ŠTORE STEEL

Internal information magazine, No. 1 - 15

Vision of smart factory

In efforts to reindustrialize Europe, which is now at the forefront of European institutions, the Chamber of Commerce and Industry of Slovenia has also recognised a need for a document that would raise awareness of optimal industrial development.

The Industrial Policy Manifesto Slovenia 5.0 defines five key factors that would enable the Slovene industry, which is still highly developed, to catch up with the world competition.

We want a Smart state that will improve business environment and encourage investors. The next factor are Smart taxes for better competitiveness in the field of employment as well as costs. For Smart HR management it will be necessary to adapt education programmes and for Smart development to create a stronger role of knowledge and development in the society. For Smart internationalisation, it is necessary to connect all institutions operating in the global space.

By digitalisation, automatization and robotisation we will get smart factories that will produce more at the same number of employees. However, they will need high-technology and advanced management knowledge.

The trend in employment and acquiring new knowledge in the 2005 to 2015 period, when we employed 349 new members of staff, will continue in the future. Besides a vision of a smart factory, it will be very important to increase the volume of finalised products.

The year 2015 has been a difficult one, but we are in spite of that satisfied with achievements. We are planning business activities for the year 2016 with moderate optimism despite market situation that cannot be anticipated.

We expect a competitive business environment in the European Union to be established and a protection of the European market from unfair competition by the European Commission, if it has already recognised steel industry as an important supplier of all other industries.

By concept of circular economy, they give recognition to the industry that cares for the waste recycling. According to recently found records, recycling was used in Štore as early as in the 19th century by a procedure of using waste slag to produce iron.

The end of 2015 is approaching and I wish all readers of the magazine a successful and happy 2016.

Marjan Mačkošek, Managing Director

On the cover:: transportation of ladle to turret; above: flame cutting of billets

Photos: testing of new continuous caster; Team members: Florjan Golčman, Metod Marolt, Janko Cesar, Luka Krajnc, Matej Kač, Klemen Stopar, Milan Levec, Boštjan Špan, Martin Dobovišek, Boris Kralj, Peter Bračun, Marjan Mačkošek, Bojan Strašek, Jano Mulej, Nejc Drofelnik as well Radovan Bofulin and Bogdan Žekar before they were retired

349 new employees in years 2005 to 2015

Restructuring of Slovenian ironworks has affected the structure of employees in the company Štore Steel. In the Štore steelworks, older workers took early retirement and younger workers were not employed due to the need for reduction of employees.

Number of new employees 2005 - 2015

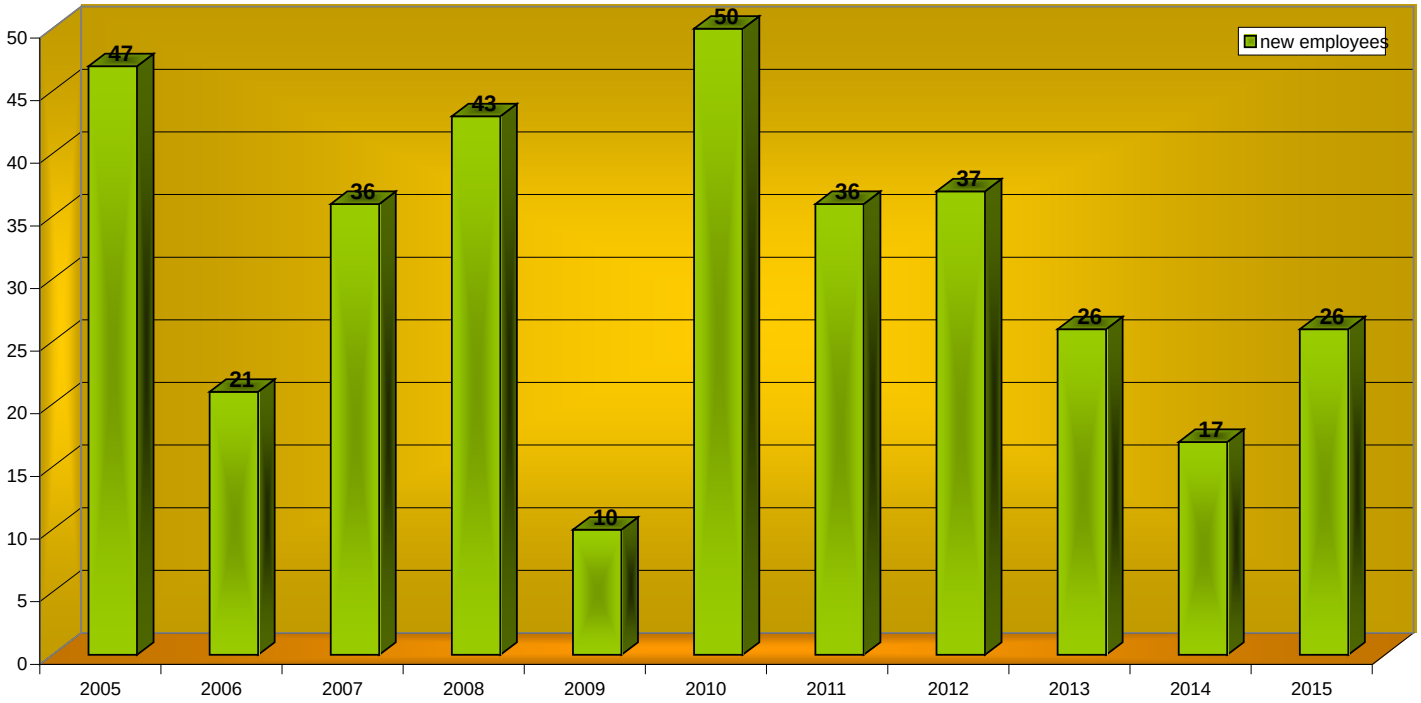


Figure 1

At the end of the year 2000, the forty to fifty year group of employees represented 47.5 % of all the employees and at the end of 2005 still 42 % (Fig.2). These generations were retiring gradually, those with added years of service even soon after their 50th year.

In the years between 2005 and 2015, we hired 349 new workers; mostly to replace retired workers (In Figure 1 is this number by years). Through the selection in the period of training 248 workers kept their job, which is 71 % of those employed in that period. Employees with up to 10 years of working experience in steel working represent today as much as 47.5 of all the employees in Štore Steel.

We were aware even before such a comprehensive employment that working in metallurgical production demands several years of training and skill mastering. Many of these skills are not written and are passed on through training employees by those with adequate experience.

Another big problem was how to ensure employment sources, because enrolment in natural sciences and technology programmes on all levels was very low.
The first step in ensuring human resources is the care for reputation of the company in the local community, where we encourage voluntary activities of local residents, our employees and their children with modest donations.

Young people were enabled to get to know the company and the work within by organising tours through the company for schools, holiday work and enabling them to fulfil their obligatory work experience demanded by their schools. The workshop by Štore Educational Centre for pupils and students of various schools belongs among these activities. The workshop is presented in this magazine.

We are concerned with encouraging working environment, improving working conditions, rights of employees and permanent and correct communication with trade unions.

Positive information affects the decisions of job seekers, that is why we are managing a wider database of potential personnel, who applied for the job in the company on their own initiative.

