ŠTOREQSTEEL

Internal information magazine, nr. 2 - 10

Our goals for the year 2011 and ahead

After a catastrophic year 2009 and stabilization in the year 2010 we have defined a goal that the volume of our sale of steel will increase from 128.000 tons in this year to 155,000 tons in the year 2011.

Picture above: after the flood - Marjan Mačkošek and Bojan Strašek, director of Petrol Energetika - PE Štore, during a consultation with the fire brigade leadership;

This can be possible due to a level of actual market demand and our new equipment resulting from an intensive investing in recent years. For investments has been within last ten years spent a value of 67 million of EUR and it is expected that within next five years there will be invested into modernization from 5 to 7 million EUR per year.

Our target market is industry of cars and commercial vehicles in Europe where we are an important producer of steel for flat springs, steel for forging and other engineering types of steels.

By increasing of sale - having an average growth of 10% per year, we will in next five years follow plans and needs of our business partners. With our developmental work we will improve required properties of material and develop new types of steel.

And at the same time we plan to accelerate also offer of some machine services with the aim to widen our offer of additional treatments made on material.

Marjan Mačkošek,
Managing director

Cover photo: renovated office building of company Štore Steel

Petrol Energetika - a complete energy supply

We are present in rounded economic zones (REZ) of towns Ravne and Štore as a supplier of all types of energy products and a system operator of all distribution networks.

In municipalities Ravne na Koroškem, Prevalje, Mežica, Dravograd, Muta and Hrastnik we act as a system operator of distribution networks for natural gas and home heating energy. In wider Slovenian region we are authorized for managing of energetic infrastructure in so called TPF (Third Party Financing) projects (boiler houses at Begunje Brežice, Murska Sobota, cogeneration Martex in Nova Gorica, cogeneration Unior Zreče and trigeneration Tehnološki park Ljubljana).

As part of a company Petrol Group we are a leading Slovenian provider of integrated energy and environmental solutions. Organized as a modern integrated energy company we are able to offer to all the existing and new customers a competitive supply of electricity, natural gas and other energy media. In addition to energy production and distribution we also trade with energy products, carry out investments in the field of industrial and communal energy, prepare projects and perform technical support on increasing of energy efficiency and in this way assure the customers a complete supply of energy and environmental services.

At REZ Štore we provide our customers with a complete supply of electricity, natural gas, compressed air, potable water, hydrant and industrial water. We also take care about preparing, cleaning and cooling of industrial water and execute maintenance of medium and high voltage electricity distribution network. In the name of a company Petrol Plin d. o. o. we also perform managing of storage of liquefied petroleum gas. The Štore business unit provides its services with its own facilities and distribution network having at the moment 34 employees.

Our largest partner in the REZ Štore area is company Štore Steel d.o.o. Market needs dictate daily adjustment to customers what requires constant investments into systems for ensuring of a reliable and qualitative supply of customers. Based on strategy for development of the REZ Štore electro-energetic system and a breakdown of the TR 1 transformer at Lipa transformer station were in the year 2007 created all project documents necessary for purchase and installation of a new TR1 transformer what resulted in this year's building-in of TR RT 40 MVA 110/36, 75 kV transformer. Together with this installation has been there also assured a parallel operation of transformers and a remote monitoring and managing of systems at Lipa transformer station.

Picture above: the liquid petroleum gas decanting station;

Modernizing of the Rolling mill has dictated also making of a long-term contract on implementation and managing of systems of cleaning of industrial water needed at operation of the new rolling line. Thus has company Petrol Energetika d. o. o. decided to take over building and managing of systems for cleaning of industrial water and dehydration of sludge.

Together with company Petrol Plin d. o. o. we intend to complete in this year also modernization of our liquefied petroleum gas decanting station which is said to be - after its renovation - the most modern one in Slovenia.

The upgrades of systems have been concluded with establishing of a central control system for control and managing of all appliances. Our further development is focused on customers' needs, real-time remote data capture and automation of systems.

The latter is crucial for optimizing of performance and providing of a reliable and qualitative supply of a customer. To reach a greater transparency of our business we intend to establish in the year 2011 an intranet portal where all customers on the REZ Štore will have an opportunity to follow all actual information about all events concerning the zone.

The portal will first of all enable an insight into a stock list of purchased energy products and a possibility for people to give their own information referring to the zone's matters.

Among our bigger future projects can be ranged a renewal of juncture at the central transformer station, a renovation of circular cable lines, automation of decarbonization (water treatment) and a renewal of industrial water pipelines.

We will continue our good practice of regular meetings of experts from both companies assuring in this way a prompt solving of all current issues and planning of further actions.

In this year have been to our numerous previous business awards added also The Slovenian Chamber of Commerce award for outstanding business and entrepreneurial achievements in the year 2009 and a winning title The client-friendly energy supplier in the field of natural gas in the year 2010.

Also in the future we will try to act towards a responsive and a customer-friendly company and in this way justify confidence of our customers.

Bojan Strašek,
Director of Business Unit Štore

Picture above: a system for sludge dehydration;

Developmental and research projects

One of main strategic goals of company Štore Steel is to remain a leading manufacturer of flat spring steel in Europe. Into this goal is focused a majority of developmental and research work which is carried out by our technical development department and in a cooperation with Štore Steel research group and some external R & D organizations.

Within a group of the Štore Steel research team and the technical development department, which is one of the most successful Slovenian industrial research groups, are active 22 researchers.

Among external research organizations experiencing an intensive work together for many years must be mentioned IMT (Institute of Metals and Technology) in Ljubljana, Laboratory for multiphase processes at Nova Gorica University, Department of materials and metallurgy at the Faculty of natural sciences at University of Ljubljana, International postgraduate school of Jožef Stefan, Faculty of mechanical engineering at University of Maribor and Institute Jožef Stefan.

When dealing with some individual projects we also cooperate with many other industrial partners and research organizations from Slovenia and also from abroad (e.g. Leoben University from Austria).

