ŠTORE STEEL

Internal information magazine, No. 2 - 14

What do we wish?

The year is coming to an end. The year, in which we increased the volume of production and sales and the business conditions grew harder. The banking sector does not fulfil its part in economy, the state does not enable comparable competitiveness to companies.

On the photo: Laying the foundation stone for the new continuous casting device

However, we are pleased with the start of our most important developmental investment, building of the new steel continuous caster. Extensive construction is in progress. The execution is planned not to interrupt the regular production. We are planning the start of production trial run at the end of 2015. We are following with the new device and investment in development our customers' development trends, their needs and demands.

We are planning to increase sales in 2015, in spite of many variables and dangers, which are present because the Chinese are launching their steelwork production surplus worldwide.

We believe in firm business partnerships, which we will create by focusing on satisfying customers' needs. We will increase the volume of product finalization, wherever market opportunities will arise, since we have enough knowledge and ideas for that.

I wish to all business partners and employees that in the end pros will prevail and ensure us a brighter future.

Marjan Mačkošek,
Managing Director

On the cover: ladle furnace

Construction work at the steelworks

The company's success depends on all employees

ETRA manufacturing, trade and services is a successful company with 72 employees and more than Ä5 million annual turnover. The name of the company is an abbreviation of its basic activities: electronics, telecommunication, computer science, regulation, robotics and automation. Franc Preložnik, the manager of ETRA, founded the company with two employees in 1994, had been before that employed in the Štore Steelworks.

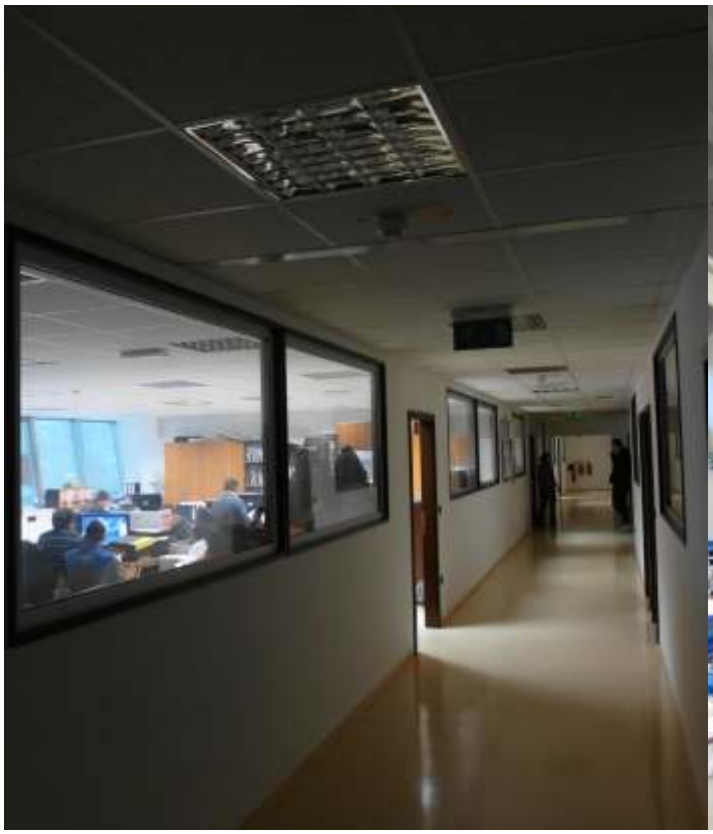
Mr. Preložnik, you started your entrepreneur career by offering services for ironmaking companies. Was their number high enough to cover the cost of two employees?

We performed maintenance of industrial electronics, automation and wireless communication for them, which was something new at the time. That opened us new market opportunities. The demands for remote control or regulation of devices were rising.
Perhaps a few examples: telephony links among telephone exchanges and telephones, command transmission over FM stations and control of church bell ringing.
Let me further mention development of modules for control systems, which were used for controlling one-way drives to various applications in industrial electronics.

