CBMM SUSTAINABILITY REPORT 2017

MANAGEMENT TOOLS

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Production Planning and Control primarily aims to analyze inventories, production capacities and sales demands to establish goals for each area. These goals are deployed for operations via Management by Procedures (MBP), a methodology that enables the calculation and distribution of targets in alignment with the company's strategy, and signals the need to create action plans and/or projects (project management) to reach targets.

To facilitate tracking progress towards achieving goals, a Manufacturing Execution System (MES) was developed that communicates with the supervisory system (equipment commands) using management tools from each area. With this, it is possible to obtain real-time information on equipment temperature, pressure, production and maintenance. MES has been implemented for the complete standard ferroniobium production line and all new installations include MES from conception. In 2016 an internal CBMM team implemented MES for the crushing process; a stoppage control module was implanted for all the industrial processes; the MES AMPLA software was upgraded; and improvements were made to the metallurgical and ATR industrial systems. In 2017 the projects developed through MES include the reservation of lots in the Metallurgy Plant according to specific chemical characteristics and destined to specific customers; trend reports per chemical element (expected, realized, specified) and the application of a mathematical model to perform predictive calculations of aluminum and titanium levels in the Crushing Plant.

MBP and MES are closely linked to Management of Daily Routines (MDR) and help ensure continuous improvements in capacity and process stability through the Plan-Do-Check-Act (PDCA) and Standardize-Do-Check-Act (SDCA) tools. The MBP approach establishes goals and the MES provides essential data for MDR. Together, the various components seek to improve results.

The MDR permeates diverse sectors of the company. Each department has a management support person, a role developed to assist in the development of the daily routine management. Nearly 200 PDCA, 70 SDCA, 22 Six Sigma (green and black belt) and four Lean projects have been developed with the collaboration of nearly 1.000 employees, in addition to the establishment of a management training system. The MDR and MBP were implemented at CBMM through a partnership with Instituto de Desenvolvimento Gerencial (INDG, Management Development Institute), currently Falconi Consultants.

Each year an Integrated Management Workshop is held wherein teams from Production, Maintenance and the Environmental Development Center present cases of SDCA results. Prizes are given to the best presentations. Employees participate in the event and see first-hand the results generated through using the SDCA methodology.

The fourth Integrated Management Workshop was held in 2017 with an expanded scope to include five categories: Matrix Management of Expenses; PDCA or SDCA; Six Sigma; Suggestions for Improvements Program and Project Management Office or Data and Records Control. With the theme of Cost Management, all areas of the company were invited to submit entries related to projects completed in 2017 having to do with the five categories. Prior to the workshop, a management committee evaluated all the submissions and selected three from each category to be presented during the workshop.

In total some 100 employees participated in the event, presenting cases of successful cost containment. Five works, one from each of the five categories, were awarded based on the evaluation done by a group composed of executive and general management, department heads and operations staff, as well as representatives from Falconi and União Brasileira para a Qualidade (UBQ, Brazilian Union for Quality).