The majority of the research work is funded by our company, but at some projects we have succeeded in obtaining of a co-financing by the Public Research Agency of Republic of Slovenia (ARRS) which supports our developmental work at projects called Physics and Chemistry of border areas of nanostructured metallic materials and Simulation and optimization of processes of casting, rolling and heat treatment for a competitive production of top quality steel.

This agency also co-funded a three-year project called Modeling of fatigue strength of spring steel and life prediction of leaf springs which ended this year. The project was regulated by IMT Ljubljana. Results of the survey were also published and we used them at some changes of technology at production of spring steel.

The project operator of the Physics and chemistry of border areas of nanostructured metallic materials project is also IMT Ljubljana. Within the project we have studied the ultra-thin and thin polymer- ITO and SiOx layers applied to a variety of substrates (glass, steel). The results achieved are published in three articles of different scientific journals in the first quartile.

Picture above: casting of molten steel;

The project Simulation and optimization of processes of casting, rolling and heat treatment for a competitive production of top quality steel is our the largest research project. The project is led by the Laboratory for Multiphase Processes, University of Nova Gorica. In this project take part beside our research group also participants from IMT Ljubljana and Inštitut Jožef Stefan. This three-year project represents a continuation of - in this year ending – also a three-year project called Simulation of microstructure for a continuous casting of top quality steel, results of which have enabled an automation of casting of steel based on a model of solidification of steel.The project aim is to establish a system that shall allow a "smart production".

The system will be based on time-related models (physically reasonable computer models and models developed on base of artificial intelligence) that are directly involved in an automation of a process. The project results will enhance competitiveness of Štore Steel and will later help at the company's transformation from a raw material-intensive industry to an industry based on knowledge.

In cooperation with IMT is being conducted also a project called Impact of segregation on a fracture toughness of spring steel 51CrV4. We have produced some test heats and on base of so obtained samples has IMT made some specific diagrams which allow to our customers an optimizing of their heat treatment. During the course of the project will be there created a system for identifying of positive and negative segregations and checked their effect on fracture toughness, which is important for development of steel for high strength springs.

In cooperation with the Faculty of Mechanical Engineering from University of Maribor is being carried out a project called An analysis of fracture behavior of different high strength types of spring steel. The aim of the project is to determine all basic parameters of microstructure of steel which define a fracture behavior of 51CrMoV4 spring steel being exposed to a dynamic and ultimate load.

On base of results achieved will be there quantitatively and qualitatively possible to determine an impact of size and type of an inclusion to a dynamic and ultimate load of a spring. There have been done some experimental measurements on base of a stereometric monitoring of deformation situation at a point of cracks. The findings have already been used at a modified production technology for production of high-strength types of spring steel.

In the project called Optimization and development of the Steel plant technological process – production of Si-killed spring steel, being executed by the Štore Steel research group, we took into account results of projects carried out by external research organizations. We have changed our production technology for spring steel. The new technology has enabled an extension of life of springs made from our steel by more than two-times. This was confirmed by results achieved at fatigue strength tests.

Besides our research work on field of spring steel we are also occupied with work on development of steel for forging and with other engineering types of steel. In this context we would like to mention a project called Optimization and development of a technological process in the Steel plant – modification of non-metallic inclusions in steel C45, implemented by our research team independently.

All these projects represent only a part of development and research work undertaken by members of our research group together with many of our employees. A successful cooperation with external research organizations will enable the company Štore Steel to establish a long-term stable and a cost-effective production of top quality steel intended mainly for automotive industry.

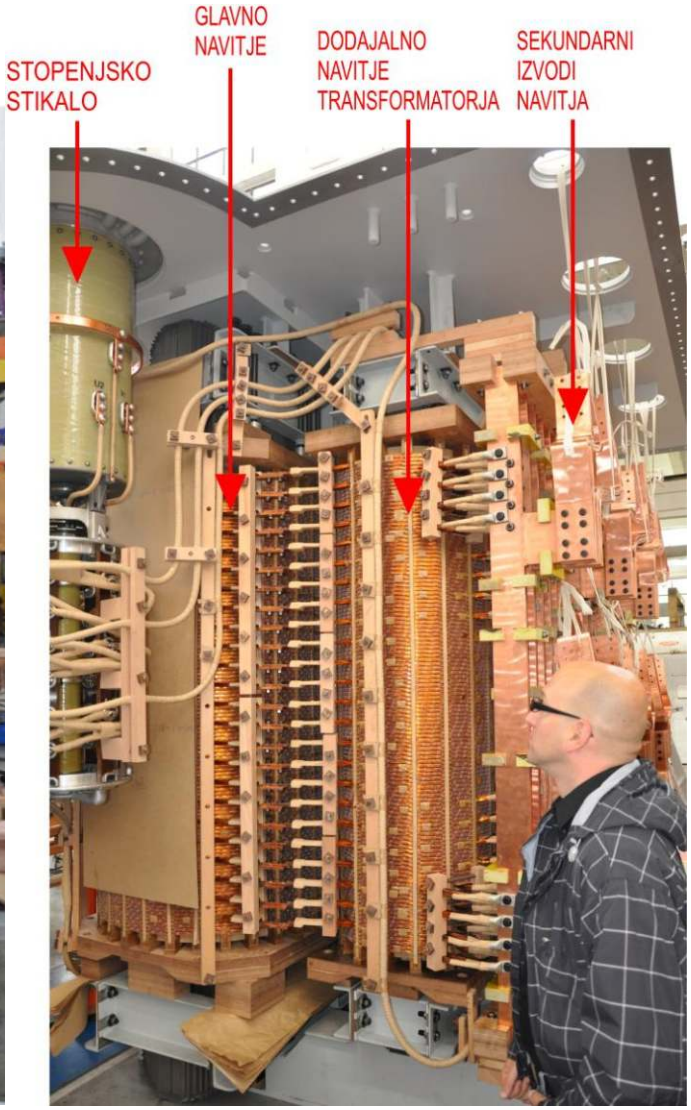
Bojan Senčič
Assistant MD

Picture above: movement of a rolled piece through rolling stands;

A new transformer for operating of our EAF

In the year 2007 started the first activities of management of company Štore Steel about purchasing of a new furnace transformer. Considering all our up to that known experiences with furnace transformers as well as modern trends of development of special products – what a furnace transformer undoubtedly is – we defined certain basic characteristics of the product and in May 2008 was there selected also the transformer's supplier – a company Kolektor Etra from Ljubljana.

