

Facing the challenges with BSE

Impacts and strategies out of the financial crisis for the steel industry

All of us had to realize just recently that we as steel makers are acting in a business environment which is extremely depending on the economic cycle. This is not really new, but probably the past five booming years have not really made it conscious.

BEFORE THE CRISIS

Exaggerating and compared to the present situation, we may say that we were doing our jobs in a kind of economical paradise before autumn 2008, in which it was more important to produce and sell as much steel as possible than to look at low cost. Of course, the raw material market was extremely volatile (and such was the product market). Of course, high efficiency and low cost were maximizing the output and profit and of course, safety and environmental protection have been major concerns. However, we could not produce as much as we could sell.

CHALLENGES TODAY

Today the situation looks different. The down-turn is not caused by the typical economic cycle but by the financial crisis. The demand for our products has been very weak. Our industry must be described by huge overcapacities compared with present demand. The raw material price did not decrease at the same proportion as the product prices did, which is shown in figures 1 and 2 for rebar and scrap as an example. We also have to realize that this crisis is not cost but volume driven. Since the profit is in a simple way "price x volume – cost" cost management is essential but not the only lever:

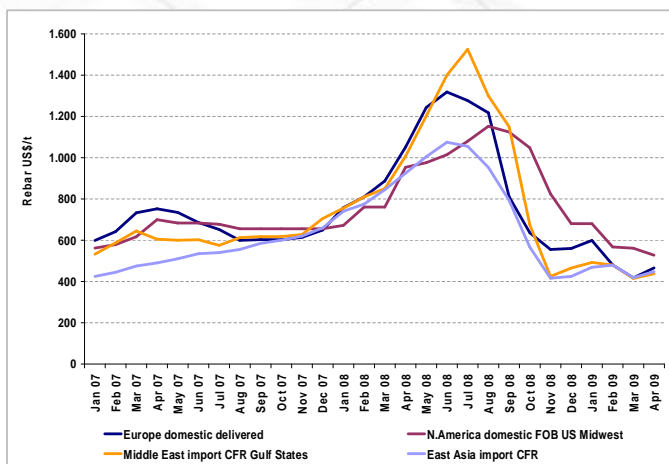


Figure 1: Rebar prices (source: SBB)

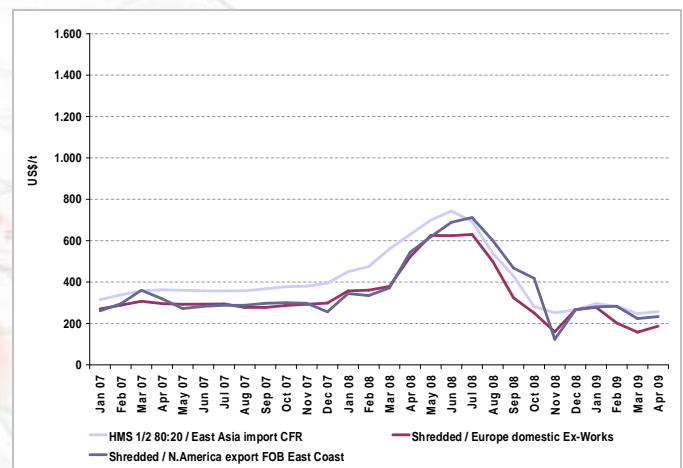


Figure 2: Scrap prices (source: SBB)

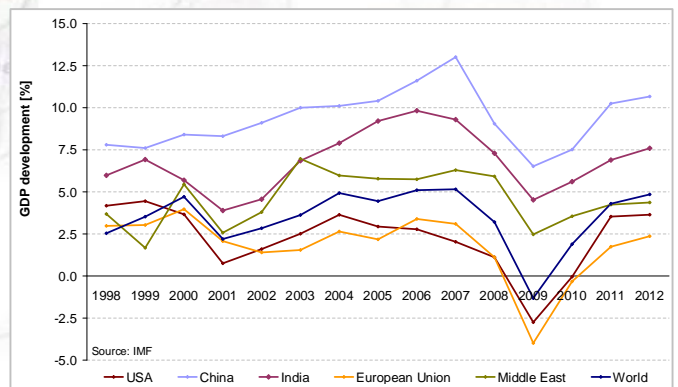


Figure 3: GDP development (source: IMF)

At the beginning of the crisis full stock levels had increased the uncertainty of the evaluation of the situation. However, our margins are eaten up and most of us are facing losses presently. The products are not in demand, resulting in a severe reduction of crude steel output to balance supply and demand and avoid an even more significant drop in sales prices. And this crisis does not only affect the steel industry but already led to a global negative growth of GDP.

