Advanced Manufacturing, Testing Methods for CLAD Pipes

By Jochem Beissel, Eisenbau Krämer - Kreuztal and Frank Kahmann, Jeffrey Stetson, Daniel Norton and Jörg Ininger, GE

From 2000 to 2013, global petroleum demand has grown an average of 1.2% year-over-year with the developing regions of Middle East, Africa and Asia rising at a combined rate of 2.8%. During this same period, global demand for natural gas has increased at twice the annual rate (2.4%) of liquid petroleum, with the same developing regions leading this growth at a combined compound rate of 5.9%.

The consumption growth seen in major regions is coincident to the development of large subsea petroleum and natural gas reserves containing high levels of hydrogen sulfide. Even relatively mild levels of hydrogen sulfide content in transported fluids results in increased internal corrosion, stress corrosion cracking and hydrogen embrittlement in the transport pipes.

These effects are all detrimental to the long-term integrity of carbon steel pipes used in pipelines. Depending on the cause of the damage to the pipe, failure can occur as rapidly forming cracks or small pits penetrate the pipe wall, causing leaks of transported fluids into the environment.

Unlike onshore pipelines that can be more easily accessed and repaired, subsea pipeline failures are not easily mitigated and often require costly replacement as documented in several recent events in developing regions.

When a pipeline fails, there are costs from lost production, the development and laying of replacement pipe sections, plus the untold environmental damage associated with leaks. Such expenses drive the industry toward preventive solutions, including the use of pipes built with corrosion-resistant alloys that line the inside of the pipe and protect it from hydrogen sulfide attack and general internal corrosion.

Aggressive Media

 Pipelines must be durable, since typically 15-25 years of service is requested, and harsh external environmental conditions and operation parameters are the key considerations. The presence of increasingly aggressive media, due to contaminated oil and gas being propagated, requires steps to avoid pipeline damage, including abrasion, corrosion, and other physical or chemical reactions. Because of these threats, there are several options for pipeline operators.

Due to its strong metal surface with inert properties, solid corrosion-resistant alloy (CRA) pipe addresses the abrasion and corrosion issues well. But, unfortunately, the associated strength adjustment possibilities are not optimum, and the costs are too high. Solid CRA costs about 70% more than the price of carbon steel pipe. At the other end of the spectrum, plain carbon steel pipes are the most cost-efficient option and can be precisely designed to application, but do not resist corrosion.

Rubber- or polymer-lined pipes are another option for pipeline operators. They present a significant cost advantage at only 30% that of solid CRA. The advantage is paid for with the durability disadvantage, especially in cases where the propagated medium has abrasive properties or where dynamical loads are high.

A CLAD plate consists of a CRA layer and a carbon steel-based material. The carbon steel part of the clad plate is responsible for the structural properties, whereas the CRA layer provides the corrosion-resistance attributes. Typical carbon steel grades used in pipe applications are X52, X60 or X65 with a CRA cladding of 316L, alloy 825 or alloy 625, depending on the corrosion requirements.

For cost reasons, the thickness of CRA layer is kept low, and it is possible to produce CLAD plates with a CRA thickness as low as 1.5 mm. In pipe applications, due to alignment problems in girth welding, a thickness of 3 mm is typical with the wall thickness of carbon steel being specified based on design criteria.

Welded CLAD pipe can be produced in different manners, such as rolled bonded plates, explosive cladding and overlay welding layers. One important differentiation should be highlighted: layers can be bonded mechanically or metallurgically.

Mechanically CLAD pipes have production and cost advantages, but may test mechanical limits and introduce risk, especially in cases where the operation parameters are demanding, which is increasingly the case. Partial cladding is a major concern with mechanical CLAD pipes. Metallurgical CLAD forms a strong bond between both layers. Typically the boundary between the layers is formed by a diffusion bridge in combination with a specific welding process.

It withstands the highest dynamical load and mechanical stress, and typically does not create cracks due to lack of residual stress, if processed correctly, as compared with other methods. CLAD comes with the advantage of its backing steel, which only slightly loses its yield stress limits, in the range of single-digit percent. The backing carbon steel strength can be further adapted by specific processes – this means high durability. The alloy layer can be chosen and processed to specific operation requirements. This explains why metallurgically-bonded CLAD is becoming a popular option for many pipeline projects.

