worldsteel benchmarking systems

The World Steel Association (worldsteel) represents over 160 steel producers (including 9 of the world’s 10 largest steel companies), national and regional steel industry associations, and steel research institutes. worldsteel members represent around 85% of world steel production. worldsteel acts as the focal point for the steel industry, providing global leadership on all major strategic issues affecting the industry, particularly focusing on technical process development and R&D, and economic, environmental and social sustainability.

Authors: Henk Reimink and Rizwan Janjua
World Steel Association

BENCHMARKING SYSTEMS
worldsteel assists its members to develop the market for steel, managing major projects in a range of industry sectors, and plays an important role in benchmarking best practice, helping its members improve their businesses. Representatives from member companies meet regularly to exchange information on technological, manufacturing and operational performance. The objective of the workshops and benchmarking systems is to improve the performance of the global steel industry through best practice and technology sharing as illustrated in Figures 1 and 2. The overall outcome sought is to make the industry safer, healthier and more environmentally responsible place to work.

worldsteel prides itself on protecting the confidentiality of participating steel companies so all benchmarking systems are hosted on secure dedicated servers with ISO 27001 accreditation. Access is provided using security codes for specific member company staff only. Unique site and plant codes are assigned, making any submission anonymous and not linked to a country or region. Access to the online monitoring systems needs to be authorised by worldsteel by requesting usernames and passwords, and members assign a person who acts as the principle person for an organisation overseeing the analysis.

The systems allow each site to compare their results internally within their business and against comparable sites or plants, or a representative reference site and are set up to be able to obtain a comprehensive understanding of the key drivers for each facility or process type. They also enable the user to compare their results against better performing sites and identify the areas for improvement. Some of these systems also forecast the impact of additional technologies and what they may bring to a plant or site.

CO₂ EMISSIONS
The CO₂ emissions benchmarking system allows participants to report on a site-by-site basis to give an overall emissions intensity for the production of steel at that site, irrespective of the final products being made (regions or countries are not relevant, only business practices have an impact).
The methodology used has now been published as an international standard: ISO 14404:2013 – calculation method of carbon dioxide emission intensity from iron and steel production. There are two versions, one for steel plants with blast furnaces and one for steel plants with electric arc furnaces (EAFs). The project is notably wide in scope as involvement is not exclusive to worldsteel members.

The data is kept secure and confidential: data are only reported to those that contribute to the benchmarking system and only global averages for the entire industry or processes are published. The aim of the project is to obtain a base level of emissions for the industry for the two key process streams. The data collection methodology and standard is designed to ensure that sites reporting emissions use the same boundaries and parameters. Once data is reported back to the member companies they can develop their own plan to make reductions in emissions and obtain a level closer to best in class. worldsteel can develop a global impact for the industry on the total emissions both for CO2 and GHG. The IEA report for CO2 emissions from fossil fuels is used to determine the global uprising of CO2 and GHG.

ENERGY

Energy constitutes a significant portion of the cost of steelmaking and can range from 20 to 40%. A broad breakdown of these costs is shown in Figure 3. Thus, improvements in energy efficiency result in reduced production costs and thereby improved competitiveness. Today’s best available steelmaking processes have optimised energy use; nevertheless, there is significant room for improvement by bringing the whole industry to the level of the best performers.

The system provides a mature and robust evaluation system of energy efficiency at site and by process level. Member companies participating in the energy benchmarking system can submit data and compare their performance with the top 25% reference level for each steel production process and determine precisely what component in the process is deviating from the reference. As such, the system enables steel producers to make a fair comparison of their own energy consumption and intensity with the rest of the industry. Another key benefit of the system is that it allows steel producers to systematically determine the areas where energy efficiency can be improved.

Participating companies can:
- Calculate their energy performance and compare it to the reference data at the site and facility level (e.g. sinter plant, or hot strip mill).
- Compare their energy performance with peer companies at the site and facility level. All plants are coded and are anonymously shown in each application.
- Calculate the energy improvement potential and run
scenarios for any technology or practices in future years.

- Analyse the performance gap to understand what is due to raw material quality and what can be gained from good practices and energy efficient technologies.
- Analyse the gap performance on a process by process basis (raw materials through to hot rolling), identifying each area of opportunity and extent compared to the reference plant values.
- Test the effectiveness of their installed energy saving technologies to verify if they perform as expected and compare to peer sites.
- Test, forecast and justify (e.g., energy intensity benefit/tonne crude steel) using different raw materials, update or implement practices, reliability improvement or implement technologies using practical experienced performance.

