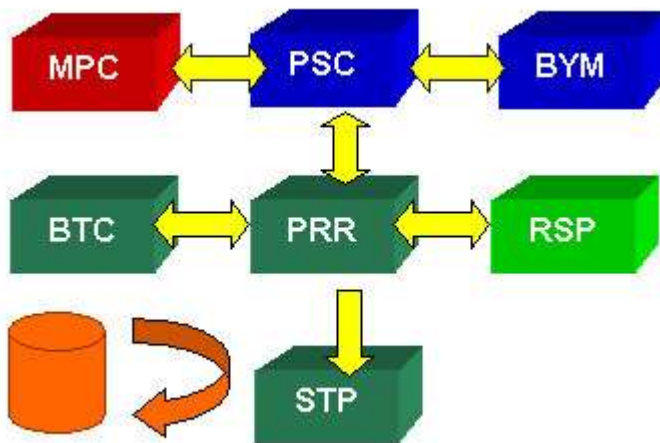


The list of [QMOS] modules are as following

- [RSP]: Roll Shop Planner
- [PSP]: Mill Scheduling & Product Set Up
- [GSP]: Guide Shop Planner
- [BCI]: Bearing and Chock and Stand Building
- [SBI]: Saw/Shear Blade Inventory
- [PRR]: Production Control & Reporting and Data Collector
- [STP]: Shift Planner and Production Analysis
- [BTC]: Bundle Tag Control and Bundle Disposition
- [PSC]: Production Scheduling and Control
- [BYM]: Billet Yard Management
- [MSC]: Melt Shop Production Scheduling & Control



Oracle DB

Diagram:

Illustrates the Communication of [QMOS] Modules in the Oracle Environment.

Introduction

The Quad Mill Operation System [QMOS] MES software has been developed for use in the rolling mill, Rolling Mill pulpit, shop floor, manager & supervisor offices as well as the roll, guide, chock, bearing, shear/ saw blade & setup shop areas.

The modules cover the entire detail scheduling of the rolling mill, optimum billet weight (length) calculation, billet (heat) ordering to the melt shop, melt shop production result, billet yard management, billet assignment to the order, charge sheet, reheat furnace map, billet tracking, delay logging, bundling and tag generation, disposition of the bundle and rework management, communication to the corporate ERP system.

The Melt Shop Module that is responsible for the detail production scheduling and control of the EAF, Ladle Furnace and Continuous Casters, as well as the auxiliary equipment in the melt shop is under development and Beta test.

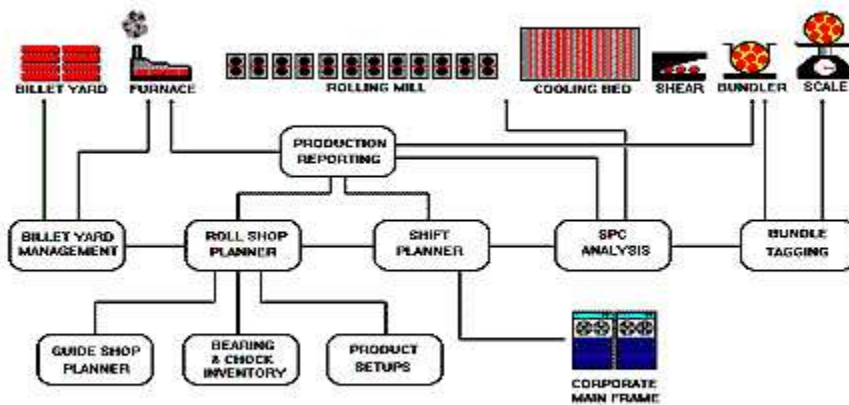
[QMOS] provides the system to fully automate and manage the entire operation of the roll shop, setup shop, stand building and guide shop. It also manages the Saw Blade/ Shear blade used for the multinning

of the produced products. The Set up is automatically communicated to the Level-1 automation and also receives back the set up results from the L-1 for further analysis and decision making.