CLAD Manufacturing

Eisenbau Krämer GmbH (EBK) manufactures longitudinally welded, thick-walled, large-diameter steel pipes for oil and gas transmission. Located in Kreuztal-Kredenbach, Germany, EBK manufactures pipes from metallurgically roll-bonded plates. This
metallurgical bond guarantees the integrity of the CLAD pipes throughout subsequent fabrication processes, including the production of bends and other fittings.

The carbon steel parts of the pipe are joined using double-sided, multi-pass submerged arc welding (SAW). The single-pass electroslag-welding (ESW), a process developed by EBK, is used for recladding of the CRA layer.

In order to perform a girth weld of CLAD pipes, the clad layers of both parts must fit each other geometrically. Therefore, the ability to perform welds of CLAD pipes in the field is to a large extent determined by dimensional tolerances of pipe ends, which have to be smaller than CRA thickness, typically 3 mm.

To ensure such tight tolerances, EBK developed and installed a calibration machine called Impander® and corresponding cold-sizing technology, in which pipes are compressed from the outside. In contrast to an expander, the Impander® grips from the outside and produces tight dimensional tolerances without contacting the sensitive CRA layer.

A controlled adjustment and final inspection of pipe dimensions demands an accurate measurement of the pipe shape. EBK uses a laser tracker with custom evaluation software that allows precise measurements of complete pipe circumference with accuracy of 100µm from both inside and outside.

The precise laser measurements allow for exact marking of the largest and smallest diameter on pipe ends, reducing time for pipe adjustment during field welding. After numerical and experimental studies, pipe “impansion” has been shown to significantly reduce residual stress in the pipe.

When cutting the pipe, a change in shape due to spring-back effect is practically eliminated. Additionally, compressive strengthening in the hoop direction due to cold work by impansion in combination with a low ovality along the whole pipe length considerably increases the external collapse pressure, which makes these pipes particularly suitable for deepwater applications.

In addition to extensive production test results, the intensive research and development program undertaken by EBK has resulted in an extensive data set covering the corrosion properties, mechanical values and welding results, which are made available to clients.

Ultrasonic Testing

The General Electric testing machine (SNUP in German) was delivered and installed at EBK in 2011. It tests SAW-welded pipes made with carbon steel of various grades. Typical dimension ranges are 12- to 100-inch diameters, with 5- to 80-mm wall thicknesses and up to 80-foot lengths.

The newer, phased-array systems provide a high level of flexibility and speed, and can be designed for demanding production environments. Depending on the scope of the test, a SNUP can perform an automated test on a pipe in three to five minutes, based on industry standards (Shell DEP, DNV-OS-F101).

The testing machine consists of a lifting frame, test-tracking mechanics, water circulation system with an automatic filter, laser system for automatic weld bead tracking, PLC control unit, UT-phased array instrument design and GE proprietary UT-software.

The robust test-tracking mechanics minimize vibration to ensure stable and repeatable results. The mechanics are equipped with specific rotation point for a better weld following, particularly for smaller diameter pipes.

Manufacturing of CLAD pipes represents a new challenge for UT testing. As a result of the formation of columnar crystals after welding, the layer in the weld bead area is difficult to test with ultrasonic sound. Standard test techniques and conventional equipment lack sufficient UT instrument performance and the necessary flexibility to adequately test CLAD. The standard GE SNUP machine design, combined with GE phased-array UT electronics and software, was flexible enough to fulfill these new requirements with only minor adaptions.

Approach, Experience

Among the advantages of phased-array technology is its ability to use multiple elements to steer, focus and scan beams (sector scan) with a single-transducer arrangement. Moreover, the technology can create “virtual probes” which are individually programmed and configured.

With one physical probe, several virtual probes can be created. For each virtual probe, a separate set of parameters can be adjusted in the software. This allows for a flexible system for all possible bevel preparations to test for lack of fusions, as well as combined testing of inner and outer defects, by adjusting the

The precise laser measurements allow for exact marking of the largest and smallest diameter on pipe ends, reducing time for pipe adjustment during field welding. After numerical and experimental studies, pipe “impansion” has been shown to significantly reduce residual stress in the pipe.

When cutting the pipe, a change in shape due to spring-back effect is practically eliminated. Additionally, compressive strengthening in the hoop direction due to cold work by impansion in combination with a low ovality along the whole pipe length considerably increases the external collapse pressure, which makes these pipes particularly suitable for deepwater applications.
angle of incidence for each specific virtual probe, which represents a single shot.