MAINTENANCE AND RELIABILITY

In a steelmaking operation, over 60% of production costs (time, buffer stocks, quality losses, energy, product damage, safety) are directly and indirectly influenced by the efficiency and effectiveness of the operation and the maintenance activities.

worldsteel has a long history of research activities covering maintenance in the global steel industry and has published several reports in the past two decades: 1993 [2], 2008 [3] and 2014 [4]. The survey data in the latest report [4] indicates that more than 50% of members have the potential to reduce their unscheduled losses and benefit through removing unnecessary costs. The gap between top and average performers shows strong improvement opportunities and carrying out reliability work can lead to major savings. Reliability aims at maximising effective operating time by eliminating unscheduled delays and reducing transition time, quality and speed losses. This can assist in reduced investment need or keeping additional facilities in operation by improving the effective operating time by 15-20%. Transforming the lost opportunities into dollar terms is equivalent to millions of dollars.

The maintenance and reliability benchmarking system intends to improve the reliability of the process plants by reducing maintenance time and costs and thereby reaching manufacturing excellence. Using predefined performance parameters, it focuses on the losses experienced, Operational Overall Equipment Effectiveness (OOEE), maintenance cost index and manpower.

Users can compare the links in their production chain in their facilities (continuous casters, hot rolling mills, coating lines, etc.) to identify the potential for reducing their unscheduled losses and benefit from the extra uptime for running at high speed, quality and throughput rate without unnecessary costs. The model is based on identifying all losses in time that a process is subjected to over an operating period. It calculates the OOEE and indicates additional opportunities for reducing speed loss without compromising on quality.

The system undergoes regular review by industry experts, with minor developments added and improvements made to the reporting features on an annual basis.

PROCESS YIELDS

Yield improvement means using fewer resources, which means less energy and processing time, resulting in higher revenue for the same input.

Users of worldsteel’s process yield benchmarking system can compare their yield at facility level starting from ironmaking through to steelmaking and on to rolling and finishing. The system helps identify the potential for yield improvement and measures to improve yield can positively influence other key performance indicators (KPIs), such as process control, quality control and general planning. Yield improvement cannot be pursued in isolation; it needs to be an integral part of a holistic performance optimisation in energy, reliability, environment and safety, etc.

SAFETY

worldsteel’s policy is to help all our members achieve an accident-free workplace. The safety and health benchmarking system is one instrument guiding our activities in this area and we collect data on members’ safety and health performance. Annual safety reports provide all members with the possibility to benchmark their own safety performance against the global one to identify areas that need improvement.

The most important indicator is the lost time injury frequency rate (LTIFR). A lost time injury is any work-related injury resulting in the company, contractor or third party contractor employee not being able to return to work for their next scheduled work period. The LTIFR shows the total number of lost time injuries per million hours worked. In addition, data collection categorises the safety incidents that lead to lost time injuries. Sickness absence rate is the indicator for health in the benchmarking system.

Safety and health data are kept secure and confidential and only global averages for the entire industry are published. Summaries of data are reported to worldsteel members on a wider regional base or global basis, not on company or country basis.

SUSTAINABILITY

This project, which operates in collaboration with the CO₂, emissions, energy and safety data collection projects, aims to report on the sustainability performance and progress of the steel industry. To reach this goal, worldsteel established sustainability indicators in 2003, in accordance with its
sustainable development policy, which encompasses environmental, economic and social dimensions. This initiative is not exclusive to worldsteel members so steel producing non-members can use the system in order to maximise participation in sustainability indicator data collection to provide a robust benchmark. Only global averages for the entire industry are published in the annual steel industry sustainability report. Summaries of data are reported to members on a wider regional base or global basis, not on company or country basis. Users of the system are able to:

- Compare their performance with peer companies at the site and facility level. All plants are coded and are anonymously shown in each application.
- Visualise in the same place the annual and historical performance trends for each indicator.
- Use the data to support company sustainability communications. MS

More information on the benchmarking systems can be found at worldsteel.org

Henk Reimink is Director, Industry Excellence and Rizwan Janjua is Head, Technology, both at The World Steel Association, Brussels, Belgium.

CONTACT: reimink@worldsteel.org

REFERENCES