact and non-destructive measurement of the diameter and the ovality of metal tubes, wire rods and bars during production. The measuring method is based on the use of laser light sources and CCD sensors in combination with powerful signal processors. The outer diameter of the metal tube is calculated by means of an intelligent diffraction analysis. Extremely short exposure times guarantee a high accuracy of the single value at all line speeds. The LASER Series 2000 includes gauge heads for different product diameters from 0.05 to 500 mm. They are free of wearing parts, keep their precision during the entire operating time and no calibration or maintenance work is necessary. The measuring values are clearly displayed on the monitor of a processor system of the ECOCONTROL series.

SIKORA also presents the LASER Series 6000. These devices complement SIKORA's product portfolio of intelligent diameter gauges by three high-end models. Up to 5,000 measurements per second and axis, all with extremely high single value precision, enable an optimum line control and provide reliable statistical data. The LASER Series 6000 gauge heads measure the diameter of tubes, wire rods and bars with a higher precision and repeatability as well as a wide range of interfaces. Three gauge head models cover product diameters from 0.2 to 78 mm. The measuring values are clearly visualized and the operation is done intuitively at the monitor of the ECOCONTROL systems.

At METEC, SIKORA continues to showcase systems for quality control of metal tubes on the basis of X-ray technology. For metal tubes made of aluminum as well as of certain light metal alloys, the diameter as well as the wall thickness are precisely measured. Moreover, the X-RAY 6000 PRO is predestined for the reliable measurement of the plastic coating on steel tubes. Typically, X-ray measuring systems are used for plastic coated steel tubes with a diameter of up to 200 mm. Precise measuring values are immediately retrievable with the online measurement. The data is visualized at the monitor of the processor system ECOCONTROL 6000 and enables the user to intervene into the process if needed. Hence, SIKORA's measuring systems are essential components for the assurance of the highest quality and an efficient process during production.

The PLANOWAVE 6000 M measures by means of radar technology the thickness of slabs, metal strips and plates.

On the basis of laser technology, the LASER 2500 XY measures the diameter of wire rods, metal bars and tubes.

The X-RAY 6000 PRO is used, amongst others, for wall thickness measurement of light metal alloy tubes as well as the layer thickness of the plastic coating on steel tubes.

SMS group GmbH

ChangBao orders world's most advanced seamless tube plant from SMS group

The ChangBao and SMS group project teams during contract signing ceremony.

Jiangsu ChangBao Precision Steel Tube Co., Ltd based in Changzhou in Jiangsu Province, China, has awarded SMS group (www.sms-group.com) the contract to supply a new, state-of-the-art PQF® (Premium Quality Finishing) seamless tube plant and related automation. Particular highlights of the scope of supply include various performance modules and a KR I 35/45 CNC groove dressing machine. This highly automated plant will enable ChangBao to meet the growing demand for precise, high-strength tubes on the local market.

The PQF® ordered will be used to produce tubes within a diameter range of up to 6 5/8 inches and wall thicknesses of between 4 and 20 millimeters. Its annual capacity is 300,000 tons of tubes. These are used in oil and gas production (OCTG tubes) and must satisfy very high quality and tolerance requirements in accordance with API standards.

With the BCO-type PQF® plant (Bilateral Change-Over), the stands are changed at both sides of the mill. The compact, easily accessible construction enhances the user-friendliness of the plant. The drive is simpler in design and is easier to service. In addition, the hydraulic capsules (hydraulic adjustment) are positively connected to the mill frame. This ensures the rolling forces are distributed symmetrically over the mill, resulting in a further significant improvement in wall thickness variations. This increases both the efficiency and flexibility of the mill.

The order also includes the full automation of the machinery and plant sections, as well as state-of-the-art laser technology for measuring the wall thicknesses downstream of the PQF® and the stretch reducing mill (SRM). What's more, the CaliView® measuring system developed by SMS group allows for fast, inline calibration of all rolling mills, and so guarantees the perfect alignment of the mill line over a period of time. A networked, CNC-based groove dressing machine (KR) for high-precision machining of the SRM stands will also be supplied.

The use of LASUS® technology means the otherwise commonly applied radioactive isotope measuring technique can be replaced by a safe laser technology, which is extremely environmentally friendly to operate and ensures monitor control with the PQF®-SecControl-Technology® as well as front and tail end sharpening in real time with the FTS system.