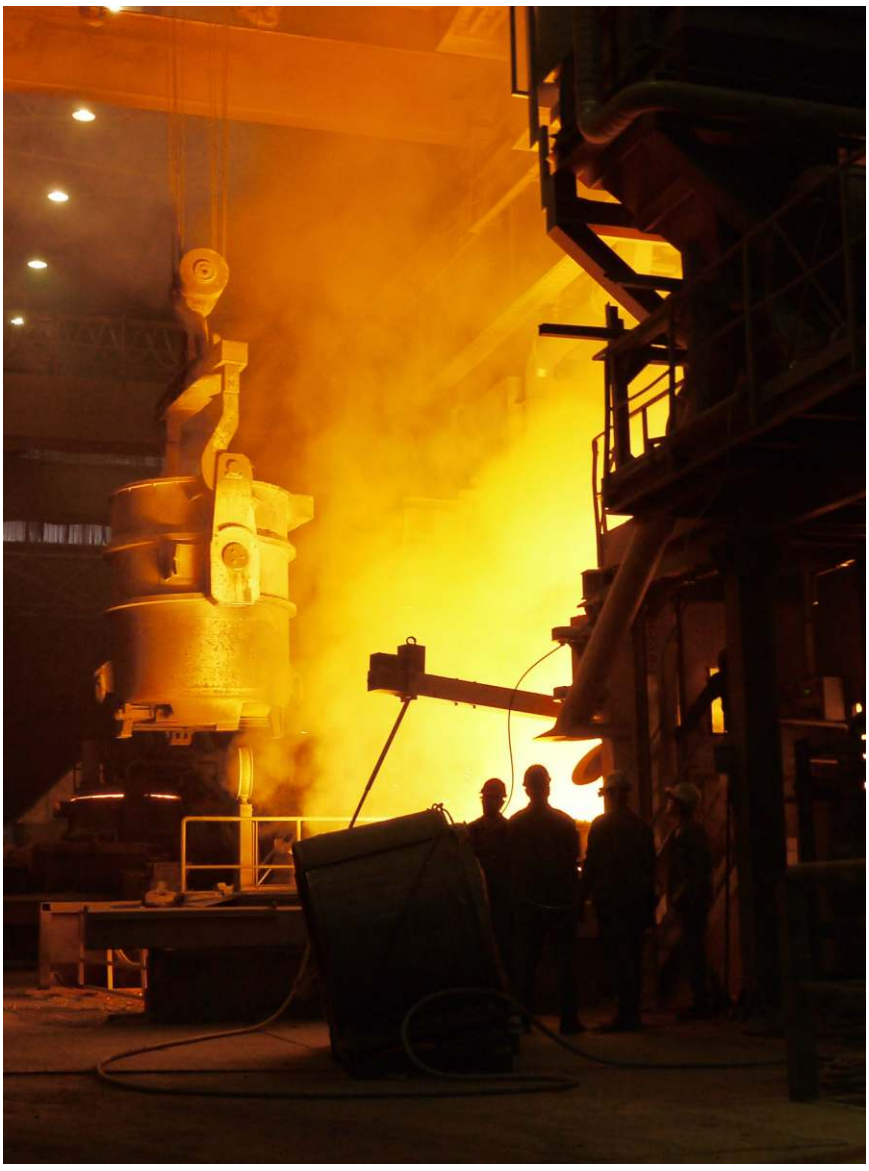
Together with signing of the contracts were there given to the supplier also all basic data about the future transformer needed for preparing of calculations and projects which were finished in December 2008.
In the first quarter of 2009 they already prepared a complete documentation which was sent to us into checking and technical coordination especially in terms of our confirmation of external dimensions and weight of the new transformer.
In September 2009 were there produced high voltage and low voltage windings and also installed on the main and on the secondary core of the transformer (see the picture on the left). In November 2009 was assembled and ready for the first tests the active part of the transformer (see the picture on the right).



In mid-December 2009 was the transformer completed, put into a boiler, filled with oil and transported to the producer's laboratory for high-voltage tests. All transformer's tests have been passed successfully. In this way was it ready for building-in and start of operating in March 2010.

It was agreed that the furnace transformer Totom - L 40MVA made by company ABB would be replaced by the new OT 64000 64MVA Kolektor Etra transformer during our annual repair and maintenance in the Steelworks. Immediately after a switching off and dismantling of the ABB furnace transformer was made we started with preparing of a place for the new, the heavier transformer (changing of sheets in rails, upgraded cooling system). Changed or upgraded was a control program together with its security features, modified logic of control of single-step switches and look of HMI interface. There was also made setting up and re-testing of the primary and secondary FPC 520 protective device. At the Steelworks II/1 transformer station was there mounted on a new vacuum switch. And the last change, done before installation and bringing into power of the new transformer, was setting up of an electrode regulation.
The first activation of the transformer into an idle mode was successfully done on August 4. 2010 at 12.45 pm and at 2.00 pm on the same day it was also for the first time burdened with a load – melting of steel.
The transformer has been since its operation beginning working under its firstly defined values of current flows, what is a good confirmation of calculations of static characteristics of operational diagrams made at planning of the transformer's features. The data recorded in the table below (data are taken from daily reports of the Steelworks in the period from January to July 2010 for the ABB transformer and from August to November 2010 for ETRA transformer):