Structure of staff by age in year 2005 and 2015

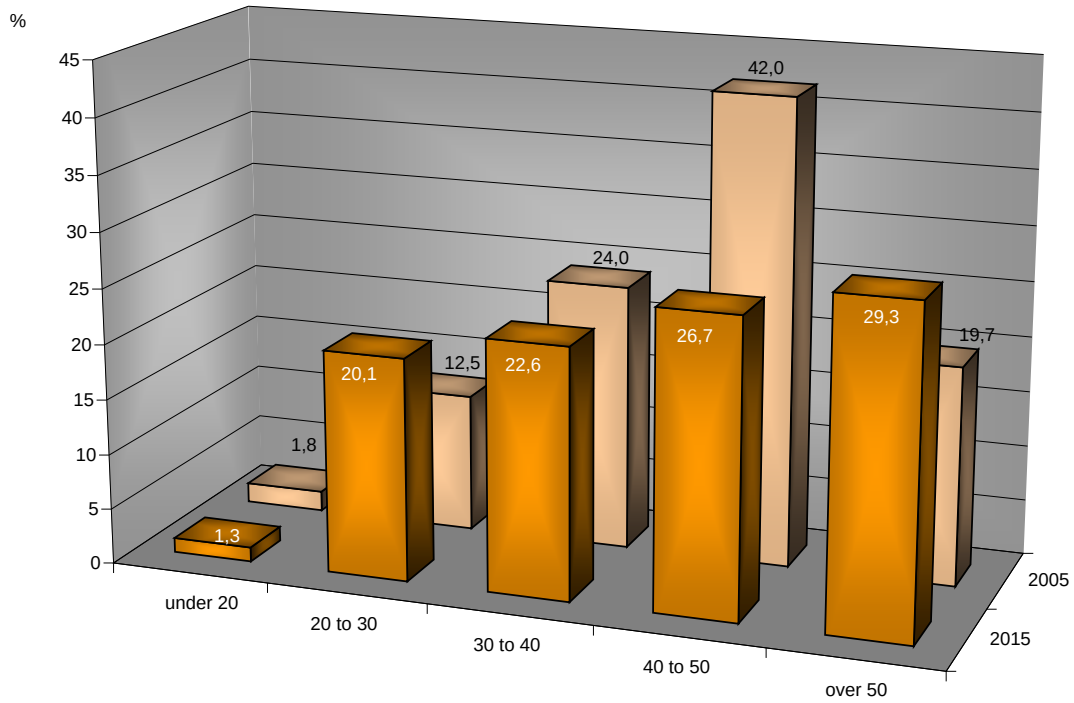


Figure 2

Structure of staff by education level in year 2005 and 2015

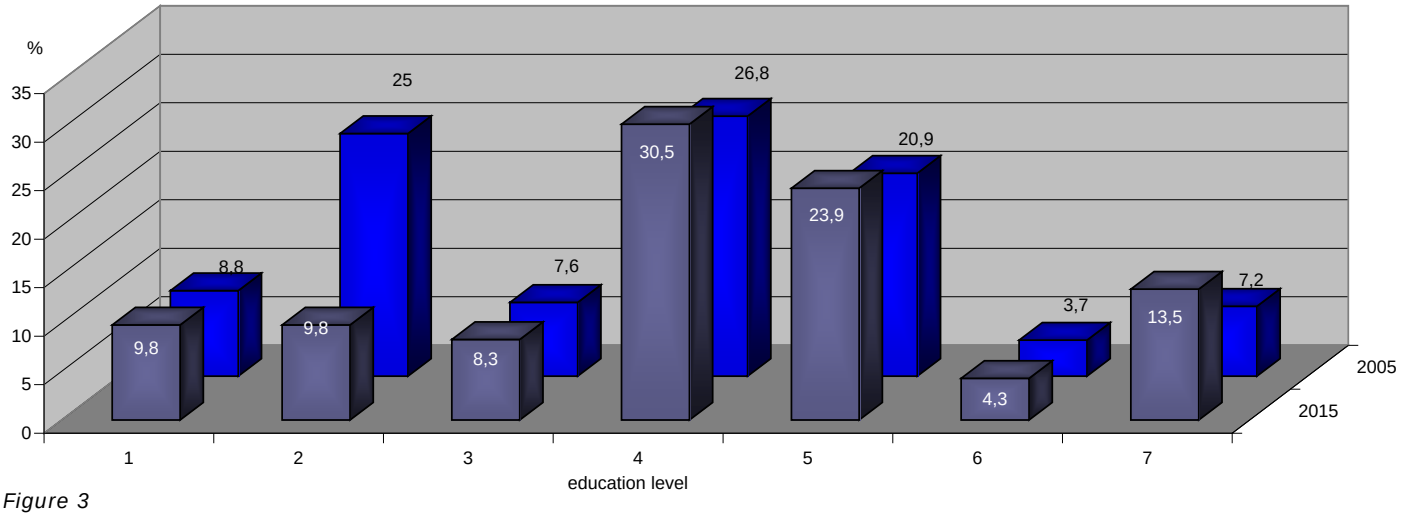


Figure 3

We are offering scholarships for programmes of vocational, secondary, higher and university studies of mechanical engineering and university programmes of metallurgy.

Candidates with agricultural, wood industry, traffic secondary education and other professions not typical for metallurgic production were also placed among job candidates. We required no working experience for the job, but got ready to execute the training in house.

We introduced a system of 6 and 12 month introduction work training, with a programme of introducing and mentoring. The training was performed in groups, which manage the production processes and which at the same time evaluated adequacy of the newly employed. In this period, we also evaluated employee's, who has otherwise no adequate profession, motivation for gaining new knowledge and what is his sense for technics.

The present structure of staff shows that we have managed to balance the age structure (Fig.2) and at the same time improved the staff structure by education (Fig 3).

Gorazd Tratnik,
Assistant of MD

Flexibility and productivity

Flexibility and productivity are the two basic principles of the business model of businessman Sandro Šemrl, co-owner and manager of the limited liability company SM Mehan d.o.o., which is a business partner of Štore Steel and which uses in their production process the EXEM steel in diameters from 85 to 110 mm..

Photo: Sandro Šemrl and Miran Prezelj, Štore Steel sales manager in the SM Mehan office

You state in your website that the company was founded in 1978. What were your activities at the beginning?

My father started the business as an artisan and later individual entrepreneur as a firm Orodjarstvo Šemrl. This was in fact mechanical machining he started performing at home in his garage.

We moved to the present location in 2001, after we finished the renovation of the decaying facilities we had purchased.

You are a family business, because all your family members work in the company. How many employees do you have altogether?

I'm the only employed family member, since my father has retired. Nevertheless, we are co-owners and we make certain decisions together. We transformed to a limited company MS Mehan in 2009.

We have 25 employees, among them engineers – technologists, who ensure the development and production planning for the manufacturing of products.

How do you acquire contracts and what are the quantities the customers usually order?

We are a manufacturer of machine parts for agricultural machinery as well as for automotive industry of passenger and commercial vehicles.

The orders we get are those of smaller and medium series, which are not interesting for larger manufacturers because of the pricing. Most orders come from abroad; we have two larger customers from Germany, who increase their orders every year. Now there are 150 positions in the production and our plans are to be able to accept orders for further 150 positions.

Photo: Production facility will be expanded by 2,000 square metres

How will you manage such an increase; how do you prepare for the manufacturing of a new product?

We have prepared for production increase. Our principle is a permanent productivity increase and fast responding. Production equipment is being gradually automatized. Two units of our machining equipment have been equipped with a robot. We have made and ordered several automatic feeding systems. Certain services that we used to outsource in the past are now executed in house. Inductive hardening of products after machining is now performed in house, which reduced the production time.