Any yield losses are minimized using the latest modules in the CARTANEO technology system. The well-known functions CEC (Crop End Control for reducing thick ends), WTCA (Wall Thickness Control, Average), and WTCL (Wall Thickness Control, Local) have been significantly improved thanks to self-learning algorithms (Artificial Intelligence, or AI).

With this investment ChangBao is banking on ultra-modern, highly stable tube production. The lower material stress allows the product range to be extended to include even thinner-walled dimensions and higher-alloy steel grades. The high level of digitalization of all equipment was what convinced the customer to be well equipped for the future.

The new seamless tube plant is scheduled to be commissioned in the first quarter of 2020.

SMS group GmbH

SMS group to supply new production facility for spiral-welded pipes to AMERICAN SpiralWeld Pipe

AMERICAN SpiralWeld Pipe Company LLC. has awarded SMS group an order covering the supply of a new Online Spiral Pipe Mill, to be installed in a new greenfield plant ("Plant 3") at Paris, Texas, U.S.A.

SMS group (www.sms-group.com) will be responsible for the engineering, supply and supervision of erection and commissioning of a coil preparation stand and a spiral pipe machine with submerged-arc welding (PERFECT arc®). SMS group's PERFECT arc® technology enables energy savings of up to 30 percent compared to competitor plants.

The new spiral-pipe production facility is scheduled to start producing in 2020. Material grades up to X-70 can be processed. The pipes will mainly be produced as water pipes according to AWWA (American Water Works Association) standards. The new line will be designed to make pipes of more than 16 meters (55 feet) length with an outside diameter ranging from 610 to 3,658 millimeters (24 to 144 inches). The maximum wall thickness will be 25.4 millimeters (1.0 inch).

The mill will operate in the so-called one-step ("online") process with submerged-arc welding from the inside and outside taking place directly after spiral pipe forming.

Often the productivity of spiral pipe welding systems is restricted by the welding speeds of submerged arc welding. PERFECT arc® power sources allow an increase in productivity of up to 20 percent, while process stability remains constant. The systems operate with IGBT (Insulated-Gate Bipolar Transistor) power electronics with fully digital welding current control. No transformers are required. As a result, the welding machines can attain an efficiency rate of over 90 percent. Compared to older welding techniques, significant energy savings (up to 30 percent) are possible, depending on the operating point.

This new plant will enable AMERICAN SpiralWeld Pipe to expand its production by a very high tonnage of spiral-welded steel pipes for the municipal water and wastewater transmission markets, industrial, hydroelectric and power markets including large diameter fabrication for treatment plants and pump stations.

The teams of AMERICAN SpiralWeld Pipe and SMS group after contract signing.

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Vallourec Deutschland GmbH

Vallourec is selected by Thailand's PTT Exploration & Production PLC to deliver oil country tubular goods for a challenging offshore project in Myanmar

PTTEP, Thailand's national oil exploration & production company, awarded Vallourec the contract to deliver over 3,000 tons of OCTG for its Myanmar M9 West exploration well; a challenging HP/HT (high pressure/high temperature) offshore field in the Gulf of Martaban, approximately 300km from Yangon.

Alexandre Valdelievre, Vallourec Commercial Director, South East Asia stated: "We are absolutely delighted to be entrusted with this contract, which truly reflects the benefits of our new regional organization. Since 2017, we have been working closely with PTTEP, building relations of confidence and proximity and supporting them for their offshore exploration projects."

The project will be essentially served through Vallourec's subsidiary in Indonesia, supported by competitive supplies from Vallourec pipe mills in Brazil, in China and in Germany. In addition, VAM® Field Services (VFS) will be present on the rig to supervise the smooth running of the well. By ensuring that running procedures are followed correctly, VFS can reduce risk, improve efficiency and contribute to the safety of operations on the rig.

PTTEP drilling engineering team stated: "Safety, quality and value for money are the key success factors for our operations which is why we selected Vallourec for our project. Thanks to their proximity, their technical know-how and field services, Vallourec will be able to support us from the start of the project through to installation."

With its Vallourec Tianda plants located in China, the group has a new, fully integrated production system, which enables it to offer a complete product portfolio at a highly competitive price to target local and export markets (Asia, the Middle East).

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Tel: +492119602267
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Vallourec Deutschland GmbH

Vallourec launches SmartengoTM, its new online sales platform for the oil and gas market

Vallourec is now offering online sales of tubular solutions with its new e-commerce platform: SmartengoTM.