	Apparent power S(MVA)	Active power P(MW)	Voltage of melting U(V)	Current of melting I(kA)	Energy of melting W(kWh/ton)	T-T time per heat t(min)
ABB Totom-L 40MVA	~35	~25	520	34	529	115,34
ETRA OT 64000 64MVA	~35	~29	580	34	546	111,68
Difference ABB - ETRA	No difference	+ 4MW	+ 60V	No difference	- 17kWh/ton	+ 3,66 min



Due to a higher voltage available on the arc (+60V) can be at the same value of secondary current on the arc developed (+4MW) higher power that is available for conversion into heat and thus for melting of scrap and heating of molten steel. This results in an average time saving of (+3.66 min / heat) what means that during the same period can be produced more than it was possible with previous ABB transformer.
Process of melting and heating of melt in the electric arc furnace depends not only on a volume of electricity input but also on natural gas and oxygen input. As time for melting and heating of a heat has been reduced – has been there reduced also intake of natural gas and oxygen - what results in an increased share of electricity used (-17kWh / ton).
At the moment operates the OT64000 furnace transformer with approximately half of its power due to some limitations on the Lipa 110/35kV power system and the 35kV distribution network that feeds the transformer.
In case that there will increase the need for production of billets in the Steelworks in the future it will be possible – with an optimal choice of output voltages and currents for melting and refining together with modified - optimized settings of burners and lances – to achieve a further reduction of melting time respectively an increase of production volume of the electric arc furnace.

Klemen Stopar
Technical Head of Operations

Picture above: casting of molten steel;

Testing of new sizes on the new rolling line

Company Štore Steel is known for diversity of its production program which is fully adapted to customers' requirements. Today our Rolling mill produces approximately 50 different dimensions of round profiles, approximately 300 different sizes and shapes of flat profiles, 10 different profiles of squares and occasionally also certain types of special profiles.

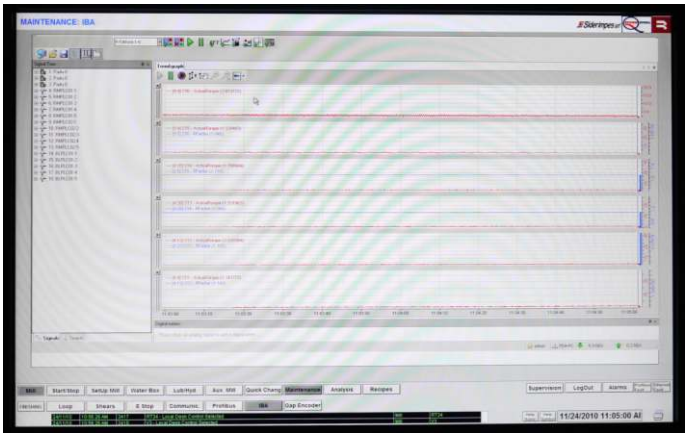
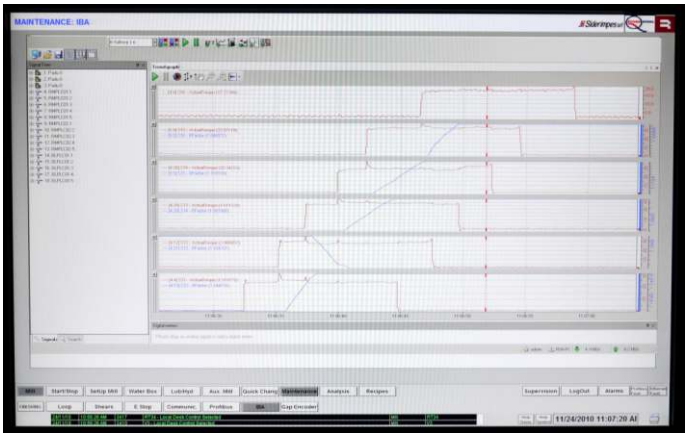
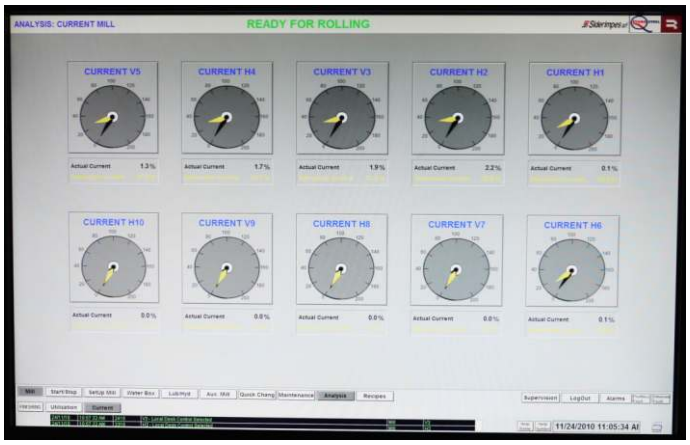
This means that there is on average in our Rolling mill "a new" size produced every two hours. Such a diversity of products rolled within an one- month rolling cycle is difficult to be controlled already under normal operating conditions – and it is extremely difficult to manage rolling of so many sizes on the new continuous rolling line where we are for the first time confronted with a completely new technology of rolling.