GE standard-phased array probes for SAW testing can steer the angle of incidence between -10° and 85° due to the integrated wedge and the small pitch. The housing of these probe types is identical to standard conventional probes.

Another advantage of the phased-array approach is the ability to check the coupling through the back wall instead of using sound transmission through the weld, which keeps the attenuation variation in a narrow range. In some cases, a variation of only 6 dB is permitted. Furthermore, a sector scan is available for each virtual probe. The sector scan is used during the static calibration to identify the best phased-array settings for detecting specific reference flaws.

One classic misconception is that one phased-array probe replaces many conventional probes. However, due to the anisotropic nature of CLAD materials, depending on the specific geometry of the pipe and weld, certain test arrangements are no longer effective.

The combination of growing demand coupled with the increasingly corrosive quality of oil and gas has led to consistent growth in the CLAD market, despite fluctuations in oil and gas prices. It is a premium market for pipeline manufacturers with few suppliers who can overcome the significant engineering, manufacturing and quality-testing challenges.

Conclusion

There have been about 80 SNUPs delivered by GE (and its German predecessor, Krautkramer, prior to the GE takeover) worldwide since 1999. The average lifespan of a SNUP is about 15 years, with some systems being used for over 20 years.

The machines need to be reliable: When a pipeline manufacturer wins a project, their manufacturing kicks into high gear. It is not uncommon for a manufacturer to run at full capacity for six days a week. The correct implementation of technology enables oil and gas pipeline owners to stay ahead of costly and dangerous failures. P&GJ

Authors: Jochem Beissel is plant manager for Eisenbau Krämer - Kreuztal in Kreuztal, Germany. He holds degrees in mechanical engineering and welding engineering from the University of Cologne, University of Aachen and GSI SLV, Germany. His Ph.D. focus was in welding techniques for producing longitudinal-welded CLAD pipes.

Frank Kahmann is global principal engineer at GE Ultrasonic Testing Systems and works with GE customers while providing guidance to external partners and other GE divisions. He holds a Ph.D. in physics from the University of Osnabrück.

Jeffrey Stetson is product manager for GE Ultrasonic Testing Systems for automated ultrasonic testing systems used to inspect pipe during manufacturing for the upstream and midstream. He holds degrees in mechanical engineering from The Pennsylvania State University and in applied physics from Shippensburg University of Pennsylvania.

Daniel Norton is in commercial operations at GE Ultrasonic Testing Systems and is responsible for developing the initial requirement to a concrete blueprint for the project execution and use of the system. He holds a bachelor’s degree in engineering from Carleton University, Ottawa and a master’s degree in science from Aachen University of Applied Sciences, Germany in mechanical engineering.

Jörg Ininger is a team leader at GE Ultrasonic Testing Systems, where he heads engineers working on welded pipes, aviation, rail and plate-testing systems responsible for both proposal management and project execution. He holds a degree in electrical engineering from Leipzig University of Applied Sciences.
The 4th edition of AMI’s study, Steel Pipe Coating – the Global Market, was completed earlier this year. The report is the outcome of several months of intensive market research and analysis, focused on the pipe coating industry and its associated supply chain – from manufacturers of equipment and raw materials to pipe coaters, to pipeline users and operators.

Based on that research, AMI calculated that in 2015 this industry supplied circa $7.2 billion worth of pipe coating – a value that does not include the pipes themselves, nor does it take into account other services supplied by pipe coating companies (such as logistic services, etc.)

**Distribution of market value by coating application (2015)**

- Concrete 37%
- Thermal Insulation 6%
- Field joint coating 38%
- Internal Anticorrosion 10%
- External Anticorrosion 9%

Volume-wise, 2015 was a lean year for this industry – but those results look much less disappointing when assessed against a background of very challenging circumstances. In a paper presented at AMI’s Field Joint Coating 2015 conference, Noru Tsalic described the political and economic environment affecting oil and gas-related industries as “a perfect storm.”

As mentioned at the time, it is not unusual for these industries to face crises in some of the geographic areas in which they operate. In recent years, however, such adverse political and economic circumstances have piled up, affecting practically all regions that are relevant in terms of oil and gas supply and demand.