"The SmartengoTM platform is the first step in the digital journey that we have just launched with VallourecTM.smart, our smart services. It will create value for our customers. They are now able to get tubular solutions online easily and reliably, with a few clicks, while still benefiting from Vallourec's know-how and quality," explains Yvan Rivaux, Director of global services and digitals.

The SmartengoTM platform makes it possible to buy around 15 different OCTG (Oil Country Tubular Goods) threaded seamless tubes. This targeted offer is available quickly and will give operators greater flexibility. For example, it will help them finish equipping their oil and gas wells very quickly, in Europe and Africa to start off with.

Vallourec customers and their representatives can go to smartengo.vallourec.com and check immediately to see if the tubes they're looking for are available and how soon. Customers can make purchases online alone, or get help from their usual sales representative. Information is updated in real time. The quote is automatically sent to the back office and payment is run as usual, offering a transparent online experience and real savings in time and ease of use.

The SmartengoTM platform will gradually expand its offer of products and services to cover all Vallourec's business sectors and all regions of the world.

Xiris Automation Inc.

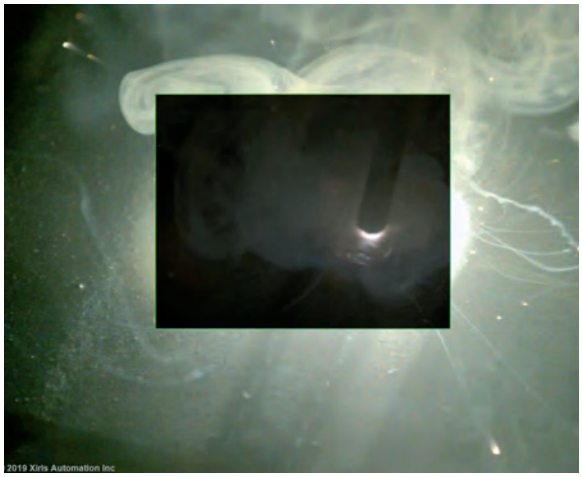
Xiris Appoints New Sales Manager for SE Asia

Xiris Automation is pleased to announce that it has appointed Mr. David Garrard as its new Sales Manager for South East Asia. With a strong background in software sales, David brings a wealth of expertise to Xiris' global sales team. Based in Kuala Lumpur, Malaysia, he will be initially focused on developing the APAC market for Xiris's XVC camera products in the weld industry.

Cameron Serles, President of Xiris Automation explains, "We are excited to have David join our sales team at Xiris to better develop and support our clients throughout the ASEAN region. This is a new market for us and it is very important for us to enhance our sales capabilities to meet the growing demand in the region. With his long history of consultative selling activities in the region, Dave will be key to helping us deliver complete services and solutions to our existing customers in the ASEAN region and growing our customer base there."

Xiris Automation Inc. specializes in developing optical equipment used for process and quality control across a number of specialty industries. With an extensive product line, Xiris provides some of the world's most dynamic manufacturers with the ability to detect, recognize, and analyze quality defects in manufactured goods.

Xiris WeldStudio™ PIP -Feature



Xiris Automation Inc is pleased to announce the release of an expanded version of WeldStudio™, its software utility for controlling and displaying images from weld cameras. The latest version of WeldStudio™ includes the Picture-In-a-Picture (PIP) feature, a powerful new feature that allows for an inset window to be created in the camera image with different settings from the main camera image. When implemented, key areas of interest within the inset window can be set up with different contrast levels than the rest of the image, optimizing the inset window for a bright weld arc while its surrounding background can be enhanced to see the darker surrounding features.

The Xiris WeldStudio™ software includes everything needed to set up, control, display and record video from Xiris XVC weld cameras. The user-friendly interface allows operators to set-up and control multiple cameras on any suitable PC running Windows 7/8/10 operating system.

Xiris Automation Inc. specializes in developing Optical Systems for Quality Control for several niche industries, providing some of the world's most dynamic manufacturers with the ability to detect, recognize, and interpret quality defects in their manufactured goods.