Renovation of tools is now also performed in house, which has increased availability and life cycle of tools.

We have quality equipment to accept new products to production. We have several measuring devices for taking digital images of products and quality knowledge in the field of computer programming of machining equipment.

What are your plans for the future?

Our development started a more intensive phase some three, four years ago. The company is despite a considerable growth not in debts and investments are financed from operational cash flow.

In 2013, we acquired an abandoned production facility next to our premises and a part of the production has already moved there. There are plans how to enlarge the facility from 1,000 to 3,000 square metres.

We expect the local community to support our plans, since they bring new employments. They could encourage our ideas by certain reliefs or at least a reasonable urban facility contribution.

Interviewed by Gorazd Tratnik

Internal logistics

The production efficiency is significantly influenced not only by quality but by productivity and flow too. The latter depends on material and information flow, that is logistics.The Maintenance together with the Storage and Transport Centre represent a complete support process. The Maintenance directly influences the availability of equipment. The key role of internal logistics is to provide optimal flow of material.

The challenge, set by internal and external clients, is to optimise the support process by abiding to the principles of lean production.

The internal logistics has to, together with production processes, provide the best usage of the space possible and reduce the paths and time of the material and information flow.

By increasing the material flow, we help to reduce the stock in the production and to use the storage space more sensibly.

The material flow from the scrape iron depot to the sales warehouse is nowadays enabled by:

- Rail/road vehicles ZEPHIR (2)
- Bridge cranes (44)
- NH tractor with implements (1)
- Fork-lifts (13)
- Transverse carriages (7)

Because of the production quantity growth and demands for greater material flow, there is a need for additional diversification of logistic means besides the ones already existing. Which is particularly the case in the field of finishing and cold working, where road vehicles (heavy-duty tractors and self-propelled cars) have an advantage over rail vehicles due to greater flexibility.

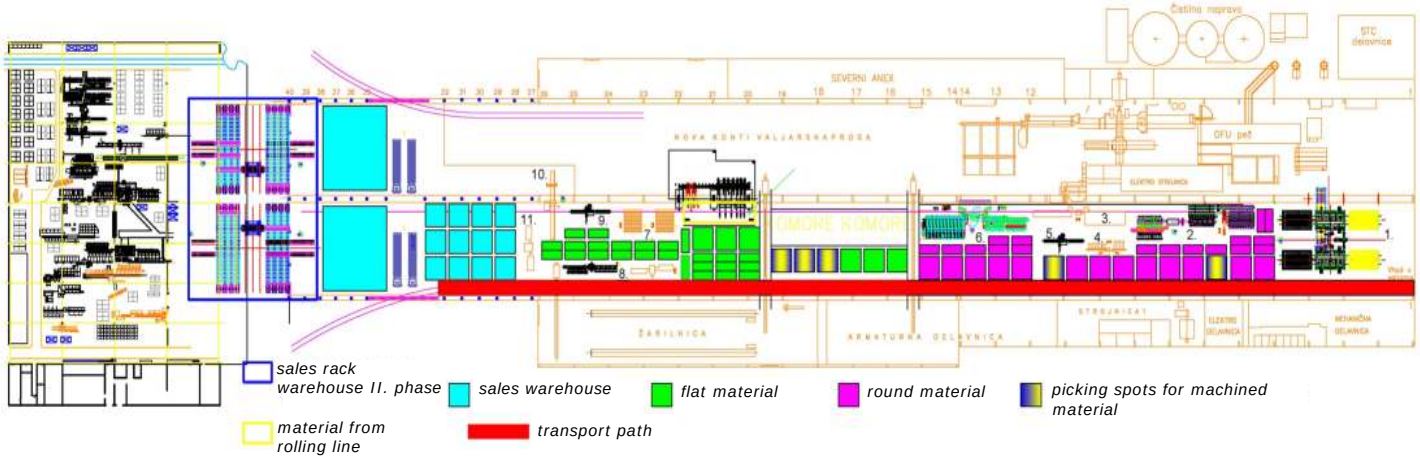


Figure: Concept of building the sales warehouse in phases and finishing and delivery internal logistics

Legend:

1. Two new annealing furnaces
2. Control line
3. BRONX straightening machine
4. PBR straightening machine
5. Round material saw
6. MAIR straightening machine
7. Picking spots
8. ISI press
9. Flat material saw
10. VALDARNO shears
11. MAE press

Concept:

Phase I
- Moving equipment in two separated production cells for round and flat material.
- Arrangement of intermediate warehouse next to machines with defined take-off positions for ground transport to the sales warehouse.
- Release of space for the end product sales warehouse.

Phase II
- Arrangement of automatic rack warehouse between the Rolling mill and Cold working halls.

In photos: above a magnet for new crane, below optional vehicles heavy-duty tractors

Because the internal logistics is integrated into the production process, it is the only way to develop optimal concepts by an interdisciplinary approach and which reduce bottlenecks and unnecessary activities without any added value. For an optimal solution, it is essential to include all the processes in the development of new concepts. This is shown on an example of planning the equipment layout, intermediate storage and sales warehouse in the rolling mill in connection with logistics.

In the field of finishing the material flow and equipment productivity are improved by a prospective in-line placement of equipment, separated for round and flat material, by manipulation of products by ground transport to the sales warehouse, and by greater crane availability for supplying equipment within the production cell.

By building a new continuous caster line in the steelworks, it will be enabled to transport billets by magnets in the billet warehouse and a new concept of storage, which will contribute to easier manipulation and safer work. For billet manipulation there is a possibility of additional crane equipment installation with automatic data acquisition and material positioning.

Support to internal logistics control must be followed by development of automatization and computerisation of sales and intermediate warehouses, which will enable better product traceability and reduction of material manipulation time.

The goal of internal logistics is to create a positive financial impact by optimising the material flow and reducing the intermediate storage and simultaneously providing high dynamics to customers on a just-in-time basis by considering specific customers' demands.

Matej Kač u.d.i.s.
Maintenance manager

Technological development of steel production in Slovenia[1]

The area of Slovenia is the place where the production of metals and alloys and their processing into different products and machinery have been present from ancient times. Even today, there are places where we can still find traces of the past production in the form of slags and metal remnants. Rich technical and cultural heritage can be admired in museum collections today.

Photo: Participants of 2. International Symposium Between Iron and Culture, Innovations in Metallurgy and Cultural Heritage, Ravne na Koroškem, 5th in 6th november 2015

Industrial production was developed in many areas in the past. In some areas, this rich tradition has remained and is closely related with technological development. Development is triggered by innovations and patents and we saw many of these in the field of metallurgy in 19th century which arose a lot of attention among expert public of that time.

With a reconstruction for the coal burning grate in the puddling furnace, the Prevalje Steelworks (Železarna Prevalje) started to use brown coal from the near Leše coalmine for steel production. In this way, they replaced black coal. With steel production in puddling furnaces, the environmental concern begins as a result of a smaller consumption of charcoal and clearing of woods.

A very original process for the use of puddling and welding slag was developed in the production of pig iron in the Štore Steelworks (Železarna Štore). It indicates the beginning of use and resumed appreciation of secondary raw materials.

The production of ferromanganese in blast furnaces is related with the production of pig iron and spiegeliron with approx. 20 wt.% manganese and with the beginnings of liquid steel in the Bessemer convertor. Ferromanganese was used in the production of liquid steel as a result of melt deoxidation. Ferromanganese with a higher share of managanese was in smaller quantities won with other processes.