You used such control when saving the rolling production after breakdown of the electromotor on 550 line. It took a longer repair, because it was impossible to get the same motor on the market?

Yes, that is true. Our first attempt of saving the production in the Rolling Plant was, when water flooded the main motor. The main electromotor on the line was driving four duo stands; the fifth contracting stand was driven by a smaller electromotor. After having built the 300 line there was its driving electromotor left unused in the Rolling Plant. The team that came to repair the main electromotor breakdown came to an idea to drive the whole line by two electro motors – the previous driving motor of the 300 line and the electromotor on the contracting stand. The contractors mechanically connected all the stands; I developed the control, which synchronised the rotating of both electro motors. We succeeded and the production was enabled for the entire period of the main electromotor repair.

Photo above: Franc Preložnik



The second time, we were saving a defect on the main drive control, which happened at start-up after refit. I remember that my wife and I were on the way through the Slovenian Mountain Trail and had to stop the hike. The repair was very demanding and took approximately a week. At this occasion, we built in a module, which we developed ourselves.

Is industrial process automation, where the previously mentioned control could be classified, the main activity of your company?

We started to intensify the development of industrial process automation in 2001. Development in the field of information and communications technologies was very rapid and digital electronics and devices were progressively cheaper. This increased accessibility of automation for companies. Our company uses programmable logic controllers (PLC) by Siemens, of which many are implemented in Štore Steel. We were contractors at the replacement of controllers on the 800 rolling line, where there are approximately 2,800 input and output signals. The replacement took us 12 days, although we had prepared the whole program in advance. We are particularly proud of that.
In the year 2013, we started with production of highly intelligent production systems and in 2013 with planning and production of high rack automatic warehouses.

Development is an essential part in the activities of your company. How do you manage it?

More than 5% of the company income is invested in education and development. We have an own research and development team registered.
Searching for unique development solution present us a challenge. We developed solutions for independent system for raw milk sale, bottle vending machine, a sophisticated calling system in several variants, parking monitoring device, smart house, lighting saving module, wave energy system, electric vehicle charging station, dynamic carriage weighing station and more.

You are recognized as a company of countless activities. With the new business building, you added a restaurant and a shop next to it; you offer services in the field of safety and health at work. Is it still possible to control it all?

