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**WORKSHOP ON THE SITUATION IN THE STEEL INDUSTRY IN THE NIS**

**THE STEEL INDUSTRY OF THE REPUBLIC OF BELARUS  
STATEMENT BY DR. Y. DZYACHENKA**

*The Workshop will be held in Paris on 2-3 November 1999.*

Contact: Mr. Wolfgang Hübner, Head of DoT and Steel Unit, STI; Tel. (33 1) 45 24 91 32;  
Fax: (33 1) 45 24 88 65; Internet: Wolfgang.Hubner@oecd.org

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## THE STEEL INDUSTRY OF THE REPUBLIC OF BELARUS

### STATEMENT BY DR. Y. DZYACHENKA

Byelorussian Steel Works (BMZ) situated in the town of Zhlobin is the only metallurgical enterprise in the Republic of Belarus.

#### 1. General information about BMZ

1. Byelorussian Steel Works (BMZ) is a state enterprise belonging to a category of mini plants with an incomplete metallurgical cycle having pellets and scrap as main raw materials. The plant was erected and commissioned on a “turn-key” basis in 1984 by “Voest-Alpine”, an Austrian state company, with participation of “Danieli”, an Italian company, and 30 companies from Germany, Italy, Sweden and other countries taking into consideration the latest achievements of science and technology. During commissioning of the first stage the most advanced and highly effective production equipment was installed at the plant. From 1984 till 1991 they continued to build the plant and additional capacities for steel, rolled material and steel cord production including essential infrastructure such as oxygen station, mechanical-repair shop, water treatment plant with a closed cycle, production transportation shop and others were commissioned step-by-step. At present Byelorussian Steel Works is among the three leading enterprises of the Republic of Belarus as per the total volume of marketable product.

2. The main technological line consists of a scrap yard, two electric furnace melt shops, a rolling mill and two wire shops with steel cord production. A more detailed information about steelmaking:

- Electric furnace steel melting shop No.1 has the following main production equipment:
  - two electric arc furnaces (EAF) equipped with transformers 75 MVA;
  - two units for metal finishing giving the possibility of argon (nitrogen) blowing of liquid steel in a tundish through a submerge lance and equipped with pinch-rolls for feeding wire with silicocalcium or other agents;
  - two continuous casting machines (CCM) allowing to cast ingots with the cross-section of 125 x 125 mm.
- Steel plant No. 2 (quality steel plant) comprises the following production equipment:
  - electric arc furnace with 75 MVA transformer;
  - ladle-furnace providing arc heating of steel, electromagnetic stirring in the ladle, argon bottom blowing, feeding of alloying slag-forming materials and wire with fillers by two pinch-rolls;

- two degassers, one - circular type, the other – chamber type;
- CCM for casting ingots 250 x 300 mm and 300 x 400 mm.
- Some details about rolling mill production.
  - Bar plant consists of two rolling mills: one fine section - wire mill, the other – large section mill.
  - Continuous fine section – wire mill 320/150 produces the following types of rolled material from 125 x 125 mm concast or rolled billets:
    - angle 20x20-50x50;
    - channel 6,5;
    - reinforcing steel Nos. 10-35;
    - round or hexagonal material diameter 10-40;
    - wire rod 5.5 mm in coils for steel cord, bead wire and hose wire;
    - wire rod 5,5 mm; 6.5 mm; 8 mm; 9 mm; 10 mm; 11 mm; 12 mm of spring and cable steel, general-purpose steel, steel for cold heading and extrusion.
  - production of reinforcing steel 8; 10 and 12 mm in coils has been developed.
- The following technological operations are executed during rod production in coils:
  - heating of billets up to rolling temperature;
  - continuous rolling in fine section – wire mill and ten-stand “Morgan” block, wire rod is cooled in water cooling line before the block;
  - cooling of wire rod with water cooling devices, formation of windings and their laying on “Stelmor” conveyor, forced air cooling of windings along the conveyor, laying of turns into the coil pit;
  - transportation of coils with the hook conveyor, mechanical compacting and tying of three coils into one bunch;
  - storage and / or shipment.
- Technological process of bar production includes the following stages:
  - charging of billets into the reheating furnace;
  - heating of billets up to the rolling temperature;
  - rolling with continuous twenty-stand fine section - wire mill;

- thermal treatment with water cooling devices with controlled water consumption (used in production of heat-treated reinforcing steel);
- cooling on the cooling bed;
- cutting rolled material to the required length with cold shears;
- mechanical tying of bundles;
- formation of bunches;
- weighing and labeling a tag;
- storage and / or shipment.

3. It is clear from the above that one group of equipment is used in wire rod production: block, “Stelmor” conveyor, coil pit, conveyor, tying machines; and the other group is used in bar rolling: cooling bed, cold shears, tying machines indicated with Roman figure.