At KID in Jesenice, they proved with the process of ferromanganese production in blast furnaces that the new technological process can satisfy demands for ferromanganese. For this innovation, they were awarded gold metal at the world fair in Vienna in 1873. The content of manganese was increased to 50 – 55 wt.% by 1875. After the world fair, French steelworks started to produce ferromanganese with 65 – 75 wt. manganese on the basis of Jesenice experience and richer ore.

Steelworks have continually followed development of steel production and initiated new processes, modernizing the process technique with Bessemer convertor (Prevalje) and SM furnaces. These furnaces used the generator gas obtained by gasification of domestic coal. For the production of tool steels, the crucible melting and refining technology was used – crucible steel. This is the beginning of crucible (ladle) metallurgy which is part of regular steel production today. Today's steel production runs in electric arc furnaces. The beginnings are connected with the Rupnik's defence line during World War II.

The past strategic development also included development technological processes to provide domestic raw materials for steel production. This indicates development of cokes and semi-cokes from brown coal for the production of pig iron in low shaft furnaces. The pilot sun furnace in Piran, the second in Europe after the French one contributes to utilization of sun energy. Metallurgical production has a long tradition in this region. Its beginnings go back to the time when iron and steel were won directly from ore and continue into industrial production of liquid steel. Steelworkers transfer their knowledge on younger generations who have always found answers to the technological challenge of time. We look at future with optimism, since our young experts radiate a steel will for progress, ensuring unvaluable development potentials.

Slag reduction from furnaces in the Štore Steelworks[2]

The Štore Steelworks was built near the new transport links, the Southern Railway line Vienna – Trieste. The line was built by sections. The first train came to Celje in 1846, to Ljubljana in 1849 and to Trieste in 1857. An important factor for the area where the line was built was the coal brown which was digged for in Štore, near the railway. The coal mines near Štore were owned by Ignac Novak. In 1850, soon after the railway line to Ljubljana was opened, the mines were bought by Bruno Andrieu. In that same year, he got a permit from the ministry in Vienna to put up steelworks in Štore, on the left bank of Voglajna.

The concession included the installation of puddling furnace, welding furnaces and the rolling mill for steel sections and flat steel. They were using own brown coal for the production of steel in puddling and welding furnaces. Hot flue gases from puddling furnaces were used for the generation of steam for steam machines.

Slag containing 50 – 60 wt.% iron is produced in steel production in puddling furnaces and during heating of steel packages in welding furnaces. Such iron is in the form of iron oxides, fayalite 2FeOSiO2 and small metal granules.

The Štore Steelworks did not have own production of pig iron and had to get it from Fužine under the Bohorje hills and from Mislinja. The content of iron in slag obtained from puddling and welding furnaces is similar to iron ore. Therefore they started to utilize this secondary raw material for the production of pig iron.

For slag reduction in relation to pig iron production, the Štore Steelworks built a pilot shape plant similar to a domeshape furnace. Here, they reduced dried composite consisting of slag, crushed charcoal and lime. Pig iron from slag was used as input material for the production of steel in puddling furnaces.

The charge for pilot reduction plant consisted of crushed puddling and welding slag and remnants of tiny charcoal which they mixed together with hot slurry made during lime stirring. Lime was first used as a binding agent to get a solid charge after drying.

In the reduction of iron oxides and fayalite, a close contact between calcium oxide and reactive substances produced slag with a composition of calcium silicates.

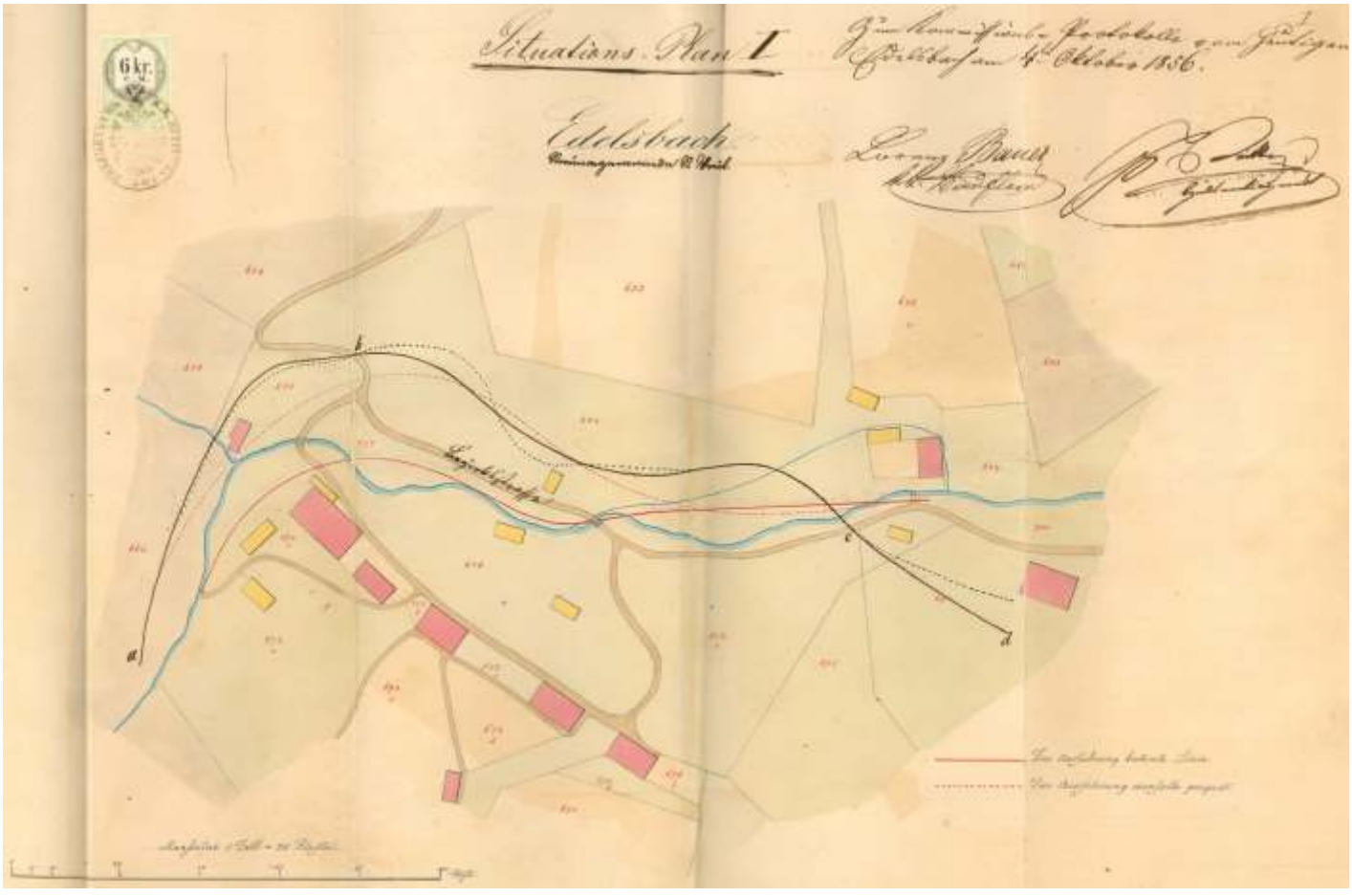
The process of slag reduction was recognized as the Lang-Frey method which was used in Mislinja and other steelworks and blast furnaces.

Already in 19th century, Štore started to utilize intermediate products produced in steel production as secondary rawmaterials. With the use of slag, they reduced the environmental pollution as scrapped material was deposited on waste dumps.