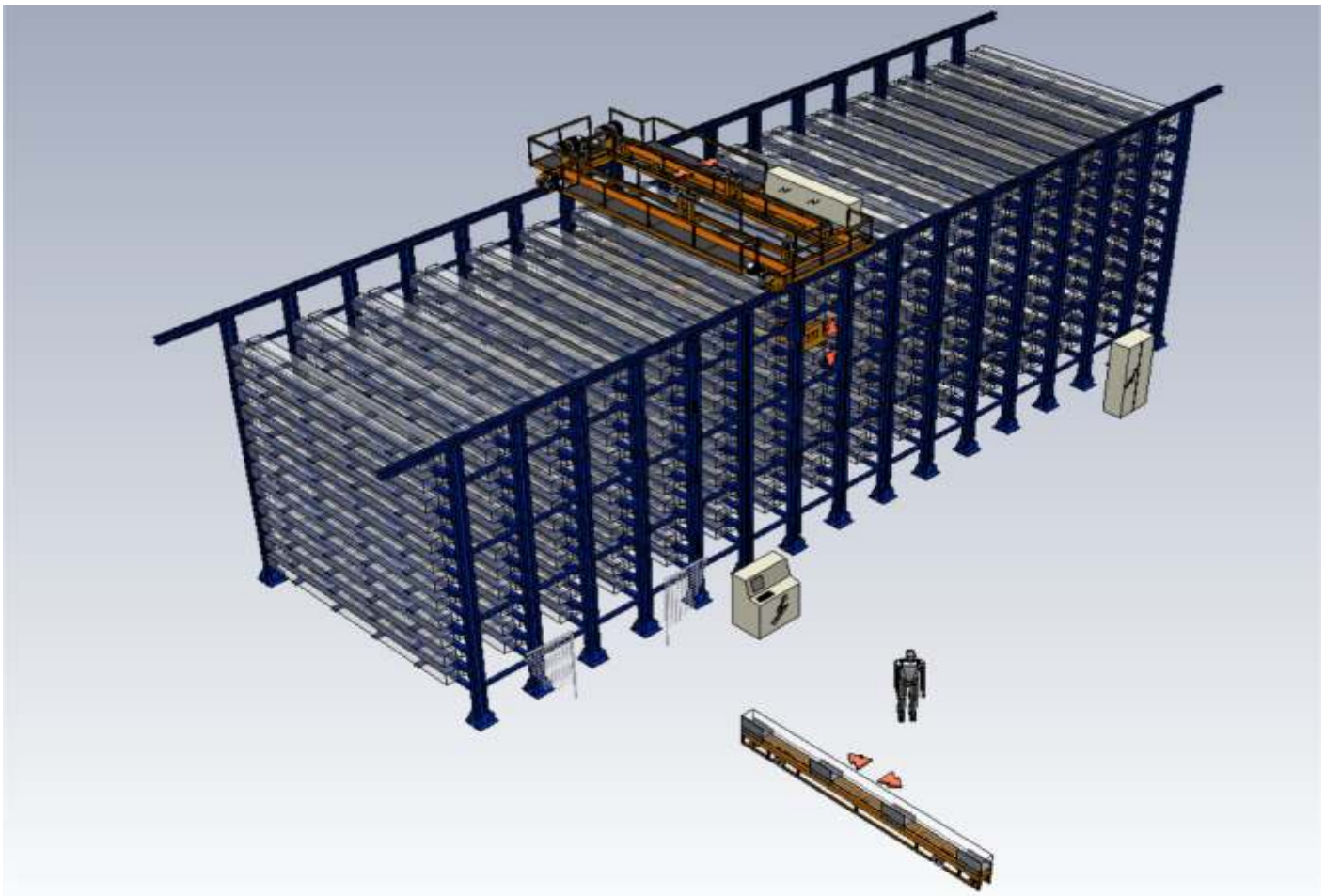
It is true that is not the same as it was at the beginning. By moving to the new business premises, new opportunities arose for development in various fields. Certain changes were necessary to control the business. First, we started with the acquirement of the ISO9001 standard. A good counsellor in this field helped us prepare a standard, which is tailored to our needs and helps us in business processing. It is understandable that functioning of the company depends on all the employees, who co-created it. They also accepted organisational changes, which were definitely needed, if we want to reach the set goals and act in accordance with the company vision.

Interviewed by Gorazd Tratnik

Left and right above: production facilities

Rolling Plant Development

The last ton of rolled profiles came from the old 550 line in July 2012. About 3.5 million tons of profiles have been manufactured in its lifetime. A development era of the Štore Rolling Plant ended by that and a new one began, which is based around the new continuous rolling line.



Regardless of further needs for development of profile rolling technology (thermo mechanical rolling, profile cooling), the emphasis of further rolling plant development will be naturally oriented toward adjusting the capacities and increasing the quality of rolled profile after-treatment. From the standpoint of controlling the material flow and minimizing interphase stock, it is important to continuously identify and eliminate bottlenecks. Their control in the finishing phases of the process is particularly important. The productivity of the manufacturing line as a whole is of vital importance for the business success. The productivity of individual phases is of lesser importance.

Future of Department for Final operations in Milling Plant preliminary project is a vision of future needs and looks of the department at 250,000 tons of annual theoretical capacities of the continuous rolling line. In the four-shift operating scheme this means 330 workdays or in average 750 tons of production per day. That is the quantity the Department for Final Operations must control, heat-treat, straighten, cut and deliver to the sales warehouse or the Cold Processing Plant for further processing.