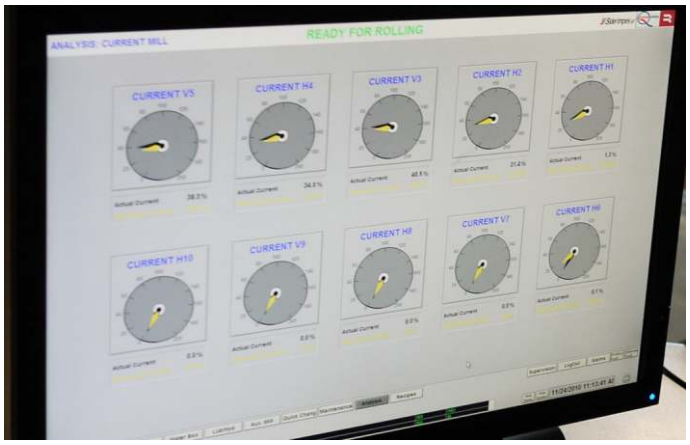
A speciality of the continuous steel rolling production line in comparison with the old - a liner one is - that a rolled piece is rolled during all its rolling process on more - respectively all stands at the same time. Besides a size of the input profile and gaps on particular stands has a significant affect to a final dimension also a ratio of rolling speed on two consecutive stands. In this way has to be here this ratio completely coordinated with a ratio defined with cross-sections of the rolled pieces being rolled on the before mentioned consecutive stands. In case that speed of the previous stand is too high – a rolled piece gets too big cross-section due to thrusting of material and in case that the speed is too low - the cross section decreases due to towing.

A parameter that determines the ratio of rolling speed on particular stands is called R-factor. At a fixed output speed of a rolled piece leaving the last stand is reduction of rolling speed on particular previous stands determined by R-factors. Theoretically is a R-factor a ratio between the input and output cross-section of a rolled piece on a particular stand respectively a ratio between output and input length of a rolled piece. As one rolled piece is at the same time rolled on two (or more) stands it is necessary to adjust (reduce) the rolling speed on the previous stand by the same percentage as the cross-section of the rolled piece on it bigger is.

Rolling schedules are made with help of a simulation program called WICON. On base of the characteristics of the rolling line, information about roll pass designs and experiential spreading factors it is possible to set up the program in such a way that it as much as possible simulates the real conditions during a rolling process. In this way can a technologist, experience change of cross-section of an input profile, use of different sequences of roll pass designs and set up of gaps, make such a rolling scheme that ensures a proper allocation of deformations as well as flow of material among particular stands. A final product of a technologist is so a rolling schedule which contains all information required by the rolling line control system for a successful control of rolling (R-factors, roller gaps, working diameters of rollers, cross- sections of rolled pieces per particular stands).

Picture above: movement of a rolled piece through a vertical rolling stand;



Picture above: the lower two screens are a part of a basic HMI (Human Machine Interface) showing only loads (current) of motors of particular stands during rolling. They are mainly applied in a combination with a manual correcting of R-factors through some switches on the command panel. Part of the HMI is also IBA software providing an opportunity for a detailed monitoring of load of stands including also adjustment of R-factors - with a possibility of a final analysis after rolling; the above screens are a part of the IBA software showing lever/load of a stand and R-factors.

Based on so prepared rolling schedule are there made drawings of rollers and the belonging lists of rolling guides. The rolls are adequately turned and together with all other equipment installed into rolling stands. Only from then on can there begin testing of the rolling line. Without regard to success of the rolling simulation made by software tools can be the final optimization of roller gaps and R-factors performed only during rolling of test billets with practical trials. Such testing is a combination of physical verification of final dimensions along the whole length of a rolled piece, an appropriate correction of roller gaps or an input profile and a correction of R-factors. For a tension analysis of the material being moved between particular stands is there used a program application called IBA. The latter records loads of individual stands from seizing of a rolled piece until the end of rolling. In case that R-factors are correct is the load of a particular stand in course of rolling of a rolled piece not changed significantly. And if the R-factor of a particular stand is not suitable – in this case the previous stand can detect load changes which can – depending on magnitude of the change - lead to some dimensional deviations of material and in serious cases also to breakdowns of a roll or any other equipment.

R-factor adjustments are carried out in a combination with optimization of roller gaps and input profile as each such change causes a change in cross- section of material and consequently to a change of the R-factor.

Data about corrections can be before rolling of the next billet entered directly into the control system of the rolling line or corrections can be executed manually during rolling by monitoring of load changes of stands and adjusting of engine power.

Once the parameters are optimized we store them in a database from where they can be always called, loaded in the control system and activated every time when rolling of a particular dimension takes place. Keeping of desired parameters during rolling is than carried out by the system itself using so called checking of tension respectively with the help of special loops placed between the stands.

Developing of sizes on the new continuous run rolling line requires a lot of effort from all involved. In any case is this process a complex technology being some generations far from the up to now existing one at Štore Steel. By the end of November were there on the new line made test rollings of almost complete range of round sizes and of a part of flat profiles. Transfer of rolling of all other dimensions on the new line will be proceeding until end of the first half 2011 when it is expected that the complete rolling will be moved from the old on the new rolling line.

