



UNITED NATIONS  
INDUSTRIAL DEVELOPMENT ORGANIZATION



## Nadezhdinsky metallurgical plant

Nadezhdinsky is a town forming enterprise, which supplies high-quality carbon and alloyed hot-rolled and calibrated rolled products for automotive and machine building, pipe industry and construction.

It is an enterprise of a full metallurgical cycle and consists of agglomeration, blast furnace, electric steelmaking, large-section, sort-rolling, calibration shops and other auxiliary units. The plant manufactures rolled metal products from over 30 grades of steel. The enterprise currently ranks the third among suppliers of calibrated roll and is one of the leaders in sorting roll production in the country.



Main types of products: rolled metal, calibrated metal, commercial cast iron. The staff comprises of 3589 employees.

### Achievements of Nadezhdinsky plant prior to joining the UNIDO project

In 2015, the plant was audited for requirements of ISO 9001:2008, ISO 14001:2004, and OHSAS 18001:2007. Upon results of the audit, quality management system of the enterprise received ISO 9001:2008 certificate and reappraised the certificates for EnMS and the health and safety management system.

For more than 20 years Nadezhdinsky plant has been engaged in the issues of energy saving and energy efficiency increase. There is a permanent commission on energy saving on the enterprise. Each subdivision submits annually its proposals to the commission. The proposal includes description of measure, expected outcome in physical and monetary terms and calculations with justification of expected results.

Every 3 months those responsible for implementation of measures report the progress in implementation of approved energy saving programme to the Department of Chief Power Engineer.

The commission analyses reports, and upon achieved effects submits to the management proposals for revision of specific norms.

Energy saving programme is developed for 3 years. This programme includes target indicators in physical terms for each energy resource, indicators by specific norms by the types of produce, and a list of measures aimed at energy saving.

### EnMS implementation in 2015

When implementing EnMS, along with requirements of ISO 50001, Nadezhdinsky plant applied UNIDO methodology in the following directions:

1. Application of regression analysis method to forecast energy consumption and to evaluate the impact of each of the production variables.
2. Inventory of energy users and identification of the most significant ones (SEUs).
3. Elaboration of Opportunity lists in relation to SEUs.

Throughout EnMS project implementation, specialists of the enterprise carried out the following activities:

1. Developed energy policy, outlined energy saving targets, defined personnel roles and responsibilities;
2. Delineated scope and boundaries of energy management system by types of energy resources: natural gas and electricity;
3. Defined the base line for energy consumption, against which one can measure and analyze the effect from energy efficiency increase.
4. Outlined Significant energy users (SEUs) and the variables affecting energy consumption.
5. In addition to existing system of energy consumption planning, the system for energy consumption forecasting was developed with the use of regression models.
6. Energy users requiring metering units were identified.
7. Organized analysis of actual electricity consumption deviations from the baseline in real time, and weekly analysis of gas consumption.
8. Meetings on energy efficiency and analysis of energy performance indicators started to be regularly organized on managerial level.

## Results of energy saving and EE improvement actions of Nadezhdinsky plant in 2015

In the framework of Nadezhdinsky Metallurgical Plant's Programme on Energy Saving and EE Increase for 2015-2017, and EnMS implementation project in 2015, the following results were achieved:

1. Low-cost measures of operational control and technical measures were implemented:
  - reduction of Si component by 0.01% in pig iron for Electric arc furnace shop due to changes in technical condition for Si component from 0.9% to 0.8%;
  - optimization of horizontal drying of buckets;
  - reduction of gas flow by lowering the specific consumption of casting forms
  - installation of a return steam pipe from steam extinguisher station to metal etching site.
2. In results of implemented measures the following energy savings were achieved:
  - Electricity savings: 161 000 kWh;
  - Natural gas savings – 5 448 000 m<sup>3</sup>;
  - Carbonite – 365 tons;
  - Savings in monetary terms: 9 528 000 RUB<sup>1</sup> ≈ USD 158 800 (with total investments of 7 539 000 RUB ≈ USD 125 650);
  - In view of energy consumption decrease, GHG emissions were reduced by 10 600 tons of CO<sub>2</sub> eqv.
3. Process personnel became involved in energy saving activities.
4. Objective factors affecting energy consumption of the SEUs were identified, and their monitoring in online mode was organized.

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<sup>1</sup> Calculated by 2015 tariffs.

5. Amount of measures being developed has increased (especially of those with short payback period), timeline for their implementation has shortened.
6. Upon the steam system assessment by UNIDO methodology, conducted in April 2015 by international expert Veerasamy Venkatesan, it was decided to implement 3 measures aimed at steam system optimization:
  - To use 2<sup>nd</sup> turbogenerator to generate electricity also in summer period, but only in condensing mode;
  - To improve combustion process in boiler furnaces by regulating excess air ratio and reducing the oxygen content in flue gases up to 2.5%;
  - Installation of automatic blowdown system on boilers.

Considering that accounting of natural gas consumption does not provide for building reliable daily models, the following was decided:

- At this stage of EnMS implementation to take data for models on a monthly basis;
- In 2017, to organize natural gas accounting on SEUs and to incorporate installed measurement tools into automated system of energy resources accounting;
- On the basis of newly created accounting to shift to daily consumption models for natural gas – in total and by the SEUs.

## Conclusions

Nadezhdinsky Metallurgical Plant celebrated its 120<sup>th</sup> anniversary in 2016. It has troubles with energy accounting: outdated equipment, lack of metering units and automated accounting system for energy resources. However, due to management's commitment to energy efficiency increase, as well as due to highly qualified personnel, who are very enthusiastic about their work – the enterprise constantly undergoes reconstruction, and the efforts towards energy savings have been maintained on a very high level for the last 10 years. Throughout EnMS implementation project, Nadezhdinsky plant was the most active and motivated among 9 participating enterprises of UMMC holding, and, in consequence, demonstrated very good results in the end.

In December 2015, Nadezhdinsky Metallurgical Plant (Metallurgical Plant in name of A.K. Serov) won the award “Annual results in Urals and Siberia – 2015” in nomination “Energy efficient production”.

In May 2016, Nadezhdinsky plant became the laureate on the EraEco – 2015 National environmental award in nomination “Eco-technologies” for development and implementation of energy saving technologies and for “System approach to planning and analysis of energy resource consumption” project.

The plant has successfully adapted the best world practices of consumption analysis and management of energy resources that were introduced throughout the UNIDO project implementation.