Even though there are some recent signs of having reached the bottom in some areas of the world, particularly in Asia, we predict an ongoing difficult year 2009 for our industry.

Most of the governmental stimulus packages focus on infrastructure projects which should have a positive effect on steel demand. In spite of that the year 2010 will most probably not show the same GDP growth as we have seen in the past booming years.

For all these reasons the focus of steelmakers has shifted from output-oriented to cost-oriented to remain competitive. Priorities and actions are certainly very different in the two cases. What would make sense under the aspect of output maximizing might be completely wrong when looking at it under the viewpoint of cost reduction. And if there is one positive aspect created by the crisis, it might be that some working time is presently available to prepare the future after the crisis.

BSE approach

BSE as a whole was mainly recognized for productivity increase with the target to increase annual output and thus optimize the profit of its customers. This was valid for our two fields of activity, Consulting and Technical Services. Nevertheless, based on our Best Practice investigations and on our own operations at BSW we developed already from 2005 on sensitivity for cost management and smart investment.

COST CUTTING VERSUS INTELLIGENT COST MANAGEMENT

Our consulting team is perfectly aware of the fact that not only the target of cooperation has been changed; there are some additional factors to be considered. Under present market conditions the experts of our customers together with ours have to deliver results very quickly. Thus we focus on the main levers in an intense but short analysis phase. For being efficient we start to look at the cost structure of rolled products which are typically the iron sources (such as scrap, Hot Metal, DRI etc.), the cost for alloys, yield losses, overheads and conversion cost. All of these cost factors have to be considered against the background of low total cost of rolled product. The analysis is directly followed by implementation of actions and followed by regular checks for further success.

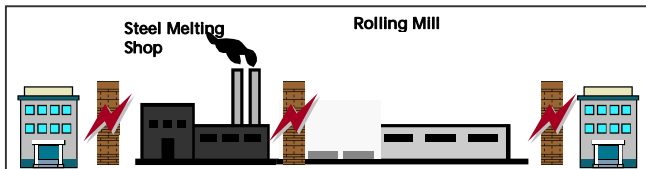


Figure 4: Departmental walls in a company

The issue is that the **complexity of steel making** with respect to cost savings is very often underestimated. Decisions about savings in one area can result in higher cost in another area so that in the end the overall cost is higher than before. In order to reduce cost of final product a deep knowledge of these interdepend-

encies is absolutely required. The operational background of BSW, the data base of BSE and our long experience in consulting are only three reasons out of many why we know these interdependencies and can quantify them. They also enable us to find the "quick wins" in the cost structure of a steel plant fast. We are furthermore in the position to implement the defined actions more or less immediately as long as no investments or people development are involved. In our experience there are very often opportunities for cost reduction just by changing the process for instance. And all that to be done in a close cooperation with the management team of our customers.

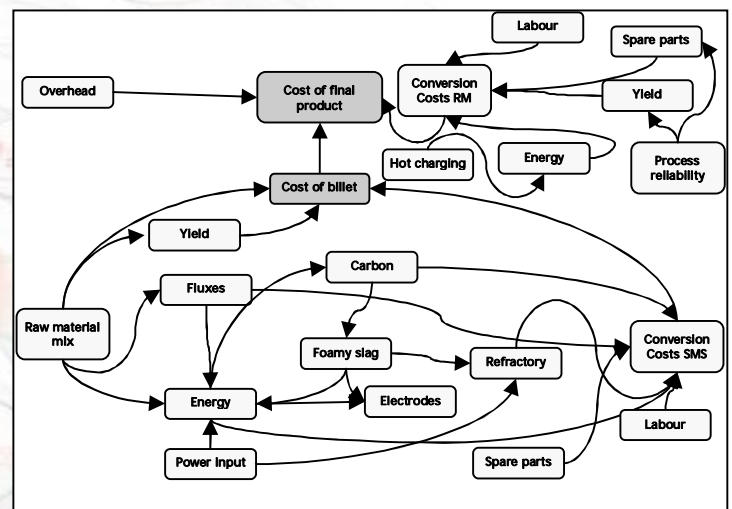


Figure 5: Complexity of process and cost (simplified)