Jakob Lamut

1 Abstracts on 2. International Symposium Between Iron and Culture,(editor Karla Oder, Slovenian Trail of Iron Culture), Ravne 2015, page 8-9.

2 Abstracts on 2. International Symposium Between Iron and Culture,(editor Karla Oder, Slovenian Trail of Iron Culture), Ravne 2015, page 16-17.



Drawing: Fužina pod Bohorjem, 4th october 1856

Introduction of interactive creative workshops for the youth

By performing creative workshops, we play an important role in the education system, which refers to the importance of steel industry and potentials young people can develop when entering the system. This industry is very important worldwide, because it creates 2 million jobs and is the second largest industry in the world. The International Labour Organization expects this sector to have one of the largest employment growth rates in the period to 2019. Therefore, it is essential that young talented people are included in its activities and metallurgy is presented as a highly demanding industry with high career opportunities on different levels.

In the company ŠTORE STEEL, we have since 2010 together with the Štore Educational Centre performed INTERACTIVE CREATIVE WORKSHOPS FOR THE YOUTH. With this workshop programme we are entering the »Youth for Celje« research project. Workshops represent a special way of working with young people, since they are invited directly to working environment and present them actual creative problems we meet.

The participants in the three-day workshop under guidance of two mentors solve practical tasks from the field of mechanical engineering, ecology, chemistry, logistics, metallurgy and electrical engineering, that are currently interesting in the company Štore Steel. The workshop with many interactive activities strengthens closeness in a group of young people and brings them a merry and entertaining inspiration for further education and work in the field of creativity and innovativeness. The main purpose of the workshop is to conquer the culture of innovativeness and creativity. The group is in that way confronted with an out of the box way of thinking and develops creative ideas. At the same time, it gets to know the bonds between communication, innovation and team and firms positive actions to finish the projects.

On the first day, the history of ironmaking in Slovenia and Štore is introduced to the young people. In the era of industrialisation, ironmaking developed under the influence of the industrial revolution into the most important economic activity, which is in Slovenia the basis for the important metal processing industry. The beginnings of ironmaking reach three millennia in the past. Various Slovenian places and towns have a history of ironmaking plants, but there have been three iron- and steelmaking centres Jesenice, Štore and Ravne na Koroškem in the last century. By visiting the Štore Museum of Ironworking and watching old films on working methods from the 1950s, the participants get an insight into the past, which they can compare to the work now in the present era and get a vision for the future. The young people get to know the importance of preserving and presenting the industrial heritage in our country.

Photo: In the Educational centre classroom

The workshop represents a form of motivation of the youth for creative studies and professions in the field of natural sciences and engineering and of course metallurgy. Through solving practical problems and tasks, the participants are presented with possibilities of creative contribution of each individual, which is at the same time in the group part a contribution to the success of the company and society.
Creativity and innovativeness are processes that largely present an advantage in the competition in the field of human resource work. That is why it is important for a company to develop environment, which will enable them to develop completely. The material, social and spiritual capital is today closely connected to innovation processes. All this are some of the questions that we think of at the workshops and develop new ways of working for the praxis.

The workshop is intended for primary school students in their final years and secondary school students. Since 2010, we have integrated 400 participants into these workshops.

In these five years, we have covered various topics, which were very interesting and current, not only for the students but for the company too. The solutions made and later at the end of the workshop presented by the students, were very creative and illustrate the fact that young people are aware of the importance of production and development in individual industry sectors.

Here are some titles of topics we were dealing with at the workshops and were together developing new ways of acting in practice:

Mechanical engineering:

Dimension and frame changes at rolling
Tension conditions at continuous rolling
Internal and surface defect emergence on the rolled piece
Influence of defects on the billet to the surface of the rolled piece surface
MSA

Ecology:

Building a portable system that would enable automatic measurement of dust particles in the air
Creating a dust expansion model
Measuring sound power of the rolling mill
Noise reduction measures
Flood prevention measures
Natural gas consumption prediction

Logistics:

Moving machinery in the Finishing department
System for automatic planning of loading bundles onto lorries
Placing rack storage into production
Determining storage space according to warehouse and technology availability
Bottleneck analysis at purchase of a new automatic inspection line in the Finishing department

Metallurgy:

Build of temperature measurement system for rolled pieces
Build of a system for microstructure specification
Build of a system for prediction of hardness after annealing
Problem of ignition
Impact of nitrogen content on yield
Impact of the first and last billets on yield
Hardening in the ingot mould
Measuring of dimensions during rolling
Impact of casting flux
Modelling of defect forming 30MnVS6 according to casting parameters
Modelling of internal defect forming QS1920 according to casting parameters
Calculation of increased machinability (ISO 3685)
30MnVS6, 70MnVS4, C45R analysis of casting parameters

Electrical engineering:

System for automatic measurement of dust particles in the air
System for measuring the level of sound pressure in the air
System for avoiding obstacles when transporting loads
Measuring of bar curvature in a bundle
Claim management system
Material dispatch system (with barcode scanner)
Robot operation at material cut
System of bar curvature measurement
Computer vision – comparing to reference images (SEP 1520)
Computer vision – bar centre boring
Computer vision – measuring hardness with a camera
Information system for notifications at production standstills (Internet site, text messages)
Virtual production environment
Measuring slot at the “special profile”
Measuring temperature in the furnace
E-commerce

Chemistry:

Automatic melt ordering system
Evaluation of chemical non-homogeneity of material
Steel waste and additions management system
Inclusion analysis system
Decarburisation calculation at random error
Non-homogeneity at steel hardening
Influence of non-homogeneity at steel hardening on defect emergence on the rolled piece – hardness, cracks
Surface bubble emergence analysis (N, O, H)

The list of tasks the participants have performed by now can be found at www.ic-store.si »CENTER USTVARJALNOSTI FERRUM«.

Some extracts from the evaluation report, done at Šolski center Celje in January 2015:
"Impressions made after three days of creating and socialising in a poll by the participants, show that the purpose has been achieved.

The youth were thrilled to see the production in the steelworks and the rolling mill, listened carefully to the introduction lecture and then under guidance of mentor Miha Kovačič, Phd. started solving concrete problems in the company Štore Steel.

They learnt about the importance of good cooperation and teamwork, that we can in life undertake very complex tasks, which seem unsolvable at first sight, that hard work and persistence are needed besides knowledge and creativity, that we meet many obstacles when solving problems, which have to be surpassed otherwise new ways to the solution must be found, that we can learn a lot from mistakes...

They were proud to find out that they can usefully apply knowledge from school at practical problem solving. They worked in a creative and relaxed atmosphere.

The mentor praised their hard work and responsibility; the students were enchanted by the broad knowledge of their mentor, his excellent explanations and willingness to help.

They learnt many new things in a relatively short time and found out some new programmes and modern technology. They realised that continuous learning and training play a very important role in life.

In the name of Šolski center Celje and our students who participated at the interactive workshop Innovativeness and creativity for the youth, we would like to thank sincerely the representatives of the Štore Educational Centre and the company Štore Steel and the mentor in particular, for valuable experiences. "

In 2011, the workshop was awarded a GZS and RGZ bronze distinction for innovation.

We presented the workshop in September 2015 at the meeting Research of the youth in step with economy, which took place in Celje. It was also introduced in November 2015 in Ravne at the 2. International Symposium Between Iron and Culture – Innovations in Metallurgy and Cultural Heritage.