Preparation of transparent starting points was of course essential when planning the new Department for Final Operations. It is obvious that the future and particularly the trend in ratio between flat and round rolling program are hard to predict. The goals of the preliminary project were clear regardless of that. We have to define required operations for profile after-treatment and its capacity at annual production of 250,000 tons; define required investments based on the present situation and capacities of the existent equipment; to prepare a new storage plan in the process of after-treatment of rolling stock; prepare a new plan of equipment placement with the goal of increasing automation of profile processing (i.e. processing lines without intermediate stops between phases); get preliminary offers for the possible new equipment (new machines, storage and transport systems); define necessary divestments in case of placing machines in the area of the present equipment of the 550 rolling line and to plan new logistic connections to the Cold processing Plant and Transport and Storage Centre.

The drawing above: View of the automatic warehouse

An analysis of existing transport routes, theoretical and realistic material production norms at 250,000 tons of annual production had to be made for two scenarios and based on existing means and data: 35% of round profiles – 65% of flat and square profiles and 60% of round profiles – 40% of flat and square profiles.

A four-shift-operating scheme is planned in the Department for Final Operations, which was considered when defining theoretical production norms (number of required machines) for the both of mentioned scenarios.

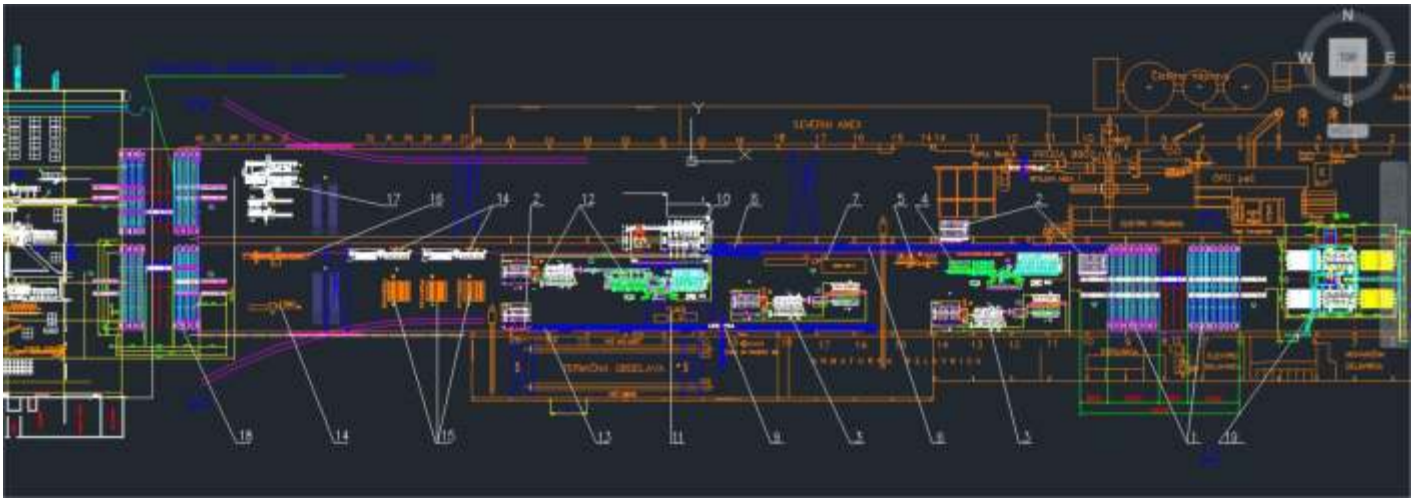
According to present trends, the alternative with the majority of round profiles (150,000 t) seems much more likely. The share of flat and square profiles has been in decline in the recent years (estimated capacity 100,000 t). The outline, made on such assumption, is represented in the figure at the bottom of the text. The key emphases of the new plan are as follows. Profile storage in the after-treatment process and in the sales depot is executed in automated storage racks, the sales storage rack connects the Rolling Plant with the Cold Processing Plant and therefore there is no transport of material with railway carriages. Two chamber annealing furnaces with 50 tons of total daily capacity are added for heat treatment requirements. The existing automatic control line for round profiles is upgraded and two new lines of higher capacity, which are equipped with automatic strapping of bundles, are added. The entire cutting centre and the RS-20 straightening machine are moved from the Cold Processing to the Rolling Plant. The refurbished Bronx PBR-6 straightening machine is reset and another Mair RMS 2-130 straightening machine is added. Two new semi-automatic devices for visual inspection of flat and square profiles are added. The storage racks are connected to individual machines by a system of conveyor rollers and transversal transporters for bundles. This reduces present issues of bridge cranes' crossing routes.