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Tube

Düsseldorf

International Tube and Pipe Trade Fair

Internationale Rohr-Fachmesse

Messe Düsseldorf

Messe Düsseldorf GmbH

Storage in the metal industry: World's leading trade fairs for metallurgy and foundry technology cooperate with ENERGY STORAGE EUROPE

- **Bright World of Metals fair quartet attracts 78,000 visitors**
- **Thermal storage for waste heat recovery is on the rise**
- **Free short presentations for metal-producing and metal-processing companies**

Energy is a major cost factor for companies that produce and process metals. These manufacturing processes account for approximately a quarter of total industrial energy consumption in Germany. For companies in these industries, it is essential to reduce energy costs and at the same time ensure security of supply in production. Electrical energy storage systems can assume central functions, because they cut peak loads and increase electrical energy quality, while thermal energy storage systems optimize waste heat utilization. Against this background, the world's leading trade fair quartet GIFA, METEC, THERMPROCESS and NEWCAST have agreed to cooperate with ENERGY STORAGE EUROPE, which takes place from March 12. to 14. in Düsseldorf.

The cooperation of the two Düsseldorf trade fairs is intended to raise awareness of the possibilities of energy storage in metal production and processing and thus contribute to increasing energy efficiency and competitiveness in these industrial segments. The four trade fairs for metallurgy and foundry technology are leading in their segments. Around 2,000 exhibitors and around 78,000 trade visitors from all over the world are expected to attend the upcoming trade fairs from 25 to 29 June 2019.

"Energy efficiency and security in demand and supply play an important role for our partners. By cooperating with ENERGY STORAGE EUROPE, we are bringing users together with manufacturers of storage solutions and thus building a bridge for our industry to position itself for a sustainable energy supply of tomorrow," says Gerrit Nawracala, Deputy Director Global Portfolio Metals and Flow Technologies Messe Düsseldorf.

As part of this cooperation, the exhibition quartet will for the first time invite visitors to ENERGY STORAGE EUROPE (ESE) via its channels and organise its own stand at ESE.

ENERGY STORAGE EUROPE Expo on 13 March from 11.15 a.m. to 11.40 a.m. offers two free short presentations on electrical and thermal storage for representatives of metal producing and processing companies.

Thermal storage for waste heat recovery is on the rise

About 25 percent of the final energy demand in Germany is accounted for by process heat and cooling. One key to improving energy efficiency here is the

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use of waste heat, which can be significantly improved by thermal storage.

"In the temperature range of over 140°C, around 12 percent of the industrial final energy requirement could be saved by using waste heat, in the range between 60°C and 140°C still 6 percent. In absolute figures, these are enormous amounts of energy. In addition, industrial waste heat can also be used to heat houses. Here we even come up with a potential of 45 percent of Germany's heating energy demand, which corresponds to a possible saving of 55 million tons of CO2 per year," says Dr. Andreas Hauer of the Bavarian Center for Applied Energy Research (ZAE).

In his presentation at the Energy Storage Expo Forum, Dr. Hauer will present thermal storage solutions that are already being used successfully in industry. These include a technology that reduces waste heat losses during the cleaning and drying of metal components by more than 50 percent. The savings are made possible by combining a hot water cylinder heated with exhaust air with a heat pump that can recover almost all the heat from the exhaust air.

About ENERGY STORAGE EUROPE 2019|Düsseldorf Exhibition Centre

ENERGY STORAGE EUROPE is the trade fair for the global energy storage industry with a focus on applications and energy systems. The parallel international conferences offer the world's largest conference program for all energy storage technologies. They include the 8th ENERGY STORAGE EUROPE Conference (ESE) of Messe Düsseldorf and the 13th International Renewable Energy Storage Conference (IRES) of EUROSOLAR e.V. The main topics are economics and finance (ESE) as well as science and social policy (IRES). In 2018, the fair grew to around 4,500 visitors from 61 countries. 170 exhibitors presented themselves. www.eseexpo.com

The Bright World of Metals

The GIFA (International Foundry Trade Fair), METEC (International Metallurgical Trade Fair), THERMPROCESS (International Trade Fair and Symposium for Thermo Process Technology) and NEWCAST (International Trade Fair for Castings) are a set of four international technology trade fairs and will be held across 14 halls from 25 to 29 June 2019. It is expected that they will receive over 2,000 exhibitors and around 78,000 visitors. Casting products, foundry technology, metallurgy and thermo processing techniques will be shown to the world over the course of five days in the capital of the Rhine region. The trade fairs are accompanied by a high-quality program including seminars, international congresses and series of lectures. For further information, please visit www.gifa.de, www.metec.de, www.thermprocess.de und www.newcast.de or www.tbwom.com.