Miha Kovačič, Phd.
Slavica Glavan, Educational centre director

Photo: students in company Štore Steel

New additional machining - central boring

Orders and accordingly production of peeled steel cut to length for half-axles increase every year. In 2007, we produced first 1,000 t of peeled steel and last year, in 2014, we reached a record production of 7,133 t. This year we will exceed an amount of over 8,000 t, if orders continue with such rate.

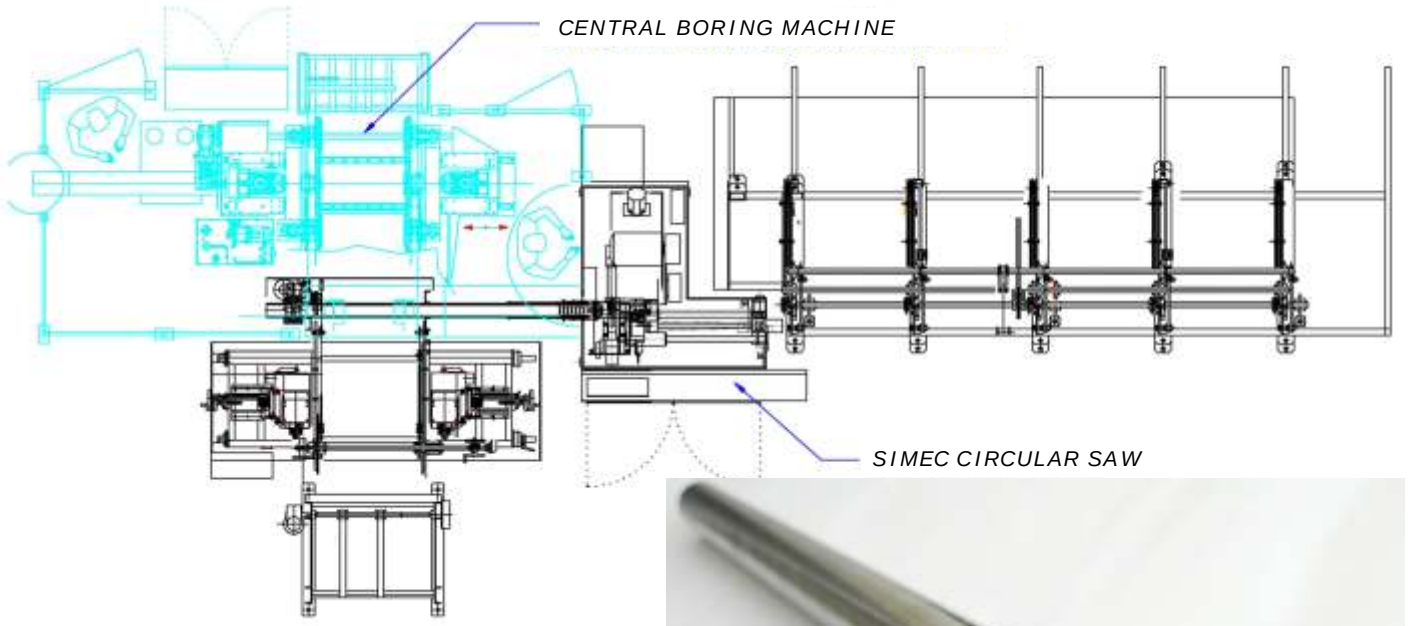


Figure: Ground layout of the machine for central boring to the existing Simec circular saw

Photo: Chamfered half-axle with a centred bore

We produce this steel for two customers, IMPAKTO (Neapco) and GKN. The customer IMPAKTA (Neapco) is predicting in the next two years (2016 and 2017) the sales of half-axles to increase by 20%, as well as a change in half-axle assortment. The share of half-axles with central bores will increase (Fig. 1). By the year 2013, we produced in average 80,000 pieces (160 t) of half-axles a year. The amount increased in 2014 to 200,000 pieces (400t). The plan for this year is 400,000 pieces (800t) of half-axles with central bores. It is planned to increase the amount of half-axles with central bores to 1 million pieces (2,000 t) every year from 2016.

The central boring is now outsourced from other services. However, such an increase presents a capacity problem for the provider as well as great logistics difficulties (transport, traceability, packaging, marking...) That is why it is the only answer, also from the financial standpoint, to purchase an adequate machine and to produce half-axles with central bores in Štore.

An investment in an automatic machine for machining the half-axle ends (chamfering and bore centring) is planned. The machine will be arranged in-line with the existing Simec II circular saw (Figure). Sawing and central boring will be executed in-line without additional manipulation. After sawing (cut), the rods will be transported to the left side as has been the case so far (rod cut only) or to the right side, where central boring will be performed. No building intervention will be necessary to set up the machine.

The machine capacity will be 1.5 million pieces a year. The value of the investment is estimated to be Ä200,000. The delivery period for the machine from order to assembly is 6 months.

The execution of the project is of great importance for the company. With this investment, we will meet the needs of the customer and simultaneously make a step forward to finalisation of our steel and by that creating higher added value. The financial impact will be higher than now as we will reduce also the indirect costs (transport, control...).

Alojz Gajšek, Cold finishing manager

Innovations in the Rolling mill

Life is like riding a bicycle. To keep your balance, you must keep moving.
(Albert Einstein)

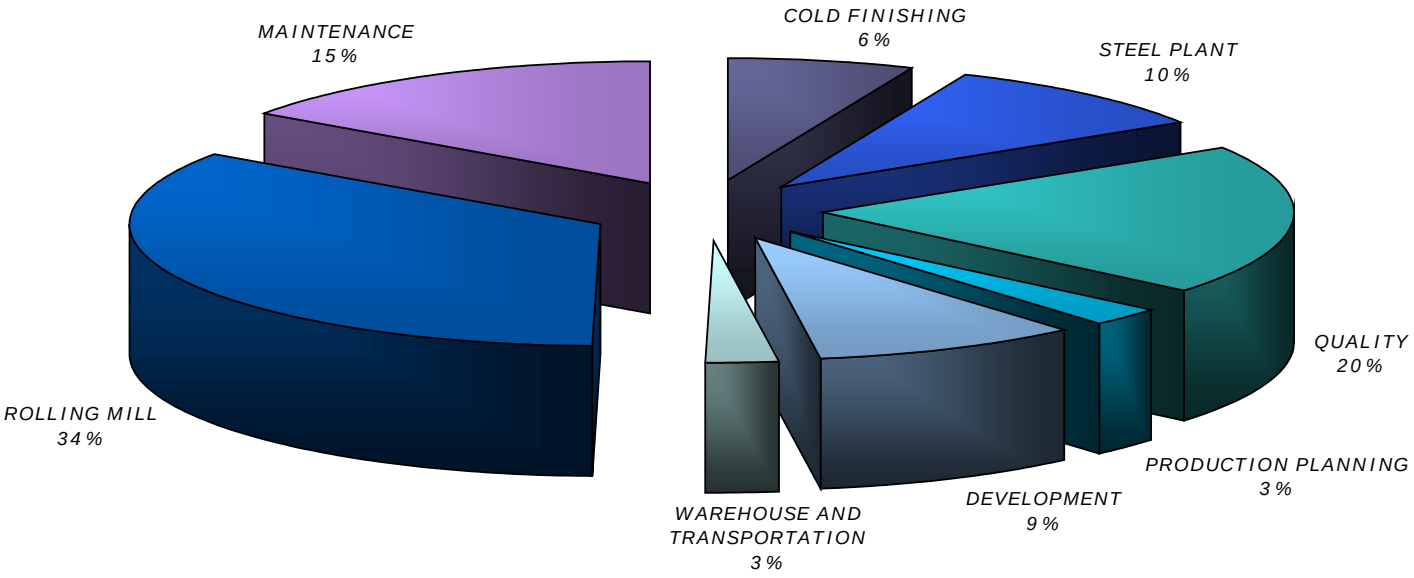


Fig. 1. Share of useful proposals by plants/services in the 2000-2014 period

In the 2000-2014 period, we have received 73 useful proposals from the rolling mill, which were implemented. The number of useful proposals and the number of innovators from the rolling mill for the above-mentioned period is shown in the following diagram.