With such a plan and actual annual production of 250,000 tons and considering a four-shift-operating scheme there would be theoretically required between 130 and 140 employees in the Department for Final Operations. About Ä 20 million would be required for the investments.

It has to be emphasized that the expected changes can be introduced gradually through several years. Which puts the financial means requirements in a completely new perspective.

The reality could be of course entirely different and will mostly depend on future market situation and quality level of rolled profiles. The higher the quality of rolled profiles, the less requirement there will be for unplanned heat treatment, control, straightening and re-cutting. By that, there will be less need for additional capacities and consequently financial means. It is all up to us.

Čedomir Minić,
Head of Department for Final Operations



The drawing above: Analysis of spatial capabilities and material storage in case of 60% round material production

LEGEND:

1- *Production automatic warehouse*
2- *Transversal transporter for bundles*
3- *Line for chamfering – ACL – weighing – automatic cutting of round profiles*
4- *Mair RMS 2 – 130 straightening machine for round profiles*
5- *RS – 20 straightening machine*
6- *Conveyor rollers for bundles (connection between continuous rolling line and production automatic warehouse)*
7- *Bronx PBR 6 straightening machine*
8- *Transversal transfer of bundles onto conveyor rollers toward production automatic warehouse*
9- *Cross rotating device for material destined to annealing furnaces*
10- *Finished bundles coming out of continuous rolling line.*
11- *Feroflux – surface control*
12- *Line for straightening – cutting – chamfering – ACL – weighing – automatic strapping of bundles for round profiles*
13- *Conveyor rollers for bundles (connection between roll and guide workshop transversal carriage to transversal carriage at the end of the annealing department)*
14- *Hydraulic presses for flat and square profiles*
15- *Devices for visual inspection of flat and square profiles*
16- *Valdarno shear*
17- *Saws (KASTOtec A4 bandsaw – 2 pieces and KASTOspeed C14 circular saw – 2pieces)*
18- *Commercial automatic warehouse*
19- *Chamber annealing furnace – 2 pieces*

Introduction of Boring Procedures

Market presents daily new requirements to suppliers. Car manufacturers in particular are the motor of development and changes. If you want to be a part of this big industry, you simply have to respond to all the challenges. You are otherwise eliminated from the competition and coming back is very difficult.

We are very well aware of that in our company and this is why we try to follow the customers' demand. An independent and globally oriented steel manufacturer following the customers' demands is the vision of our company. All the additional machining of rolled and peeled steel means a higher degree of our steel processing and by that, we create a higher added value i.e. profit.

An inquiry from our customer Muelles from Spain came in this spring for an annual supply of approximately 4,000 t of cut spring steel in pieces with a bore (Fig. 1). We have been delivering to this customer flat spring steel in 6-meter length or pieces (cut to the desired length). The demand for a bore in the cut pieces was a new one. The company management made a decision to make a serious attempt to realise the possibilities of boring pieces of cut flat spring steel. That is a way to get new orders and simultaneously a product of higher added value. The realisation of the task was entrusted to the Cold Processing Plant.