That’s not to say that pipeline building and pipe coating activities have completely frozen. To start with, numerous projects are still economically viable; others are too advanced to cancel or postpone. In certain countries (not in the least in China, Russia and the Middle East), such projects are not driven by purely financial considerations, but are part of longer-term policy and government-set strategies.

In addition, given their age and the fast progress of technology, some pipelines are in need of rehabilitation or replacement – for safety, rather than purely economic reasons. There is also an expanding share of non-oil and gas pipelines – in particular drinking water pipelines – which is already considerable in places like India, for example.

In addition to analysing the current level of demand, segmenting it by geography, application, on/offshore location, coating functionality (external anti-corrosion, internal by function, thermal insulation and concrete by function) and material, the steel pipe coating report focuses on forecasting demand to 2019.

Despite the “perfect storm” that recently affected it, the fundamentals remain positive for the pipe coating industry. The world’s demand for energy continues to grow; oil and gas continue to provide a large share of primary energy supply and the demand for these fossil fuels continues to grow, despite increasing adoption of renewable and other sources; in fact, countries will have to progressively switch from coal to the relatively less polluting oil and (especially) natural gas, if they are to fulfill their commitments in terms of reducing CO₂ emissions.

The global reserves of oil and gas are still far from exhaustion; carbon steel pipelines continue to be, in most cases, the state-of-the-art solution for cheap, safe and secure gathering, short/medium range transport and high pressure distribution of oil and gas; and functional coatings are increasingly deployed to serve those pipelines.

After analysing trends (including forecasts for the price of crude oil), the report concludes that demand for steel pipe coating should grow on average by circa 3% per annum between 2015-19. However, the growth is unevenly distributed across that time interval and also geographically and in terms of coating types and materials.

For more information on the study, contact Sarah Phillip at sjp@amiplastics.com.
Demand for Steel Pipe Nears 80 Million Metric Tons

Global demand for steel pipe is projected to advance 3.5% per annum through 2019 to 79.7 mmta, with growth paced by continued strong increases in developing markets.

The pace of gains will decelerate from that of the 2009-14 period as construction activity slows in China and other developing countries, and as oil and gas exploration moderates in North America after a period of rapid growth. These and other trends are presented in World Steel Pipe, a new study from Freedonia Group, a Cleveland, OH-based industry research firm.

The oil and gas market is the leading application for steel pipe, accounting for over half of demand in 2014. Steel makes up the vast majority of pipe used in oil and gas transportation and especially production due to its high strength and its pressure and thermal resistance.

Steel pipe used in equipment manufacturing is expected to see above average growth through 2019. Steel pipe also sees significant use in the construction market in a variety of applications, such as conduit, sewer and drainage.

China, by far the world’s largest national market with 28% of the global total in 2014, was a primary driver of growth in steel pipe demand between 2004 and 2014.

“Through the forecast period, advances in steel pipe demand in China are projected to decelerate significantly; nevertheless, growth will remain above the global average,” noted analyst Mariel Behnke.

In contrast to slowing growth in the Chinese market, demand for steel pipe in several other countries in Asia is projected to accelerate through 2019. India will see strong improvement in growth, driven by acceleration in construction spending and expansion in its manufacturing sector, while growth in demand in Indonesia will be supported by increased output in its manufacturing sector.

The North American market contracted between 2004 and 2009 due to economic recession, but saw robust 2009-14 growth, driven by a boom in demand for pipe for oil and gas production. Through 2019, demand in North America is projected to decelerate significantly, due to a slowdown in investment in the energy sector as plans for oil and gas production and exploration were scaled back following the collapse of oil prices that began in the second half of 2014. P&GJ

### World Steel Pipe Demand (thousand metric tons)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Steel Pipe Demand</td>
<td>52,777</td>
<td>67,140</td>
<td>79,650</td>
<td>4.9</td>
<td>3.5</td>
</tr>
<tr>
<td>North America</td>
<td>11,330</td>
<td>15,780</td>
<td>17,250</td>
<td>6.9</td>
<td>1.8</td>
</tr>
<tr>
<td>Western Europe</td>
<td>5,530</td>
<td>5,420</td>
<td>5,680</td>
<td>-0.4</td>
<td>0.9</td>
</tr>
<tr>
<td>Asia/Pacific</td>
<td>21,620</td>
<td>29,690</td>
<td>37,800</td>
<td>6.5</td>
<td>4.9</td>
</tr>
<tr>
<td>Central &amp; South America</td>
<td>3,430</td>
<td>3,700</td>
<td>4,080</td>
<td>1.5</td>
<td>2.0</td>
</tr>
<tr>
<td>Eastern Europe</td>
<td>6,030</td>
<td>6,320</td>
<td>7,380</td>
<td>0.9</td>
<td>3.1</td>
</tr>
<tr>
<td>Africa/Mideast</td>
<td>4,830</td>
<td>6,230</td>
<td>7,460</td>
<td>5.2</td>
<td>3.7</td>
</tr>
</tbody>
</table>

©2016 by The Freedonia Group, a division of MarketResearch.com, Inc.