Boris Kumer
Rolling mill manager

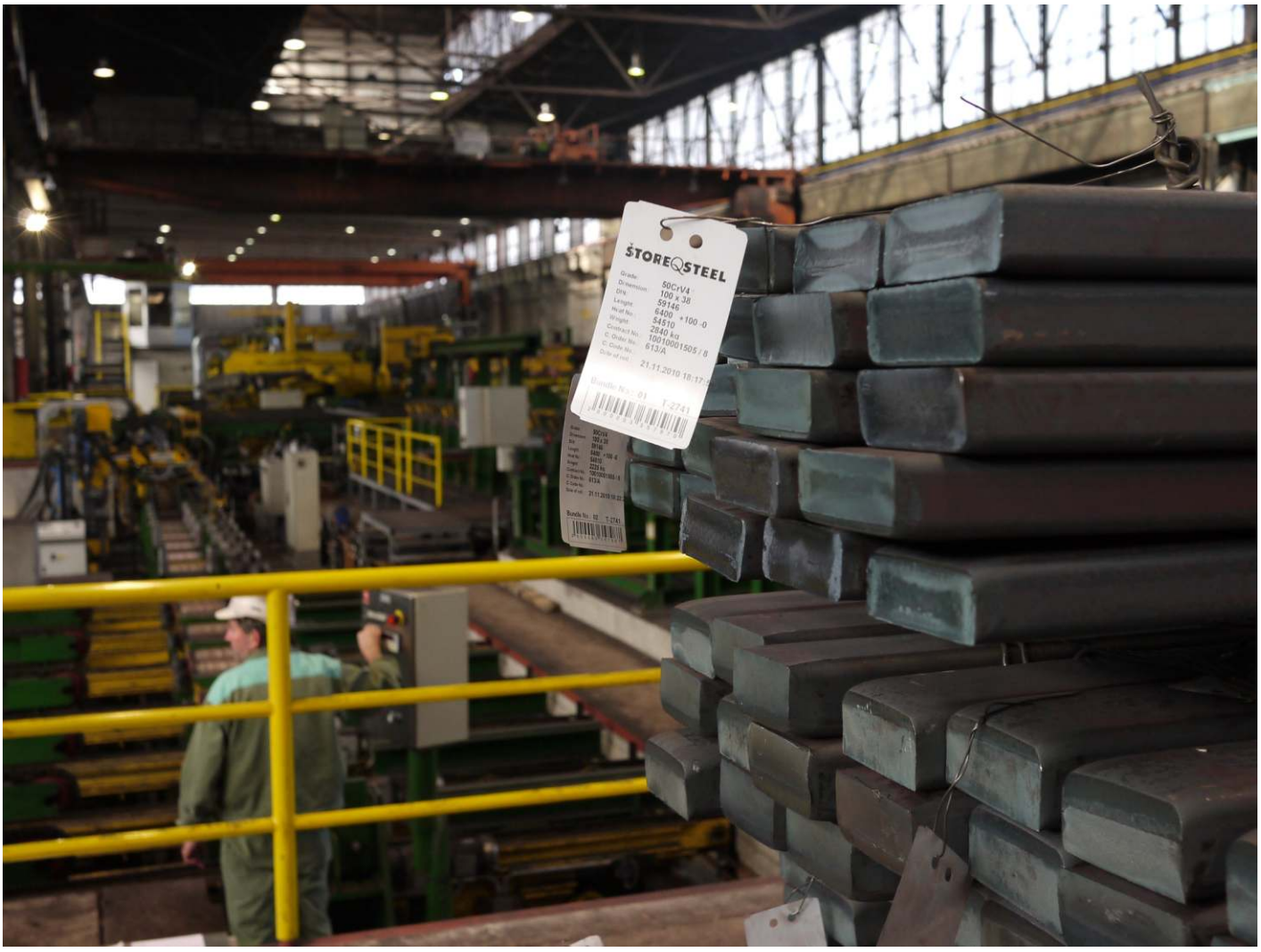
Marking and labeling of bundles

Process of production of rolled bars in the Rolling mill is completed when the bars are, after cooling, cut into the lengths that meet customers' requirements respectively enable an optimal processing in further processes. But for a qualitative monitoring of material being exposed to different additional treatments here and at buyers it is necessary to have a suitable marking of steel bundles. For this purpose is here used a system of marking with labels.

In the recent history have companies used different types of labels. Metal labels on which were there "beaten" some basic material information (heat No., dimension, quality grade) have been already some years ago considered as inadequate due to small range of information they contain.
After looking for an appropriate solution we have started using metallized adhesive labels – glued on a small aluminum plate and bound on each steel bundle. This system has enabled carrying of a greater range of data being obtained from our information system.
The labels included, beside basic data, also our company's logo and all other information requested by our customers as well as information needed at our further internal logistics operations. At introducing of this system we have also established a new way of making labels (printing with thermal transfer printers) which enabled beside already programmed data also formation of completely individual labels for individual orders. An disadvantage of this method of labeling was a great possibility of deformation of label back which may occur at material moving with cranes. Such a deformed label was no longer legible and had to be replaced.
With the aim to reduce a possibility of such errors we started in September using a completely new type of labels.

The basic requirements for the selection were the following:
The label must be heat resistant as we equip material with it immediately after cooling (temperature at that time may still exceed 300^{0} C).
The label must be immune to some minor mechanical deformations.
Writing of the new label must be done with use of the existing software solutions.
Use of a new type of labels should not require a replacement of the existing hardware (printers, thermal transfer ribbons).

Picture above: a label on the material being in the middle of the process - before an additional operation in the Cold finishing plant;



Due to positive experiences got while using self-adhesive labels of manufacturer S+P Samson from Germany we tried to find some appropriate solutions within its production program. Just in that time they have started with production of so called "freestanding" labels with a temperature-resistance up to T = 570. After a successful testing we have decided to buy Graphiplast labels which have the most met with our requirements.

Basic features of the new type of labels are:
A print-out is stable even after a prolonged exposure to higher temperatures (what proved to be very important for material being for longer time cooled in cooling chambers).
Despite a complete deformation of a label (e.g, crushing) the latter returns to its original state and enables a high-quality access to the information recorded.
Label handling is easier as there is no longer needed an extra gluing on the base aluminium plate.

At launching of the new type of labels was there necessary to set up anew some printers and to do some minor program changes for printing of labels (setting up of format) – what was carried out in one day during a regular production without any interruptions.

At the moment we test also use of spring carrying loops for fitting of labels on bundles what would replace hanging of labels with use of annealed wire. It is expected that the procedure will be even simplified in the future as bundle making on the new rolling line enables achieving of a constant distance of binding bands from the end of a bundle what can adjust also the length of the carrying loops and thus unifies look of the packaged material.

After some months of use will be there made an analysis of the label's adequacy, especially in term of optimizing the size and form of record on it. According to actual information on use of the new type it is assumed that the chosen solution is the appropriate one.