Due to urgency of the first deliveries, we tried to find a solution for the boring services. We connected to ISI, company for the handicapped, from Štore and agreed on production of the first bored pieces. The test quantity was realised in April 2014 (Fig. 2). The test quantity was successful and confirmed by the customer. Since May we have been delivering approximately 700 – 1,000 pieces (30 – 50t) per month of this steel to the customer. In the Cold Processing Plant is cut-to-length material transported to ISI, where individual pieces are bored according to plan, labelled, and put back to bundles. The bundles are returned to the warehouse, from where they are delivered.

Top left: hole in the rod; Top right: Lot for delivery to the purchaser in Spain

Simultaneously with the development of the boring technology with ISI, we started considering the boring being performed in our plant, due to logistics and cost. We tried to find out where and how to bore, and how to manipulate the bars, because they weigh up to 50kg. We came to an idea to use the existing magnetic manipulator for manipulating the pieces, which had been used for stacking of cut flat steel on bandsaws. Bandsaws with manipulator were namely practically not needed anymore after the investment in the robotic circular saw and reduced orders. The material manipulation issue was solved. Next, a boring machine had to be found, which would, together with the manipulator, form a device that would enable us to perform boring of cut-to-length flat spring steel. We connected KLH Trade, which were ready to produce such a boring machine and merge it to our manipulator, so that the device would function in automatic mode. KLH Trade further connected ETRA to make the software for automatic boring and manipulation. In June 2014 a contract was signed with KLH Trade totalling Ä38,000 for the complete production of a device for boring cut-to-length flat spring steel. The delivery date was at the end of September. Due to the unique nature of the device and a lot of internal expertise (Fig. 3) was the start-up delayed until December 2014.

The boring device is designed to operate in a completely automatic mode. The cut bundle is by a crane delivered to input conveyor rollers of the boring device. The bundle is placed under the manipulator, which puts bar after bar onto the boring unit, where the material is bored and chamfered. The manipulator then grabs the bored bar and places it on another conveyor belt, where another bundle is being formed. The cycle for a bar lasts a minute. This boring device enables realisation of over 4,000 bored cut-to-length flat spring steel pieces and so creating higher added value. A lot of effort and knowledge of employees in the Cold Processing Plant were invested into the realisation of such a device. The logistics and working principle of the boring device is the result of their own expertise. Their “wishes” were successfully realised by the companies KJH Trade and ETRA.

Alojz Gajšek, Head of Cold Processing Plant

Photo above: drilling machine

Presentation of LIBS instrumental analysing system

Needs for analyses from the production plants are growing fast – demanding expansion of analysis volume, higher frequency of analyses and faster analyses results.

LIBS (laser induced breakdown spectroscopy) is a chemical analytical measuring technique of spectroscopy, which we will start using with the purchase of a new instrument.
The instrument works by ablating a small quantity of material from the sample surface by a focused laser beam with energy between 1 and 50 mJ. Laser pulses form on the sample a plume-shaped plasma.
A fibre optic cable transfers light emitted by the plasma into an ICCD spectrometer, which measures the received light in the bandwidth from 200nm to 900nm on the programmed wavelengths of the light spectrum. The measuring camera with built-in time control lets the light into the spectrometer in programmed time intervals from 50ns to 1ms in 25ns steps, which are synchronised with the laser pulses.
A computer program calculates based on input calibration settings and by using mono and multivariate chemometrical algorithms the mass concentration of elements present in the sample.
Beside for determining quantity, the instrument can be used for quality determination as well, where it determines which elements are present in the sample by comparing the sample light spectrum to spectra, which are saved in the library. Therefore, we can identify the material in the analysis.
The built-in micro camera enables us to localize and identify the contaminators in a material, detect surface defects, analyse inclusions etc.
Using multivariate chemometrical methods enables us to determine chemical and physical properties of a material from the measured emission spectra of the sample, which are otherwise dependant on the sample chemical composition and are as such not measured directly. This technique could be for example used to determine material humidity, lime reactivity, indirect determination of steel machinability etc.

photo above: charging the electric arc furnace

We can analyse practically all the elements of the periodic table, which have a concentration higher than 10ppm. The instrument is particularly highly sensitive to elements with a low molecular mass, with the exception of noble gases. It is ideal to analyse halogen elements and impurities of transient elements.