Messe Düsseldorf GmbH

Start-ups for wire 2020 and Tube 2020

The Federal Ministry for Economic Affairs and Energy (BMWi) supports young, innovative entrepreneurs at the leading Düsseldorf trade fairs for wire, cable and tubes.

In 2020 the Federal Ministry for Economic Affairs and Energy (BMWi) will get involved in the Düsseldorf trade fairs wire and Tube, the international No. 1 trade fairs for the wire, cable and tube industries, to be held in the halls of Düsseldorf Exhibition Centre from 30 March to 3 April 2020.

Young, innovative start-ups can apply to participate in wire and/or Tube with Messe Düsseldorf and will be given the opportunity to present their innovative products and services as part of a BMWi Pavilion in spring 2020.

Over the five days of the trade fair to the tune of 70,000 trade visitors from throughout the world are expected; alongside the key players in these industries there will also be a strong SME presence. For those producing and trading in these sectors it's a must to be represented at wire and Tube.

The prerequisite for start-ups to participate in the Federal pavilion is that they present new developments or improvements of existing products, have been in existence for less than ten years, employ fewer than 50 staff and are headquartered/operate in Germany. Their annual turnover must not exceed EUR 10 million.

Once these conditions are fulfilled, up to 60% of the eligible expenditure (up to a total of EUR 7,500) will be borne. Start ups can book exhibition stands of 6, 9 or 12 square metres. Within the BMWi Pavilion a Lounge Area provides an appealing and suitable setting for talking to potential customers. The objective is to strengthen national business relations and to develop international export activities.

Messe Düsseldorf organises the BMWi Pavilion and serves as a contact for interested start ups wanting to use this opportunity for showcasing their products at the world's biggest trade fairs for these sectors. The shell stands offered are built in a "Made in Germany" design and are therefore clearly identifiable for trade visitors. The trade fair appearance for start ups will be eased further by competent on-site support from Messe Düsseldorf staff.

Interested companies are requested to contact Messe Düsseldorf GmbH direct (Ms Katja Burbulla) by e-mail at BurbullaK@messe-duesseldorf.de, by telephone on +49 (0)211 4560 77 07 or by fax on +49 (0)211 4560 87 7707.

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FIMIGroup
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Events for Business, Technology, Education and Networking

Diary of world class tube events

May 2019

14 – 17 May 2019	EXHIBITION: **Tube Russia** Moscow, Russia	EXPOCENTRE in Moscow Fax: +49 211 4560 8540 AhrensG@messe-duesseldorf.de www.tube-russia.com	
14 – 17 May 2019	SEMINAR: **Tube Russia – Tube & Pipe Industry Development Seminar 2019** Moscow, Russia	Organised by International Tube Association e.V. www.itatube.org	

June 2019

19 – 20 June 2019	EXHIBITION & CONFERENCE: **Valve World Americas**	Messe Düsseldorf North America, KCI World www.valveworldexpoamericas.com/	
25 – 29 June 2019	EXHIBITION: **METEC** Düsseldorf, Germany	Messe Düsseldorf GmbH Fax: +49 211 4560 8540 MuellersM@messe-duesseldorf.de www.metec-tradefair.com	

September 2019

18 – 20 September 2019	EXHIBITION: **Tube Southeast Asia** Bangkok, Thailand	Messe Duesseldorf Asia Pte. Ltd. beattrice@mda.com.sg www.tube-southeastasia.com	
19 September 2019	SEMINAR: **Tube Southeast Asia – Tube & Pipe Industry Development Seminar 2019** Bangkok, Thailand	Organised by International Tube Association e.V. www.itatube.org	

October 2019

1 – 3 October 2019	EXHIBITION: **Tubotech** Sao Paulo, Brasil	www.tubotech-online.com	

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FABTECH Chicago
November 11-14, 2019

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FABTECH Canada
June 16-18, 2020

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Events for Business, Technology, Education and Networking

Diary of world class tube events

November 2019

11 – 14 November 2019	EXHIBITION: **FABTECH** Chicago, USA	www.fabtechexpo.com	

March 2020

30 March – 3 April 2020	EXHIBITION: **Tube Düsseldorf** Düsseldorf, Germany	Messe Düsseldorf GmbH Fax: +49 211 4560 8540 AhrensG@messe-duesseldorf.de www.tube-tradefair.com	
3 April 2020	STUDENTS DAY: **Tube Düsseldorf** Düsseldorf, Germany	Organised by: International Tube Association	

September 2020

23 – 26 September 2020	SEMINAR: **Tube China** Shanghai, P. R. China	Messe Düsseldorf (Shanghai) Co., Ltd. www.tubechina.net/en/	

New members

The ITA is pleased to welcome the following new members who truly reflect the global status of our Association.