A steel making **organization** is typically relatively large and conservative. It is BSE's long experience that the persons in an organization are usually making the difference no matter whether they work in operations, maintenance, quality control, purchasing sales or elsewhere. Consequently their mindset has to change from output-oriented to cost driven, and this not only in all departments but with at least a huge mutual understanding or better in a focused joined team across departmental walls. Very often there is a huge potential in the interface which we realize by breaking down these walls. This is what we entertain within a consulting project not only by working closely with the experts of our customers in an expert-to-expert way, but also by creating and facilitating interdisciplinary teams of key persons of our customers and our consultants. By doing so, we link cost and process with each other and quick wins can be seen in many fields:

It might also be worth to consider even under given market constraints the possibility of increasing productivity in one plant or at one production line in order to close another one and consequently save fixed cost.

As **iron sources** are the major cost factors for steel makers we need to look at them as well. Under given circumstances it may make sense to compromise on

scrap, Hot Metal or DRI prices and quality accepting an increase in consumption figures in the steel making process. But the higher cost created by worse melting, casting and also rolling performances may not consume all the cost advantage coming from cheaper raw material. As the production volume is presently not required, cost savings in that approach can be huge.

With our operational experience we are also in the position to balance low price raw materials, additives and **consumables** with their impact on operational performance figures and thus specific product cost. Under the view of strict cost control it might be useful to buy low price electrodes and refractory which on the other hand fulfill certain quality standards so that their cost performance is optimized. Or the other way round: To accept more expensive purchasing prices for materials of a higher quality, but reduce consumption figures in order to reduce overall costs. The wisdom must be seen in the knowledge of which material to choose.

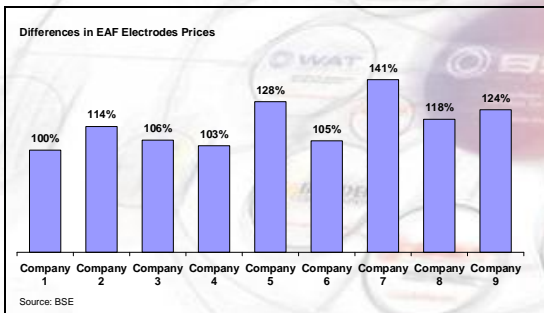


Figure 6: Differences in EAF electrode prices (different diameters and qualities)

In many steel plants, some of the **maintenance** activities are outsourced. Reducing these activities in a wise way is another issue worth considering, particularly nowadays as the plants are not operating around the clock and as there is more time available for maintenance. At BSW we started some years ago a maintenance cost management (MCM) program in order to save at least 15 % in maintenance cost.

The **energy** density in an EAF is certainly different if seen under the assumption of maximizing output than with regard to cost optimization. Maximizing the energy density which made sense under output optimization needs to be re-thought now with the aim to reach savings in overall energy-, electrode- and refractory consumption and in metallic yield. An EAF must certainly be operated in a more smooth way nowadays than in the "good old times".

During times of normal plant utilization the total costs for a finished product are mainly driven by the volatility of raw materials (scrap, ferro-alloys). **Labor costs** and **other capacity related fixed costs** represent only a smaller portion of the total costs. In times of crisis like today this picture changes: Scrap and ferro-alloy

prices dropped and so did plant utilization. This has a tremendous impact on the overall cost structure.

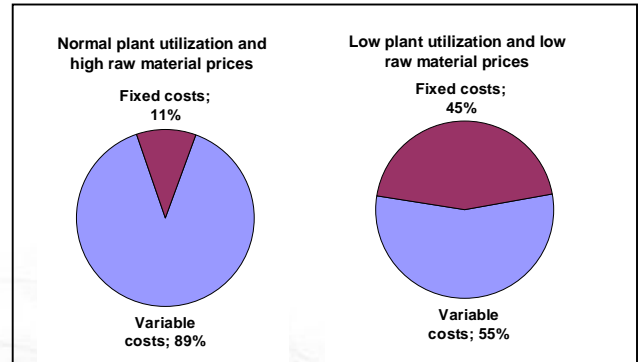


Figure 7: Cost structure

The relative percentage of product related (variable) costs decreases, while capacity related costs increase. Therefore it is also essential to analyze labor costs and the overhead structure. Nevertheless it is important to do this in an intelligent way. In some countries it is possible to introduce short time work, while the government pays a certain percentage of the salaries and wages. This enables companies to reduce their labor costs without laying off people permanently. Therefore a loss of knowledge can be avoided and it is easier to react quickly, if the market recovers. Unfortunately in some cases this option is not given and the company is forced to lay off people. Hence it is important to analyze the working places and define the minimum manning level, which is required to operate the plant successfully. It becomes obvious, that again the combination of detailed process know-how and understanding of costs is a critical factor for success.