4. Large section mill produces rolled material of carbon and alloy steels from concast billets with the cross section of 250x300 mm and 300x400 mm, cast with continuous casting machine No.3 (CCM-3) of the electric steel plant. Types of rolled section include:

- rounds diameter 80; 90; 100; 110; 115; 120; 130; 150 mm;
- square with the cross section of 100x100; 125x125 mm;
- production of other types of rounds from 80-150 mm diameter has been developed according to the requirements of certain contracts, for instance, in inches.

5. Production process includes the following technological operations and equipment:

- billets charging into the preheating furnace (billet temperature is less than 200°C) or into the reheating furnace (billet temperature is from 0°C to 800°C);
- heating up to the rolling temperature;
- removing furnace scale from the surface of warmed up billets with the hydraulic descaling device
- rolling in duo-revercing stand;
- cutting rolled metal to length, removal of front and bottom end with the hot abrasive saw;
- hot marking of metal with stamping machine;
- cooling on rack-type cooling bed;
- placing material at the intermediate store with magnet cranes;

- depending on the assignment rolled material can be exposed to softening or anti-flake treatment by placing it into the pits where steel can be heated to 790°C, soaked and slowly cooled with a set rate. Pits are equipped with the required devices and means of automation;
- straightening of cooled and heat-treated material with a rotary mangle;
- rolled material descaling with shot blast machine;
- surface quality control by magnet – fluorescent method with “Meccana” device;
- inner defects control with an ultra-sonic device equipped with a colour-marker;
- surface defects cleaning with emery machines;
- cutting rolled metal to ordered length, sampling and removing of defective areas with cold saw;
- weighing, packing, tagging (marking of bundles);
- storage and / or shipment.

6. BMZ products are exported to the U.S.A., Germany, Sweden, Norway, Finland, Rumania, Middle East and South - East countries, Africa and C.I.S. countries. BMZ is the biggest steel cord producing plant among operating enterprises and it is among five leading producers, besides, it produces wire for tire bead rings and wire for reinforcement of high-pressure hoses.

7. In 1998 the plant achieved the following results:

- Concast billet production – 1300,1 thousand tons per year, including 474,6 thousand tons of export (design capacity – 1100 thousand tons), excluding C.I.S. countries.
- Marketable rolled materials – 775,1 thousand tons per year, including 270 thousand tons of export, C.I.S. countries excluded.
- Total volume of production of the two steel wire plants – 95,2 thousand tons per year
- including 34,7 thousand tons of export (design capacity – 70 thousand tons), C.I.S. countries excluded.
- Steel cord production – 43,2 thousand tons per year, 21,4 thousand tons of export included.

8. On the whole, the volume of export in 1998 reached 51% of marketable production cost and it amounts to 72% including export to C.I.S. countries.

9. Number of employees equals to 12500 people.

10. A steel plant builds towns. Population of Zhlobin is 70.000 people. Average number of family members is 3,4 per one worker. 12500 multiplied by 3,4 gives approximately 40000 people. Thus, most of the population of the town is closely connected with the plant. BMZ has built a large number of flats and continues this work. According to our balance sheet to 1.01.99 we have 557 000 m<sup>2</sup> of housing on our

balance, 9 kindergartens with the total number of 2000 children, a palace of culture, a gymnasium, public services including 6 canteens, 3 cafes, 7 snack bars, 8 shops. Our employees: families with many children, men returning from the army and/or those having poor housing conditions, pensioners, etc. – exercise a considerable support at the account of the plant finances. Each year a collective agreement is signed between employees and administration of the enterprise together with trade unions. All questions are reflected in this agreement including social problems solved by the administration.

## **2. Technical particulars of development of steel production at BMZ**

11. On the basis of modernization program and technical rearmament of Byelorussian Steel Works with participation of Voest-Alpine (Austria) approved by the Ministry of Industry of the Republic of Belarus of 06.11.96 and a business-plan, modernization of CCM and ASF of steel plant No. 2 was carried out in 1997-1999.

12. Modernization of CCM 3 included:

- installation of low – frequency capacity controlled coils for electromagnetic stirring at 2 levels;
- mounting of straight molds providing a better, even heat cooling along the perimeter in the zone of crystallization;
- installation of a new system of secondary cooling to decrease cracking of an ingot;
- introduction of an automatic control system of continuous casting on the basis of super powerful PCs of the second level and use of new software to control the mechanisms, hydraulic systems, etc.