S. K. Mahajan	Jindal Stainless Steelway Limited	India
Amrendra Singh	Jindal Stainless Steelway Limited	India
Arpit Mishra	Jindal Stainless Steelway Limited	India
Kavish Agarwal	Vishal Pipes	India
Ashok Sarkar	ASR MARKETING SERVICES	India
Allan Harapiak	Brandt Engineered Products	USA
Jason Schoff	Brandt Engineered Products	USA
Joseph Rizk	Brandt Engineered Products	USA
Terry Best	Brandt Engineered Products	USA
Andy Semple	Brandt Engineered Products	USA
Anatolii Nedelko	Marine Survey Company LLC	Ukraine

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Please see the prices below. Even if you do not book a double page, please be assured that your advert in the next edition of the ITAtube Journal will achieve a lot of general attention!
For more information please contact: jennifer.kranz@itatube.org

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	1x	2x	3x
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Double page	€ 1,500.00	€ 1,425.00	€ 1,350.00
Inside front cover	€ 1,200.00	€ 1,150.00	€ 1,100.00
Inside back cover	€ 1,200.00	€ 1,150.00	€ 1,100.00
Front page	€ 2,000.00	€ 1,900.00	€ 1,800.00
Outside back cover	€ 1,500.00	€ 1,450.00	€ 1,400.00

ITAtube Journal Rate Card – Non-Member

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Full page	€ 1,600.00	€ 1,520.00	€ 1,440.00
Half page	€ 900.00	€ 855.00	€ 810.00
Quarter page	€ 600.00	€ 570.00	€ 540.00
Double page	€ 3,000.00	€ 2,850.00	€ 2,700.00
Inside front cover	€ 2,400.00	€ 1,900.00	€ 2,200.00
Inside back cover	€ 1,800.00	€ 1,710.00	€ 2,220.00
Front page	€ 4,000.00	€ 2,280.00	€ 3,600.00
Outside back cover	€ 3,000.00	€ 1,900.00	€ 2,800.00

ITATUBE Journal

Order form

Magazine of the Sole Worldwide Acting Association of Tube & Pipe Engineers

Single Issue(s)

☐ I hereby order the following stated issue(s) of the ITAtube Journal at a price of US$ 20.75; € 18 (EU VAT exempt); £ 13.10 each including shipping costs.

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I have the right to revoke this order within 14 days (date of email or the postmark) in writing.

Family Name: _____ First Name: _____

Job Title: _____

Address _____

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Tel: _____ Fax: _____

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Company: _____ EU VAT No. (if applicable): _____

Date: _____

Signature _____

Please return form to:
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Tel.: +49 211 947-5650 • Fax: +49 211 947-3938 • info@itatube.org • www.itatube.org

Industry partner to major tube and pipe exhibitions:

Tube China · Tube India · Tube Russia · TUBOTECH · Tube Düsseldorf

Corporate Membership Application Form

The Sole Worldwide Acting Association of Tube & Pipe Engineers

The following company applies for a Corporate Membership in International Tube Association for upto five members and agrees to pay the annual subscription of US$ 293; € 250 (EU VAT exempt) or £ 220.

☐ I / We agree on use of personal data as well as company data and logo particularly for registration on ITA website as well as for information purpose (revocable reserved).

Company Name: _____

Address: _____

_____

Tel: _____ Fax: _____ EU VAT No. (if applicable): _____

Email: _____ Website: _____

Applicant 1 – Payee for Group

Family Name | First Name

Job Title

Email address

Tel.

Applicant 2

Family Name | First Name

Job Title

Email address

Tel.

Applicant 3

Family Name | First Name

Job Title

Email address

Tel.

Applicant 4

Family Name | First Name

Job Title

Email address

Tel.

Applicant 5

Family Name | First Name

Job Title

Email address

Tel.