Also the **market and the product portfolio** must not be neglected. The produced steel grades and the different forms of the finished product (e.g. dimensions, shapes...) have a big impact on the cost structure of a company. It is therefore absolutely crucial to have a clear picture about the product cost and the profitability of the different products, customers or markets. In bad economic times like today it is even more important to have reliable cost information for correct decision making. Nevertheless low data quality and wrong calculation methodologies can still be found in many companies. Of course this is critical for a company. Nowadays sales people have to fight hard for every single order; hence they must be able to decide whether to accept an order at a certain price level or not. Due to 'blurred' cost and profitability information sales people may make wrong decisions, which result in a lower profitability or even in a cash loss. So even in times of crisis a re-adjustment of the product and customer portfolio and a proper pricing are important. The company must be able to figure out the impact of each order on the break-even situation, and even more important on the cash situation. In order to see the com-

plete picture a joint teamwork of sales, production, purchasing and accounting is required in order to make a correct analysis and determine the best way for the company.

BSE consulting project practice

How do we execute such a project? In order to create quick results we send a small team of experts to the customer for a short fact finding visit in which we define the goal of the cooperation and start to get a deeper understanding of the business and internal situation. We will roughly analyze the important key figures and estimate cost saving potentials. The understanding of the customer situation results in a definition which BSE experts are to be involved in the further progress of the project as well as in a streamlined program. All that will be done in a close interaction and communication with the management of our customers.

In the next phase we will be present at the customer's site performing a complete survey for about one week with our complete team of experts to precise the database and observe manufacturing and also business processes. In order to utilize the creativity of our customers and combine it with our expertise we will also facilitate idea workshops on specific topics. Together with the acting persons of our customers we will develop a concept on how to verify quickly cost saving potentials. For that purpose we will employ different methods such as positioning cost and consumption figures (against the industry) in our "real world" best practice data base, looking at the energy and mass balance of the production unit and determination of main cost drivers.

In the same period we already start to do implementation work. This can mean that we execute trials with different scrap mixes, with different power profiles or changing other operational processes. The outcome of the trials might lead to an adjustment of the implementation road map which we define in a mutual workshop between the customers and our experts.

We also agree with our customers upon some "homework" and priorities for the next weeks in which we won't be present but always are available by either phone, or e-mail or other communication tools.

In order to entertain the sustainability of the implementation we will ask for a regular status report, do conference calls periodically and also check-ups with presence of our experts at site.

SMART INVESTMENT BY BSE REVAMPING

As mentioned before, one top priority of EAF steelmakers today is to maintain their cash. Entrepreneurial vision of building complete new turnkey plants is certainly on hold. Nevertheless the existing equipment

has to be maintained or replaced to keep the investment under control. Experiences from former crisis show that a certain level of investment is essential. Today the target is to make existing operations more efficient at optimized investments.

The BSE approach for equipment revamp is based on a step-by-step analysis within a holistic approach: Investment versus benefits and versus operational costs. Thus, the best technical solution may not be necessarily the ultimate solution. A view into the future with our customers and their mid- and long-term production targets is considered when elaborating a conceptual engineering. This concept includes also the feasibility of re-using existing equipment, or upgrades.

BSE EAF/LF revamping

The preparation of a BSE revamp project is very intensive and is based on an analysis of the existing equipment and customer's situation. We distinguish in equipment to be replaced, modified or just taken over in order to balance the investment cost with expected operating cost. One of our major tasks is to involve key persons of our customers in the elaboration of the conceptual engineering and work in a close team. Following this approach we have done many revamp projects; and all of them "in time, in budget and in expected performances", just to quote one of our customers.



**Figure 8: Example:
Before and after EAF
Revamping**

Considering our own production site at BSW a continuous improvement process can be seen which is linked with continuous and manageable investments. As an example the basic layout of our plant goes back to the 60s with an original tapping weight of 50 t and a production volume of 200.000 tpy. Today we reached 2.2 Mio tpy in 2008 with 95 t tapping weight.