Tomaž Marolt,
Technology Manager

Picture above: a label on a bundle after rolling;

Floods and elimination of consequences

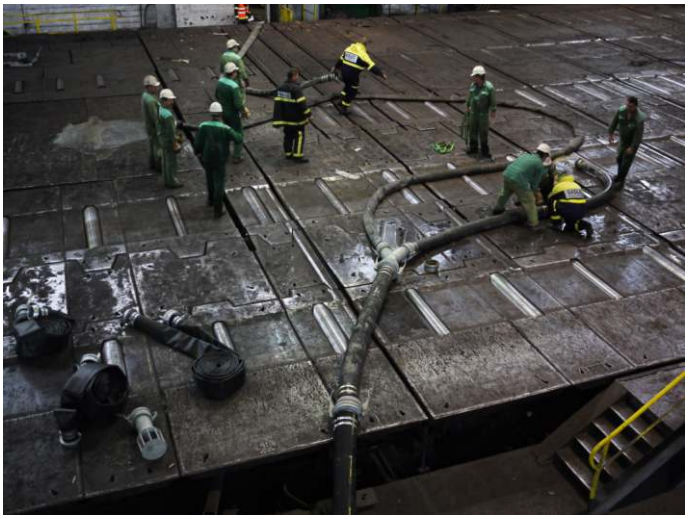
Slovenia was in the period from September 16. to September 20. 2010 affected with one of the worst floods in recent years. The flood water hit a big part of the country. The worst situation was in central Slovenia, in the Celje and Zasavje region and in the Slovenian Littoral.

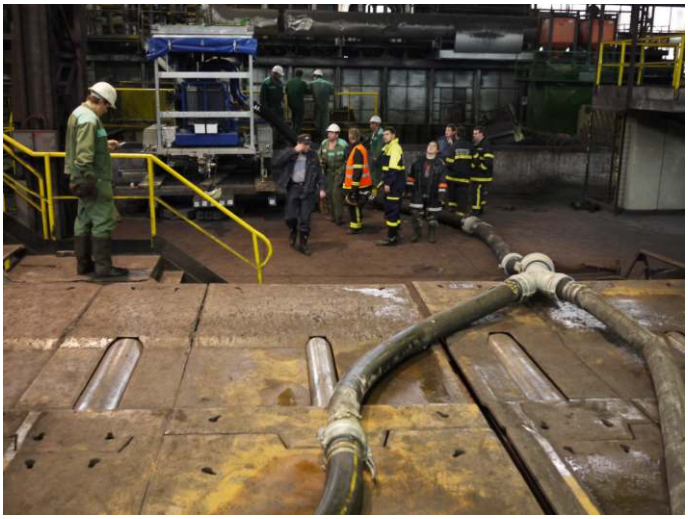
After some weather warnings we were in the company prepared for executing of eventual emergency measures. When on Saturday, on September 18., early in the morning, started watering of the machinery of our electric arc furnace, we informed the responsible staff of civil protection and began to perform some urgent measures to protect the factory from flooding. Gravelling and building of an about 200 m long flood protection embankment prevented us from the Voglajna river overflow.

Firemen who used all available flood protecting means were able to maintain the water level in the flooded engine room of the electric arc furnace at a level that was below the level of floods in the year 1998. All this was possible due to some measures executed by our workers who on the critical points closed water flow through underfloor channels in our Steelworks. Preventively was there also stopped production in the Rolling mill. On Sunday morning the Voglajna river, due to additional rainfall, increased by further 28 cm above the level of Saturday. Because of the flood embankment built on Saturday and putting of some "big - bag" bags on Godec bridge was there prevented overflowing of the Voglajna river once again, but increased water caused a higher water pressure through the sewer system and energetic ducts and started to flood the Steelworks. As the Steel plant could no longer be prevented from flood were there all available firefighters and equipment moved to the Rolling mill to defend engine rooms of rolling lines and furnaces. With extraordinary efforts and measures taken were there prevented from water the whole machinery and other equipment of our OFU furnace, rolling line 800 and the new continuous rolling line. But inspite of all that were there flooded the engine room of rolling line 550 and the Vibrohud furnace.

By building of some temporary gravels we prevented flooding of the company from water coming from the north (Teharje). Pumping of water from the flooded places took place until Monday morning.

At the flood rescue activities took part beside Celje professional fire brigade also members of the following voluntary fire brigades:
Štore, Prožinska vas, Svetina, Teharje, Ostrožno, Lokrovec, Škofja vas, Šmartno v Rožni dolini, Dobrna, Zreče, Kristan vrh, Šentvid pri Grobelnem, Kalobje, Vitanje, Gaberje, Mestinje, Nova Cerkev, Lemberg, Gorenje pri Zrečah and Konus Slovenske Konjice.



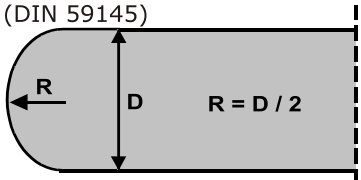


Already during pumping of water were there organized many crisis meetings concerning organization and control of elimination of flood damage.
Our maintenance staff has organized some external contractors to execute repairs. There was also organized renting and buying of some pressure washers, heaters and dryers. We also hired a company licensed for removing of waste oil.
Priority were all repairs which enabled a re-activation of electricity in the Steelworks and drive of cranes needed for disassembly and removal of motors and replacement of bearings.
Working time for maintenance staff was 12 hours daily. Basic cleaning was done by the Steel plant workers themselves. In the Steelworks was flooded regulation / control and this requested an exchange of cards / circuits. Because of residual melt in the electric arc furnace and its wet bottom, it was necessary to empty it and to rebuilt again.
In the flooded places were placed 78 electric motors, which were, due to timely switching off of electricity , left intact – but they needed to be dried in special kilns.
Thanking to an exceptional care of the staff together with a prompt and an effective action were there in a period of one week after the flood consequences already eliminated and production started again - in the Rolling mill on Monday, on September 27. and in the Steel plant on Tuesday, on September 28.
At the beginning of October was there with a company Petrol Energetika d.o.o. prepared a contingency plan to prevent future flooding. It was realized by the end of November.
And from the competent state bodies we also requested implementation of measures relating to regulation of water levels of the Slivniško jezero lake, a regular cleaning of the regulated Voglajna river and settlement of flood water releases between the Voglajna river and the ditch near railway.