This analytical technique will be used mostly to analyse steel slag. It will be also used to analyse ferrous alloys and other additives in steel manufacturing, dust after cleaning the steelwork's flue gases, foireproof materials and additives in steel manufacturing, non-ferrous metal materials and to determine the type and size of steel inclusions.

It is important to know that the instrument as delivered is not ready to perform the needed analyses. It has to be programed to optimal laser and spectrometer analysis conditions and calibrated for each material and each element in every material which analysis is planned. For example, if we want to analyse five different types of materials and ten elements in each, we have to create five analysis programs (methods) and at least 50 calibration curves. Each calibration curve is determined after having measured ten standard reference samples with different content of individual element. Consequently, at least 500 standard reference samples are needed. The colleagues in the chemistry laboratory will have to perform a lot of work before the instrument will be ready to use.

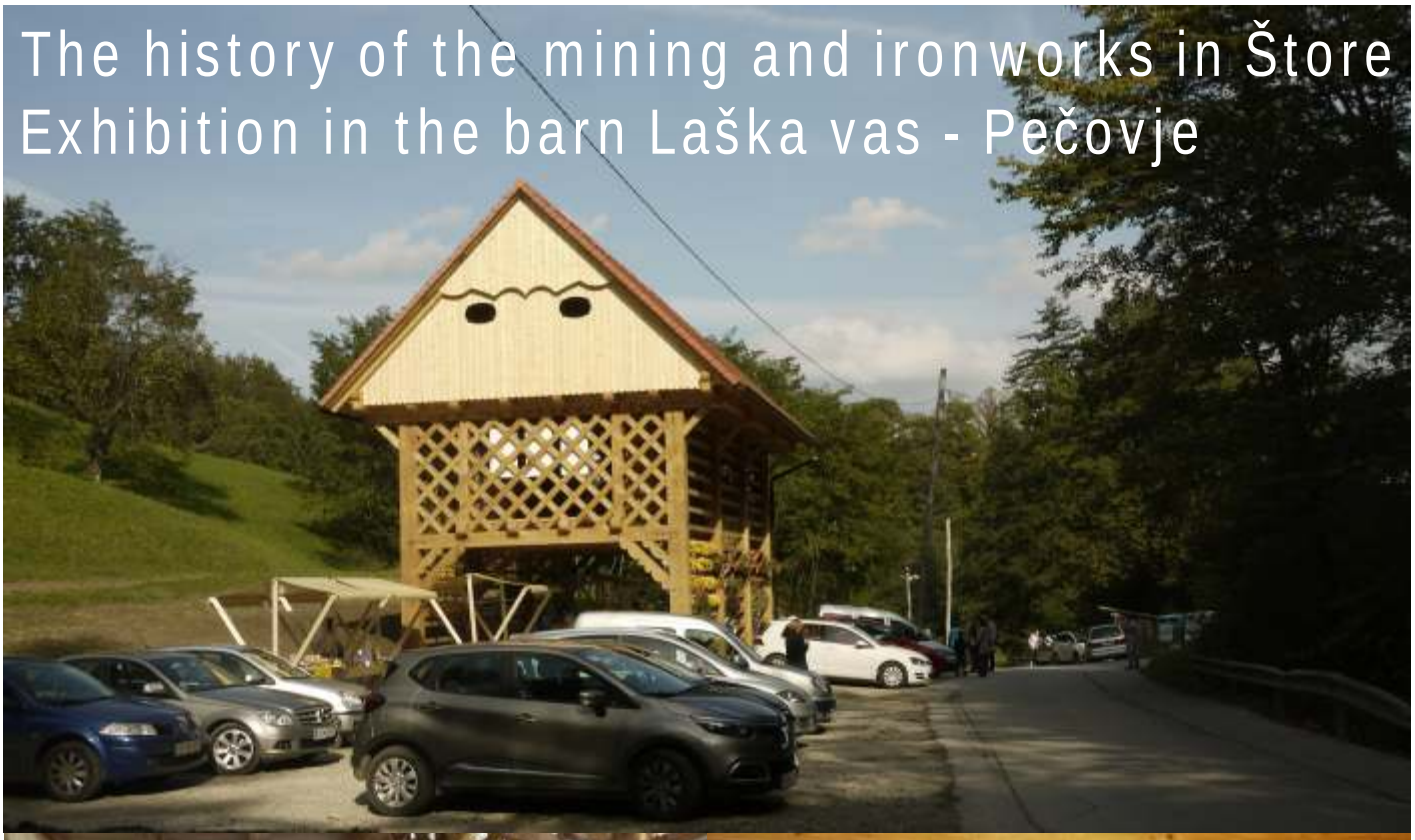
In everyday work, the LIBS analytical technique will enable us to abandon the outdated wet chemical analytical procedures, where substantial amounts of chemicals are needed and which are either caustic, flammable, stifling or toxic. After the long-lasting analysis, the used chemicals have to be disposed in an ecologically friendly way.