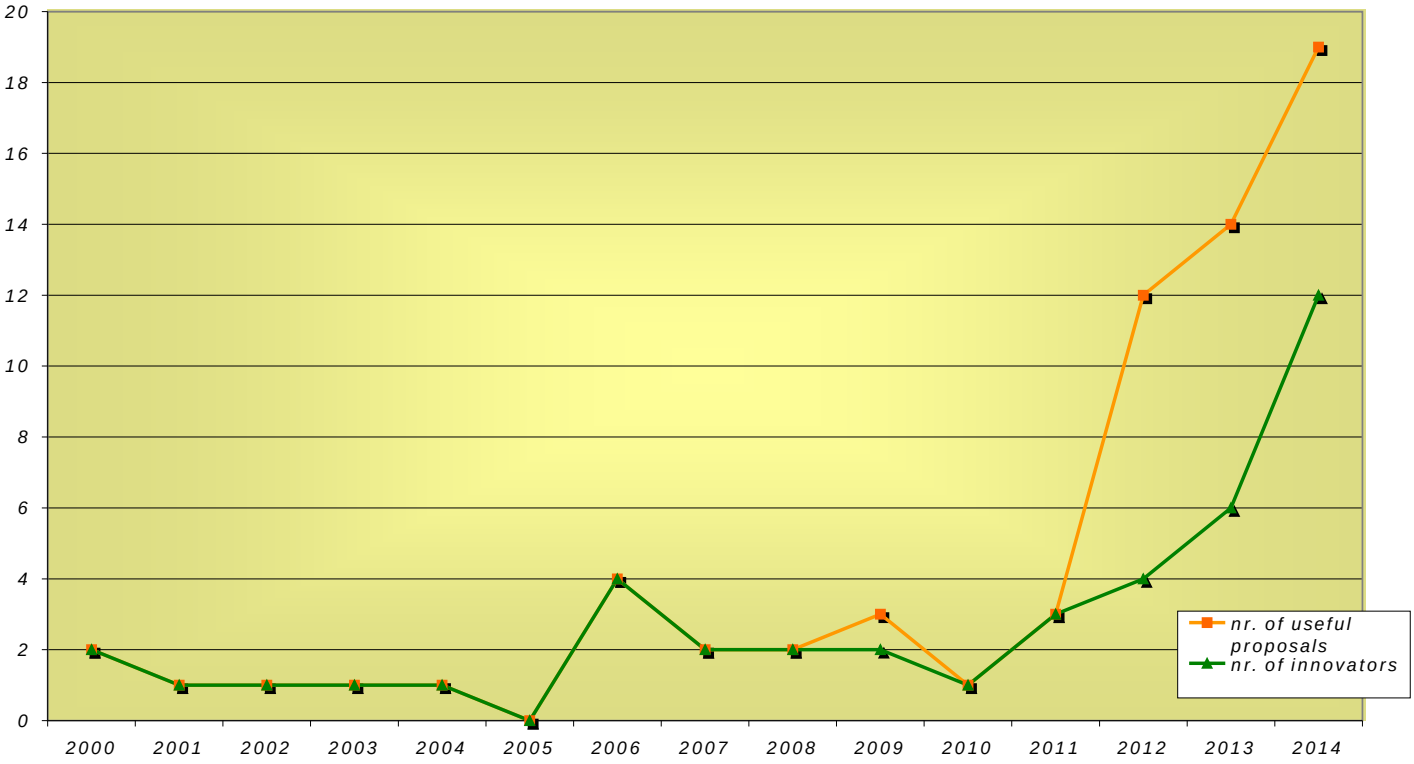


Fig. 2. Number of useful proposals and number of innovators from the rolling plant in the 2000-2014 period

The rolling mill is currently the leader in number of useful proposals. We have interviewed Vojko Slapšark, who is the innovator with the highest number of useful proposals in the company and works in the rolling mill.

After primary school, Vojko Slapšark finished a two-year education on then "SKSMŠ" school as a metalworker. In 1987, he got a job in the then Štore Ironworks, where he worked for 5 years. In the company SMELT he gained experience in Libya and Italy (as locksmith) from where he in 2007 returned to the homeland. Since then he has been performing the task of a rolling worker in our company. He continued his education and this year finished the programme "mechatronics technician". Now he is continuing his studies in Celje to become an engineer.

Vojko, does the fact that you are one of the most productive innovators, not only in the rolling mill but also in the whole company, surprises you?

»Yes. I have expected that there are more like me in the company ...mostly better ones...«

Why such expectations?

»It is my opinion that the employees don't want to be exposed ...«

If I rephrase the question, why do you create?

»It is my personal belief that there is definitely a financial aspect, but I also know that it is good to create something useful ... to work easier and produce higher quality...«

What are the advantages and disadvantages in the present system of performing innovative activities in the company?

»The advantage is definitely the encouragement of innovativeness by the company, from the financial aspect ... that the innovations are adequately evaluated ... I don't see any disadvantages at the moment. More I believe that people don not expose themselves ... A disadvantage is perhaps, but not of the company system, rate of innovation award taxation by the state. ... perhaps there is still some margin of manoeuvre left ...«

How would you attract your co-workers to innovative activities?

»It would be necessary to inform people, educate, organise workshops for encouraging innovativeness, team spirit, perform a systematisation of innovative activity stimulation ... that it is a permanent duty of a worker to be innovative ... because he can make his work easier ... and so the company profits too ...«

Do you have something up your sleeve?

»Always... when I go through the company and see that there are no possibilities for innovations left, I will probably, disappointed with myself, have to change the job ... (laughter)«

Thank you for the interview.

dr. Miha Kovačič, Manager of Quality
Ivan Končan, Technologist for Plastic deformation

Photo: Vojko Slapšark in working environment

Workshop renovation

Workshop is a place, where people do their work and spend their working time.The workspace has to be tidy, pleasant and adjustable, because it is an important factor for keeping the employees satisfied. The speed, accuracy and certainty how workers performtheir work, as well as feeling of comfort at work, depend heavily on physical and climatic conditions, in which they work.

In the original design and layout, workers themselves noticed that certain machines are set up inadequately and that there is not enough space to perform all the procedures necessary. They were particularly discontented with the layout of the “washing chamber”.The place, where they cleaned and degreased the dismantled machinery was too far from the position intended to repair these machines, too small for washing and cleaning larger machine part and out of reach to empty the contaminated washing agent and waste grease. Ideas appeared in 2010, when the line 550 was stopped, to renovate or reorganise the workshops in the Maintenance Department. To release the space, the demand was given to start building a warehouse for parts that had been stored in the workshop until then. In this way, a very much-needed space was released and is now used for repairing larger and heavier machinery (reducers, straightening machines, wheels, conveyor rollers...). All the work was planned in the way that as much as possible can be done by our workers. The operatives in the Maintenance Departure rearranged the facilities, set up racks, and if necessary made the storage racks themselves. The workers themselves also made two handy storage places, where smaller and lighter machine parts are kept. They also rearranged and in an exemplary manner prepared the electric parts warehouse in the Rolling mill. When finished with setting up the storage space, we started activities to move the partition wall in the mechanical workshop. This was also done by maintenance workers themselves. By this move, we gained even morespace in the mechanical workshop. By doing that, we created conditions for further procedures – floor replacement and moving of the washing chamber and oil storage.