13. Modernization of an electric arc furnace to produce high-quality structural steel grades and steel for tire cord. Among the implemented measures it is necessary to point out usage of the following devices:

- system of bottom argon blowing of fluid bath for intensification of heat exchange and melting processes;
- manipulator for simultaneous blowing of oxygen and carbon-containing powder under a slag layer for slag churning;
- a special burner at the bottom of the furnace giving the possibility to heat charge, to feed oxygen into steel, to add carbon-containing elements during different periods of melting;
- door-type rotating gas burner for heating and melting of charge in the area of the operating window;
- three conductive electrode consoles of welded box structure of copper-clad sheets manufactured by vacuum rolling (Voest-Alpine patent) with hydraulic cylinders;
- three electrode clamping devices;
- a coil from the basic side allowing to use long electric arcs for melting;

- a new high-pressure hydraulic installation for all types of furnace movements;
- a modern system of automatic adjustment of furnace pressure to minimize air inflow taken into the furnace trough untightness;
- VAI digital system for electrode control with a system of visualization, i.e. electrical parameters, such as current, voltage,  $\cos \phi$ , net capacity, reactive capacity, etc. are displayed and entered into the memory;
- The second automation level of EAF No.3. Electric capacity of each electrode and water temperature of the panels is displayed on the monitor.

14. In July 1999 these measures helped to decrease: time of furnace operation under current from 62 to 54 minutes; and specific consumption of electric current per a ton of liquid steel from 533 to 476 kW/h.

### **3. Policy at the steel, bar and steel cord market**

15. Producer's position at the market has an exceptional importance. BMZ markets are situated on different continents and marketing policy of the plant is built up in accordance with substantially variable conditions of demand and solvency of buyers. To strengthen its position at the markets of C.I.S. countries, especially in Russia, and to prevent decrease of the volume of steel, bar and steel cord production and sales the plant practices complicated system of clearings to meet the requirements of production in energy resources. Flexible schemes of financing are used at the markets of foreign countries giving the possibility to attract short-term finances for expanding the production. The plant works individually with each large buyer so as to provide maximum quality and price competitiveness of its products.

16. The basis of our policy is a deliberate attitude to the market behaviour and care of partners due to the following methods of co-operation:

- Long-term co-operation method.

Companies that have been cooperating with BMZ for a long period of time and that have proved their qualification and have done good work with BMZ products at the export market have preference in realization of projects connected with co-operation at those markets and with the product in which these companies specialize.

- Step-by-step method and progressive joining the market.

To organize long-term co-operation with the largest users, a thorough study of requirements of these companies for this type of product is carried out; we try to understand the problems the company meets working with traditional suppliers. To gain confidence for BMZ as a reliable supplier of quality products, corporate standards of the company are introduced at the plant, trial lots are supplied before large-scale sales; operative response to the remarks and desires of the buyers has become a rule.

- Control method of movement of goods at the developed market.

Tracking of goods on their route to the users. During production we have to know who will use the product, how it will be reworked, the assignment of the product manufactured with BMZ goods as raw material. Handling of the goods is monitored during transportation, i.e.

loading/discharge inspection, inspection at the port of loading, attraction of neutral inspecting organizations, control of supply to a certain user, assessment of the result of product processing, development of measures for maximum satisfaction of a buyer's requirements.

- “Open-book policy”.

To supply goods to export market through trading companies, a policy of “open final prices” is established. This policy is based on understanding of inadmissibility of ignorance of sales potential of every individual market and on each individual product and comprises establishment of agreements with partners when BMZ knows final commercial value of its product already supplied to the end user less transport expenses, payment of import taxes, bank interest, storage costs, trader's commission agreed with BMZ.

17. An indispensable condition for carrying out sales in the situation of the present competition is quality of product to be mainly accepted by users and independent experts (third party). We speak about certification of products and quality assurance system.

18. Activity on certification of products began in 1991 and in 1994 we started to introduce quality assurance system. This activity allowed us to achieve recognition of the following:

- in July 1992 after testing BMZ products by “TUV Berlin Brandenburg” company the plant was acknowledged as a steel cord producer and a certificate was issued to approve this fact;
- in 1995 leading tire producers carried out audits to control production and product quality and BMZ got the right for long-term supplies of steel cord and hose wire to European plants. The same year our plant got an approval of SBS (Sweden) and Kontolraadet (Norway) for production and supplies of reinforcing steel to Scandinavia. In April the same year plant testing laboratories were given certificates of accreditation of the national Byelorussian State Committee on standardization. In 1997 Byelorussian Steel Works was presented “TUV - CERT Berlin - Brandenburg” certificate attesting correspondence of the plant Quality Assurance System to the international EN ISO 9002 standard.

19. Nowadays quality assurance system on the basis of QS 9000 standards is being actively developed and prepared for introduction in wire production and later it will be distributed to metallurgical production.