Authorised Signature _____

Name _____ Date _____

Brief description of company production/services:

_____

_____

Additional Information – Person responsible for marketing and PR (if not shown above)

Name _____ Job Title _____

Email _____ Tel. _____

If any applicant is located at a different address to above, please advise on a separate sheet.

Please return form to:

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Tel.: +49 211 947-5650 • Fax: +49 211 947-3938 • info@itatube.org • www.itatube.org

Industry partner to major tube and pipe exhibitions:

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Individual Membership Application Form

ITA International Tube Association

The Sole Worldwide Acting Association of Tube & Pipe Engineers

The following person applies for an Individual Membership in International Tube Association and agrees to pay the annual subscription of US$ 110; € 95 (EU VAT exempt) or £ 85. *
* reduced subscription for students of US$ 25; € 21.65 (EU VAT EXEMPT) or £ 16.

☐ I agree on use of personal data as well as company data and logo particularly for registration on ITA website as well as for information purpose (revocable reserved)

Family Name: _____ First Name: _____

Job Title: _____

Address: _____

_____

Tel: _____

Fax: _____

Email: _____

Website: _____

Company: _____

EU VAT No. (if applicable): _____

Date: _____ Signature: _____

With my signature I hereby accept the constitution of the International Tube Association e. V. and agree to be bound by them. Furthermore, I confirm that I have read and understood the data privacy and personal rights information. In signing, I also agree as the legal representative to uphold all demands of the Association deriving from membership.

Data security and privacy rights

1. The Association collects, collates and stores personal data from its members in a data processing system in accordance with and for the fulfilment of the stated aims of this Constitution (e.g. name and address, banking details, telephone numbers and email addresses, date of birth, licenses, position within the Association).
2. By their membership and the therein implied acknowledgment of this Constitution the members agree to the collection, processing (storage, alteration and dissemination) and use of their personal data in line with the fulfilment of the statutory tasks and aims of the Association. Other use of the data (e.g. sale of data) is not permitted.
3. By their membership and the therein implied acknowledgment of this Constitution the members agree furthermore to the publication of their name, general contact details as given on the membership application form, and pictures incl. company logo in print, broadcast and electronic media, insofar as this corresponds with the statutory tasks and aims of the Association.
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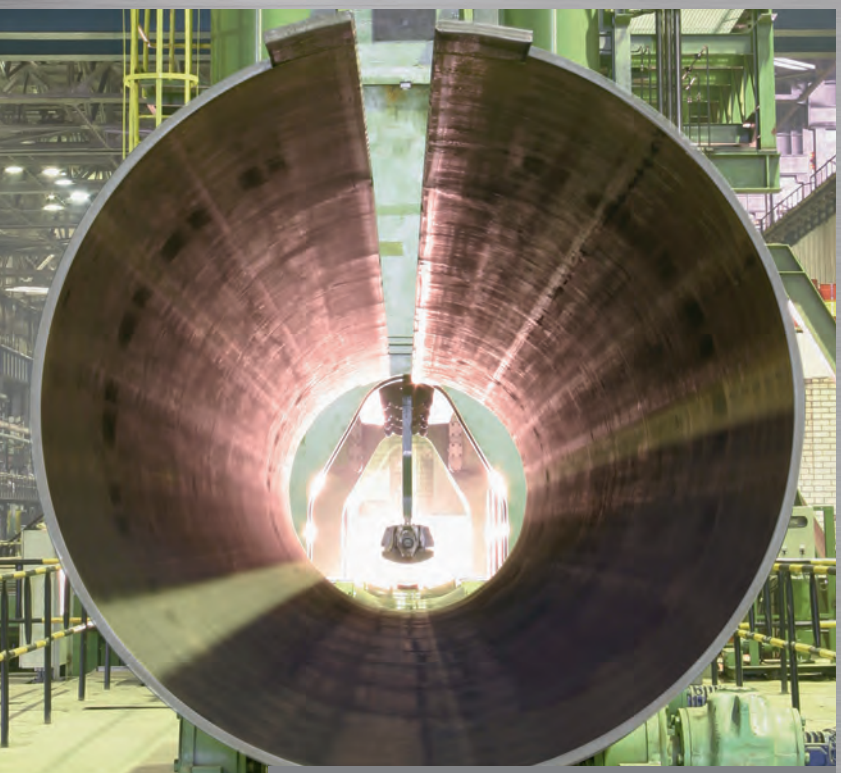
WELDED TUBE AND PIPE PLANTS



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