The software is available as separate and compatible modules as part of the Quad Mill Operation System [QMOS]. The modules of [QMOS] are listed as following:

- 1 [RSP]: Roll Shop Planner
- 2 [PSP]: Product Setup
- 3 [GSP]: Guide Shop Planner
- 4 [BCI]: Bearing & Chock Inventory
- 5 [SBI]: Shear/ Saw Blade 6- [PRR]: Production Reporting
- 7 [STP]: Shift Planner
- 8 [BTC]: Bundle Tag Control
- 9 [PSC]: Production Scheduling and Control
- 10 [BYM]: Billet Yard Management
- 11 [MSC]: Melt Shop Schedule and control

Mill Production Scheduling and Control



This diagram illustrates the position of [QMOS] modules in the management and operation of different parts of the steel rolling mill.

Production Scheduling & Control For the Mill and Melt Shop

1) The Roll Shop Planner [RSP] module includes aspects of the roll shop that are closely linked in order to manage the physical inventory of rolls. This information is combined with product and pass information to fully define how each product is to be rolled

2) The product setup [PSP] module works with the [RSP] module . to aid in the selection of rolls needed to roll the desired products. This module also the allows various operators and technicians to use setup sheets (written or paper-less) for correct scheduling and setup of the mill rolls, stands and guides.

3) The guide Shop Planner [GSP] module manages many aspects of guides including guide building and work order control for guide work required to roll different products. This module also manages the physical inventory of guides and parts.

4) The bearing and chock inventory [BCI] module manages the building of stands and the inspection of main mill bearings. This module also manages the physical inventory of bearings and chocks.

5- Shear Blade/ Saw blade [SBI] module manages the inventory and use of the shear blades and saw blades in the rolling mill. It controls the status of the blades and provides the correct blade information for the specific product and product group. It also monitors the cuts on each blade.

6- Production reporting [PRR] module manages the Reheat furnace billet loading, tracks billets entering the mill, manages cobble, Reheat, records the delays and provide means to assign the delay to the right cause, and rationalizes yield when the finished product is marked and tagged. This information is used to generate production and yield reports. It also manages product and pass changes in the mill, and send and receive the setup information TO and FROM Level-1.

7- The shift planner [STP] module takes information from the roll shop and production modules and presents it in an easy to comprehend windows format. This information can be used to view roll wear status and upcoming roll changes, harness analysis, TPH analysis, Roll Gap analysis. Shift notes, delay editing, delay analysis, production analysis, trend analysis, crew scheduling and time-sheets along with other items relevant to operations is included. This module provides tools to generate the production and yield reports, on the shift, daily, and for any period. The system provides analytical capabilities to manipulate the information in the system.

8- The Bundle Tag Control [BTC] module takes information from the product tracking system and combines it with the bar code bundle tag information. The bundle tag number is traceable back to the billet and heat. The creation of the bundle tag puts the product into finished goods inventory on the corporate computer system. The bundle will be handled by the QC personnel through disposition process. The bundling result is communicated to the ERP system.

9- Production Scheduling and Control [PSC] is a group of the software modules that provides the necessary tools for the QC and mill scheduler at steel rolling mills to provide detail schedule to the production of the mill on a monthly and/or weekly basis.

This module will receives the order from the sales, [PSC] starts with the detailing of Long Term Plan, the Short Term Schedule, the optimum billet length for the production will be calculated. The casting schedule provides the billets and heats needed to be produced by the melt shop. [PSC] then monitors the result of the heat and billets produced in the melt shop. Assignment of the suitable billets to an order then provides ability to the crane operator to charge the assigned billets to the reheat furnace. The system allows the direct charging of the billets from the casters. This module is totally integrated with the current [QMOS] modules available and installed in the steel rolling mills.

10- The billet Yard Management [BYM] module creates a link between the melt shop caster, billet yard and rolling mill. This module manages the physical inventory of billets and matches charged billet grades and chemical analysis of the billets to the production furnace charge plan. Billet Yard Management provide operator friendly touch with wireless Ethernet capabilities in the crane to easily move the billets around the billet yard or loading the billets to the re-heat furnace.

11- Production scheduling and control for the melt shop monitors the execution of the schedule for the production of the heats, capture the process parameters, tracks the heats, monitors the alloy addition, energy, and quality of the produced billets during the course of the production from melting to refining and casting. This system capture the delays and allocate the logical cause of the delay. This information will be used by the system to generate the production and yield reports, on the shift, daily, and for any period. The system provides analytical capabilities to manipulate the information in the system.