Marjan Mačkošek,
Managing director

FLAT BARS WITH SHARP EDGES
DIN EN 10058
(DIN 1017, DIN 59200)

FLAT BARS
DIN EN 10092-1-A
(DIN 59145)



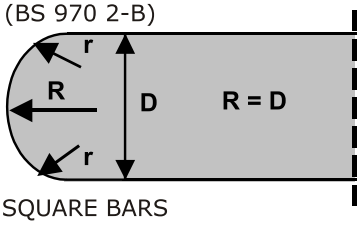
FLAT BARS
DIN EN 10092-1-B
(DIN 4620)

FLAT BARS
DIN EN 10092-1-C
(DIN 59146)

SPRING STEEL
EN 10089: 51CrV4, 52CrMoV4, 56Si7, 61SiCr7, 55Cr3

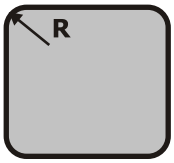
ENGINEERING STEEL
Forging steel:
EN 10025: St52-3, St37-2
EN 10083-1: from Ck22 to Ck60, 25CrMo(S)4, 34CrMo(S)4, 42CrMo(S)4,
EN 10084: 16MnCr(S)5, 20MoCr(S)5, 20MnCr(S)5
EN 10083-3: 30MnB5,
DIN EN ISO 4957: 31CrV3, 51CrV4
Carbon steel - case - hardening:
EN 10084: C10, C15, Ck10, Cm15, Ck15
Carbon steel - hardening and tempering:
EN 10083-1: Ck22, Ck25, Ck35, Ck45, Ck55, Ck50, Ck60
Structural steel:
EN 10025: St37-2, RSt37-2, St44-2, St50-2, St60-2, St70-2, St52-3
Steel for welded chains:
DIN 17115: 27MnSi5, 20NiCrMo2, 23MnNiMoCr54
Steel for cold forging:
DIN 1654: QSt323, 15CrNi6, 36CrNiMo4, 21NiCrMo2, 30CrNiMo8, 34CrNiMo6, 38Cr2, 34Cr4, 37Cr4, 41Cr4, 16MnCr5, 20MnCr5, 25CrMo4, 34CrMo4, 41CrMo4,
Alloyed steel:
EN 10083-1: 36CrNiMo4, 30CrNiMo8, 34CrNiMo6, 38Cr4, 34Cr4, 37Cr4, 41Cr4, 25CrMo4, 34CrMo4, 42CrMo4, 50CrMo4, 30CrMoV9, 51CrV4
Structural steel for housings of bearings:
DIN EN ISO 683-17: 100Cr6
Steel for heavy duty automotive parts:
WNr.:1.5231: 38MnVS5
VW-TL 1427: 27MnSiVS6, 27MnSiVS6+Ti, 30MnSiVS6
VW-500-30: 36MnVS4, 70MnVS4

FLAT BARS
BS EN 10089
(BS 970 2-B)

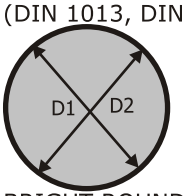


EXEM STEEL WITH IMPROVED MACHINABILITY:
WNr.: 20MnV6 EX, 38MnVS6 EX, 30MnB4+Ti EX, C15 EX,
EN 10084: 16MnCr(S)5 EX, 21NiCrMo2 EX, 20MnCr(S)5 EX,
EN 10084 in UNI 7846:16CrNi4 EX,
EN 10025: RSt37-2 EX, St52-3 EX,
EN 10083-2: C22 EX, C35 EX, C40 EX, C45 EX,
EN 10083-1: Ck45 EX, 42CrMo(S)4 EX,
UNI 7845: 39NiCrMo3 EX,
UNI 7846: 18NiCrMo5 EX,

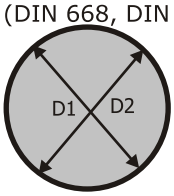
SQUARE BARS
WITH ROUND EDGES
DIN EN 10059 (DIN 1014)



ROUND BARS
DIN EN 10060
(DIN 1013, DIN 2077)



BRIGHT ROUND BARS
DIN EN 10278
(DIN 668, DIN 671)



SQUARE

Dimension mm	Radius mm
40 x 40	6
45 x 45	6
50 x 50	6
55 x 55	8
60 x 60	10
65 x 65	10
70 x 70	10

FLAT

Standard	Dimension mm
EN 10058 (DIN 1017)	65 - 120 x 40 - 55
EN 10058 (DIN 1017)	50 - 150 x 7 - 40
EN 10058 (DIN 59200)	150 - 200 x 7 - 25
EN 10092-1-A (DIN 59145)	50 - 120 x 8 - 35
EN 10092-1-B (DIN 4620)	50 - 200 x 7 - 30
EN 10092-1-C (DIN 59146)	60 - 120 x 16 - 62
EN 10089 (BS 970 2-B)	60 - 120 x 30 - 36, 40 - 42
EN 10092-2 (DIN 1570)	90-120 x 10-20

ISO 9001
ISO 14001
OHSAS 18001
BUREAU VERITAS
Certification
N° 214241 / N° 221243 / N° 224323

ISO/TS 16949
BUREAU VERITAS
Certification

ROUND

Standard	Diameter/Process
EN 10060 (DIN 1013)	25 - 68, 70, 72, 73, 75, 77, 78, 80, 82, 83, 85, 90, 95, 100, 105 mm / rolled
EN 10060 (DIN 2077)	25 - 68, 70, 72, 73, 75, 77, 78, 80 mm / rolled
EN 10278 (DIN 668)	24 - 50 mm / drawn 24 - 95 mm / peeled
EN 10278 (DIN 671)	24 - 95 mm / peeled

ŠTOREQSTEEL

RECYCLED STEEL