Steel Tube Industry Continues Heading for Global Growth

Steel tubes are still a success story. Except for a downturn in 2009, global production figures have been pointing in one direction only – upward. According to the German Steel Tube Association (Wirtschaftsvereinigung Stahlrohre) in Düsseldorf, Germany, steel tube manufacturers increased their worldwide production by another 7% in 2014, reaching a record 166 million metric tons.

As in previous years, the increase was due, in particular, to higher production figures in China. In 2014 the People’s Republic achieved yet another above-average increase in steel production by 11.6%, reaching 89 million tons. In the same year, 54% – over half the world’s steel tubes – was produced in China. China is even more dominant when it comes to seamless hot-rolled steel tubes, where its share in global production has now reached two thirds.

In other parts of the world growth was 4% – 77 million tons – and thus considerably lower. In East Asia (excluding China) production remained more or less constant, at 2.2 million tons. Japan recorded 7.2 million tons and thus a 3% growth. The EU, too, experienced a slight production increase in 2014, after the previous year’s sharp downturn, though without achieving the record values of 2005-08.

Nevertheless, at 12.6 million, European steel tube manufacturers are still producing 4% more than in 2013.

The German steel tube market is buoyant again. A 4% production increase (2.7 million tons) was also recorded by the German steel tube industry in 2014. But 2013 was one of the weakest years for German manufacturers. The industry is still well off the record values of about 4 million tons produced in the period 2006-08. Not all industry segments benefited from the recovery.

Gains were made, above all, by welded steel pipe manufacturers, while seamless steel producers experienced a decline. According to the German Steel Tube Association, the poor results in this market segment were due to a substantial drop in crude oil prices, particularly during the second half.

The main reason for the rise in German production was an increase in domestic demand. Germany’s foreign trade surplus, on the other hand, experienced a decline, as exports dropped 12% to 2.4 million tons. At the same time imports went up 5%, reaching 1.9 million tons. This resulted in supplies for the German market rising to 2.2 million tons – up 18%.

In addition to this development in volumes, the development
of prices was equally important to manufacturers. After a general decline in the previous year, 2014 brought different results for different types of steel tubes. Whereas prices went up for large-diameter tubes, they went down for seamless tubes. For precision steel tubes, on the other hand, prices varied only very little.

Outside Western Europe

According to Salzgitter AG, 2014 was marked by rising energy requirements in the BRIC countries, the development of the United States toward self-sufficiency in oil and gas and, at the same time, a decline in energy demand in the industrial nations, caused by improvements in efficiency. These developments meant that growth opportunities for the tube industry largely shifted to regions outside Western Europe. Moreover, partly due to overcapacities on the steel tube market in 2014, several markets also saw stronger competition.

In its annual report Salzgitter broke down global production into products and manufacturing processes. It shows that seamless tube production increased globally by less than 6%, reaching 49 million tons, of which 32 million was produced in China. The production of welded steel tubes up to 406 mm (outer diameter) rose to 94 million tons – a segment where the Chinese share reached 50% for the first time.

By contrast, large-diameter tube production (i.e. above 406 mm outer diameter) stagnated globally at 22 million tons. Slight increases in the CIS, China and Japan were offset by a decline in production in the West. The downturn in large-diameter tubes was particularly noticeable in the United States – partly because U.S. production had been at such a high level in 2013.

Benteler International AG is another company whose 2014 annual report focuses on the background of developments on the steel tube market. The company found the year marked by crisis-induced downward movements in Brazil and Russia. The company observed a decline in drilling activities caused by falling oil prices and, as a result, a lowering of demand for pipes in oil and gas exploration. The big regional differences in the use of steel tubes were reflected in growth rates of 3-5% – and sometimes even higher – in Asia, Africa, the Middle East, Eastern Europe and Turkey, while the Western European market remained rather weak, with growth mainly below 2%.