With the new method is the sample prepared by mechanical procedures only, is analysed in the measuring instrument, which last from 30 seconds to a few minutes at the most and the instrument simultaneously displays the results of the analysis for all the elements, which we need to determine the properties of a material.

Jože Hebar, head of chemistry laboratory

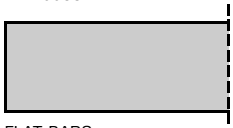
Photo above: flame cutting billets

The history of the mining and ironworks in Štore
Exhibition in the barn Laška vas - Pečovje

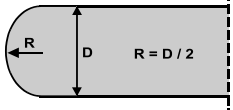


CROSS-SECTION SHAPES

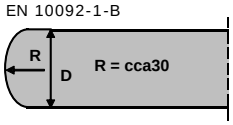
FLAT BARS WITH SHARP EDGES
EN 10058



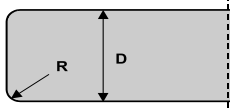
FLAT BARS
EN 10092-1-A



FLAT BARS
EN 10092-1-B

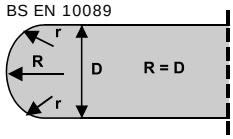


FLAT BARS
EN 10092-1-C



FLAT BARS
EN 10092-2

FLAT BARS
BS EN 10089

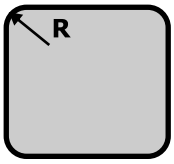


SPRING STEEL:
EN 10089: 51CrV4, 52CrMoV4, 56SiCr7, 56Si7, 61SiCr7, 55Cr3
WNr.:1.5025: 51Si7
WNr.:1.7792: 58CrMoV4

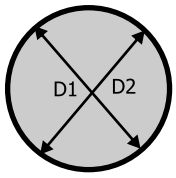
ENGINEERING STEEL:
Forging steel:
EN 10025-2: S355J2, S235JR
EN 10083-2:od C22R, C35R, C40R, C45R, C50R, C55R, C60R
EN 10084: 16MnCr(S)5, 20MoCr(S)5, 20MnCr(S)5
EN 10083-3: 30MnB5, 25CrMo(S)4, 34CrMo(S)4, 42CrMo(S)4,
DIN 17350: 31CrV3, 51CrV4
Carbon steel – for case – hardening:
EN 10084: C10E, C15E, 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,

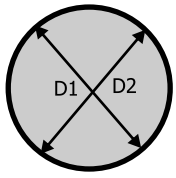
SQUARE BARS
WITH ROUND EDGES
EN 10059



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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