The original floor in the workshop - impregnated wooden cubes laid in sand – didn't enable effective cleaning due to wear, damage and unevenness in the floor. It was also not possible to effectively clean spilled fluids. That floor felt untidy and neglected and as such didn't offer an adequate workspace. With new concrete floor with additional surface finishing, we got an even surface, which is easy to clean and maintain. It is also possible to remove spilled lubricants and other fluids effectively. In the workshop, heavy equipment with small footprint is often put down, so we protected a certain part of the floor with rubber, which was laid on floor and we placed 15mm thick steel boards on the rubber, to adequately protect the concrete floor from damage.

The story is not over yet by finishing the concrete floor in the mechanical workshop. A new washing chamber will have to be made to wash machine parts. It will be placed directly behind the gate from the rolling mill hall to the mechanical workshop, next to the transversal carriage. Such installation means the shortest way from entering the workshop to the location where the equipment is cleaned and prepared for servicing. The new washing chamber will be accessible by crane as well as forklift.

With all the above-mentioned activities, we gained a lot of workspace in the Maintenance department workshops, which can from now on be used for repairs of larger machine parts.

With these renovations and changes in the workshop, we will achieve better well-being of employees and higher quality of work, will change attitude towards tools and equipment and have a cleaner and brighter workshop with less grease stains on the floor.

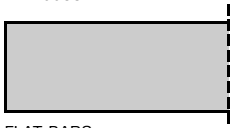
Despite the fact that there have been quite a few changes in the look of the workshop, we are still receiving ideas from employees what to improve and change to make our work more efficient and of higher quality. We are all striving for efficiency, higher quality of services and more tidiness, because this means lower maintenance costs with fewer standstills. In this way, we all contribute to better business results of the company.

Klemen Stopar, Assitant of Maintenance manager

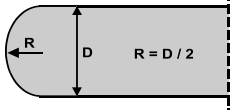
Photo: renovated workshop

CROSS-SECTION SHAPES

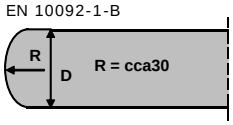
FLAT BARS WITH SHARP EDGES
EN 10058



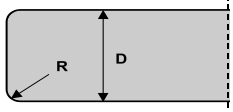
FLAT BARS
EN 10092-1-A



FLAT BARS
EN 10092-1-B

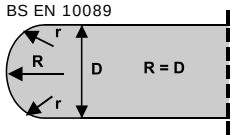


FLAT BARS
EN 10092-1-C



FLAT BARS
EN 10092-2

FLAT BARS
BS EN 10089

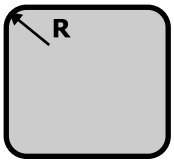


SPRING STEEL:
EN 10089: 51CrV4, 52CrMoV4, 56SiCr7, 56Si7, 61SiCr7, 55Cr3
WNr.:1.5025: 51Si7
WNr.:1.7792: 58CrMoV4

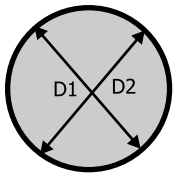
ENGINEERING STEEL:
Forging steel:
EN 10025-2: S355J2, S235JR
EN 10083-2:od C22R, C35R, C40R, C45R, C50R, C55R, C60R
EN 10084: 16MnCr(S)5, 20MoCr(S)5, 20MnCr(S)5
EN 10083-3: 30MnB5, 25CrMo(S)4, 34CrMo(S)4, 42CrMo(S)4,
DIN 17350: 31CrV3, 51CrV4
Carbon steel – for case – hardening:
EN 10084: C10E, C15E, C10R, C15R
Alloyed steel - for case – hardening:
EN 10084: 17Cr3, 16MnCr5, 20MnCr5, 18CrMo4, 20MoCr4, 17CrNi6-6, 20NiCrMo2-2, 18CrNiMo7-6
Carbon steel – for hardening and tempering:
EN 10083-2: C22E, C35E, C45E, C55E, C50E, C60E
Alloyed steel - for hardening and tempering:
EN 10083-3: 30CrNiMo8, 34CrNiMo6, 34Cr4, 41Cr4, 25CrMo4, 34CrMo4, 42CrMo4, 50CrMo4, 51CrV4
Structural steel:
EN 10025-2: S235JR, S275JR, S355J2, E295, E335, E360,
Steel for welded chains:
DIN 17115: 27MnSi5, 20NiCrMo2, 23MnNiMoCr54
Steel for cold forging:
EN 10263: C4C, 17Cr3, 17CrNi6-6, 18CrMoS4, 34CrNiMo4, 20NiCrMoS2-2,
38Cr2, 34Cr4, 37Cr4, 41Cr4, 16MnCrS5, 20MnCrS5, 25CrMo4, 34CrMo4, 22B2
Alloyed steel:
WNr.:1.5231: 38Cr4
EN 10083-3: 30CrNiMo8, 34CrNiMo6, 34CrS4, 37CrS4, 41CrS4, 25CrMoS4, 34CrMoS4, 42CrMoS4, 50CrMo4, 51CrV4
EN 10085: 31CrMoV9
Structural steel for housings of bearings:
DIN EN ISO 683-17: 100Cr6, 100CrMnSi6-4
Steel for heavy duty automotive parts:
WNr.:1.5231: 38MnVS5
VW-TL 1427: 27MnSiVS6, 27MnSiVS6+Ti, 30MnSiVS6
VW-500-30: 36MnVS4, 70MnVS4, 46MnVS5

EXEM STEEL WITH IMPROVED MACHINABILITY:
po WNr.: 20MnV6 EX, 38MnVS6 EX, 30MnB4+Ti EX
EN 10084: C15R EX, 16MnCrS5 EX, 20NiCrMoS2-2 EX, 20MnCrS5 EX,
EN 10084 in UNI 7846:16CrNi4 EX,
EN 10025-2: S235JR EX, S355J2 EX,
EN 10083-2: C22R EX, C35R EX, C40R EX, C45R EX,
EN 10083-3: 25CrMo4 EX, 41CrS4 EX, 42CrMoS4 EX
UNI 7845: 39NiCrMo3 EX,
UNI 7846: 18NiCrMo5 EX,

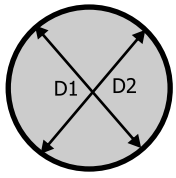
SQUARE BARS
WITH ROUND EDGES
EN 10059



ROUND BARS
EN 10060



BRIGHT ROUND BARS
EN 10278



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	Dimensions mm
EN 10058	50-200 x 8-62
EN 10092-1-A	60-150 x 8-36
EN 10092-1-B	50-200 x 8-35
EN 10092-1-C	60-120 x 14-67
EN 10092-2	120 x 12-20
BS EN 10089	60-120 x 27-42

ROUND

Standard	Diameter / Process
EN 10060	20–68, 70, 72, 73, 75, 77, 78, 80, 82, 83, 85, 90, 95, 100, 105 mm / rolled
EN 10278 (h11)	18–105 mm / peeled
EN 10278 (h9)	18–100 mm / peeled

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

ISO/TS 16949
BUREAU VERITAS
Certification

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