North America continues to be an important market. According to Benteler, positive signals came from the important OCTG market in the U.S. Due to a considerable increase in oil exploration and production, the demand for tubes rose substantially from mid-2014 forward. U.S. anti-dumping measures against imports from various countries, particularly Asia, led to price increases by the second half of the year. Toward the end of the year, however, a major drop in oil prices began to cause a tangible reduction in demand.

In all, says André Sombecki, CEO of Benteler Steel/Tube, the steel tube market has evolved positively over the last few years: “The demand for tubes is rising, and the market is growing – especially in the United States and Asia. Europe recorded some slight growth and a high level of existing capacities. At the same time we can observe increasing competition from China, Russia and Eastern Europe.”

The U.S. is seen as an important growth market, which is underlined by the new hot rolling mill in Shreveport, LA. Sombecki said Benteler not only wants to demonstrate a close customer focus and a local approach, but it also wants to achieve a better long-term ability to serve markets in North and South America.

Statistics of customer industries of German steel tube manufacturers show that the energy sector is the biggest single area, with 40%. It is followed by automotive (about 20%) and mechanical engineering (15%). The energy sector is seen in the industry as the biggest growth engine and global market of the future. According to a forecast published by Benteler, production of shale oil is expected to rise over 100% in the period 2012-25. Production of liquid petroleum products and liquid gas is set to increase 100% in Latin America, 40% in North America and 35% in the Middle East.

Restrained Development

In 2015, however, the steel tube market did not confirm such forecasts. Overall, after the weakness of the first six months, this market continued to develop in a rather more restrained manner during the third quarter. This, at any rate, was the conclusion of Salzgitter AG. One major reason was apparently the crude oil prices which ultimately caved in again after a brief period of recovery. This led to weaknesses in vital exploration activities.

The impact could be felt by seamless steel tube manufacturers which had to cope, for instance, with up to 40 production slumps in North America. Substantial downturns were also recorded in the European Union, including Germany.

In all the other segments, by contrast, the economic performance was more positive. In welded steel tubes up to 406 mm (outer diameter) manufacturers achieved a slight increase in production output. Increases were also recorded for large-diameter pipelines (above 406 mm outer diameter), especially in North America, Russia and China. In the EU, on the other hand, production was only slightly higher than the very low level of the previous year. European manufacturers benefited when the suspension of the Black Sea Pipeline Project, Part One, was lifted – the former South Stream Pipeline, now TurkStream.

Yet, in all, the number of new and existing orders recorded by Salzgitter’s Energy Division – which handles its tube activities – was lower for the first three months of 2015 than for the same period a year earlier. As oil prices continued to be low, numerous gas and oil exploration projects were postponed or even abandoned throughout the world. Reduced demand coupled with newly created production capacities, particularly in Asia, led to greater price pressure and thus to a massive decline in revenue. This development also affected HFI and spiral-welded tubes, a segment which recorded a tangible downturn in existing and new orders in the first three quarters compared with the previous year.

After the continuing weakness of Europe’s large-diameter pipeline market had prolonged much of 2015, several facilities in Germany did show improvement in their employment situation. This was helped by the resumption of production for the Black Sea pipeline project, the order for the Trans-Adriatic Pipeline (TAP) and the ongoing positive situation in North America. The Salzgitter Group won the tender for 270 km of large-diameter pipes and 1,559 pipe bends for the TAP which will eventually transport natural gas from the Caspian Sea to Europe. Due to low oil prices, the company anticipates results below the level of 2014 for seamless stainless steel tubes.

No Crisis in Steel Tube Industry

“The steel industry is going through a global crisis, which even the German steel industry won’t be able to avoid,” stated Hans Jürgen Kerkhoff. But the President of the German Steel Tube Association also admitted that the “weak economic figures in the steel industry are in contrast with the prospects of its big customer industries.”

Apparently, a positive picture continues to emerge and inspire confidence – partly from performance indicators and thus a good mood in most customer industries, but partly also from the forecasts of the most important steel-processing companies. Certain signs of stabilization can be observed in mechanical engineering and construction. Kerkhoff added: “In the steel tube segments stimuli should mainly be coming from large-diameter pipes.” In total, production in the processing industry is expected to increase somewhat, while the need for steel will move slightly sideways.