We are looking back on more than 40 years experience in a step to step investment strategy in practice as well as many EAF/LF revamps world-wide at our customers.

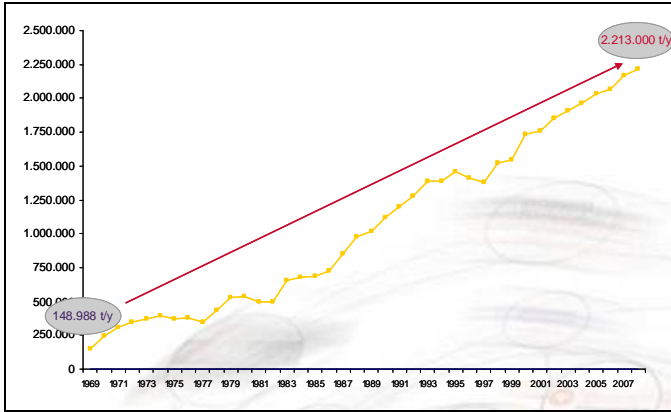


Figure 9: Production development BSW 1968 - 2008

BSE off-gas revamping

One of the major advantages of EAF steel making versus integrated steel making is its **flexibility**. Not only can an EAF be shut off and restarted at any time, but also can the raw material mix be changed according to availability and - today more important - to price and overall manufacturing cost.

Thus, some mini mills consist today of mini blast furnaces delivering Hot Metal to the EAF. Hot Metal is charged into the process with its sensible heat and its chemical energy potential basically due to high carbon content. As this carbon needs to be oxidized within the EAF more off-gas volume is generated, which needs to be tackled by an upgraded off-gas system.

On the other hand, off-gas systems have to deliver compliance with **official emission limits and other legal regulations**. In many regions these regulations are becoming stricter as the awareness and sensitivity of environmental protection has generally become stronger. As an example the development of the emissions of Dioxins and Furans for BSE is shown in the graph below

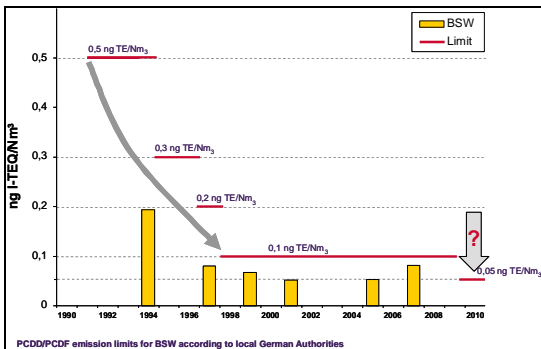


Figure 10: Development of emission levels of Dioxins and Furans at BSW

Beside the furnace revamp we are following the same philosophy of smart investment in the off-gas area. The off-gas system in a steel plant is usually generically grown. This means extensions were made on an existing design with not enough attention to details. You will find in most of the plants complex designs with low efficiency. Our approach focuses on the re-use of most of the existing core components like fans, filters, stack and the redesign of the entire system with better performances.

The cost saving potential is immense regarding existing dedusting systems. Why? Because most of them are not optimized on either reaching not the desired capacity or simply using too much energy for too little suction capacity.

Especially today, saving operating cost is the focus: Guaranteeing technically compliance with the needed suction capacity but operate them on much less operating costs – with the side effect to comply with strict legal regulation.

How does it look like in practice?

A tremendous **reduction of operating cost** at the same exhaust capacity and with decent investment can be achieved by a replacement of the technology. An encouraging ROI with improvement in Environmental Issues can be achieved.

An **upgrade of the dedusting system** as a reaction/necessity to reach a higher exhaust capacity (e.g. due to technology change (hot metal), productivity increase over the years, more strict environmental regulation ...) – see below two charts as an example:

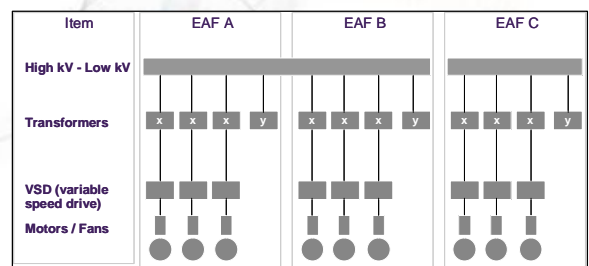


Figure 11: Arrangement before revamping

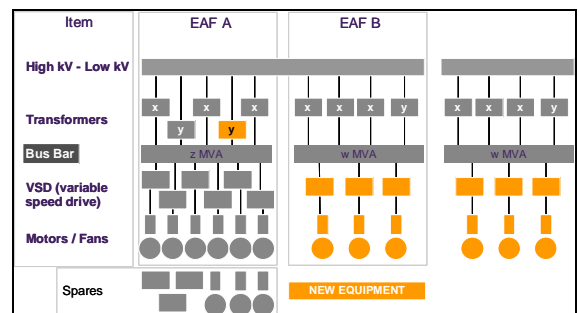


Figure 12: After revamping

Changes and up-grades of the emission control system usually mean quite some investment. But not only the investment means spending money also the operation of it creates operating cost. The main variable cost factor is the electrical energy consumption which can easily reach ranges from 20 kWh/t up to 50 kWh/t. Consequently, optimization in operational cost of the dedusting system can have a fundamental impact on the overall performance of a steel plant. We therefore look at the specific cost per m³ and the specific flow rate per kWh. "Cost" means the total operational cost of the off-gas system, which are mainly cost for electrical energy to operate the main fans, supply compressed air, maintenance and wear parts.

The figure below gives some examples of BSE installations with their achieved improvements and key figures. In this example some parts of the emission control system have been replaced by new equipment and others have been revamped. Their performances are both indicated in the diagram.

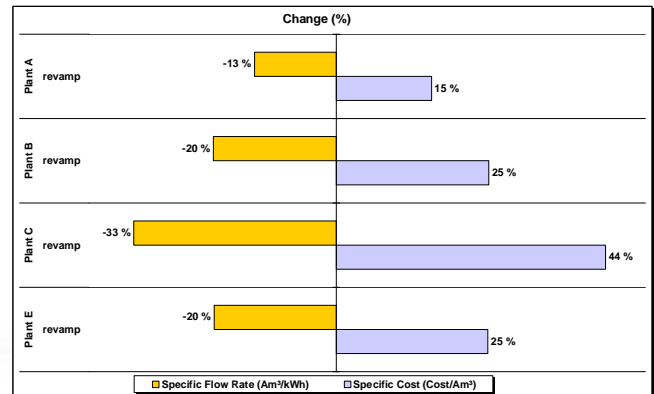


Figure 13: Customer examples

It is obvious that higher flow rates (as the main performance indicator for an emission control system) could be reached at lower operating cost compared to the former equipment. So even in times of economic crisis it can be worthwhile to invest, not only to prepare the company for the economical recovery but also to reduce operational costs. Moreover many governments offer subsidized funding for such projects, which is also a nice side-effect. The crucial factor is to identify the right potentials, elaborate a tailor-made revamping program and execute it in a highly efficient way.

LESSONS LEARNED

The economic crisis has heavily affected the global steel industry. Every steel maker follows now a tight cash and cost management in order to survive these days. Nevertheless it is important to carry out an intelligent cost management, instead of general cost cutting. This approach involves the entire organization and should consider all cost factors from material supply to the finished products. It is essential to have a deep process and cost understanding, in order to influence the cost drivers successfully. Furthermore internal barriers ("departmental walls") need to be broken down, in order to fully realize the given potential. Of course BSE can assist in such an approach with detailed process know-how and a deep understanding of costs.

Despite the given poor economical situation, successful companies also look into the future. Of course cash and cost management is crucial for surviving, but excellent companies also prepare themselves for the market recovery, while the crisis lasts. Hence a focused, prioritized and well elaborated investment plan is required. Instead of building a complete new plant or buying brand new equipment, the focus should be on targeted revamping projects. The goal is to optimize the operational performance, while spending only the least necessary money. In order to do so a detailed analysis is required in order to figure out which parts of the equipment need to be replaced and which parts could be kept. It's important to keep also mid and long term goals of the company in mind. By doing so, very successful investment projects with a quick payback time can be carried out even in times of crisis. Smart investments require a smart partner with a long experience in successful revamping – BSE and BSW have a long track record in that area.

In conclusion a successful crisis management considers several aspects: Cash management, costs and revenue management, as well as smart investments into the future. There are already some positive signs on the horizon, but of course nobody can predict when the steel demand fully returns. But for sure it will return and successful companies will be prepared and will be even more competitive after the crisis than before.

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