CASE STUDY

Virtual Simulation Validates Steel Mill Capacity

Customer Challenges

- Sufficient Capacity Demands
- Uncertain Machinery Constraints
- Need for alternative shift patterns
- Sensitive changes to product mix and demand

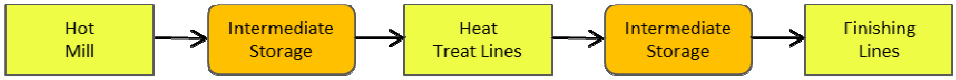
PROJECT SUMMARY

PMC's simulation team created a model of a state-of-the-art steel mill for the purpose of capacity validation. The model was used to conduct several 'what-if' analyses of mill operations. PMC demonstrated that the mill was capable of maintaining desired producing levels, ascertained the locations of tight constraints in the system, and also identified potential bottlenecks in the production process.

SYSTEM DESCRIPTION

The steel mills target production level was 600,000 tons per year. Approximately two-thirds of available capacity was slated for tubes used in the oil industry, with the remainder allocated for line pipe and casings.

The major elements of the production system studied were the hot mill, the heat treat and finishing lines, and the intermediate work-in-process (WIP) storage areas between them. Shift patterns and definitions, as well as the availability of the crane material handling resource were also areas of concern.



High Level Process Flow

OPPORTUNITY

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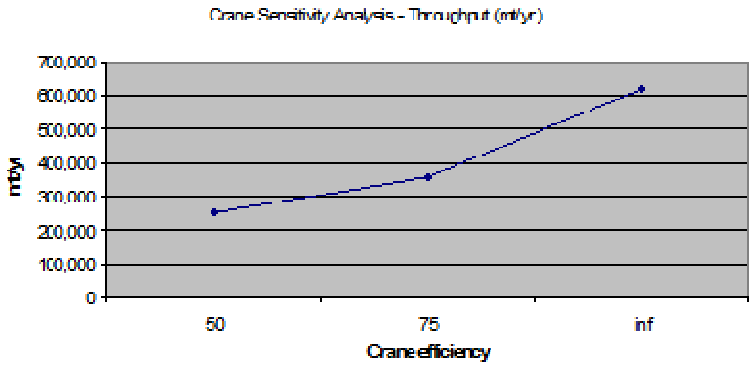
APPROACH

PMC created process flow charts for the relevant areas of the mill. After mapping the process from start to finish, the modeling portion of the project began; applicable input parameters were identified and the appropriate data was collected.

Simulation input parameters included:

- Product descriptions and attributes
- Processing rates for all equipment
- Cycle, set-up, and down times
- Storage and buffer area capacities
- Plant operation hours and shift patterns
- Crane cycle times and attributes

With the extensive discrete event simulation model created, PMC utilized sensitivity analysis coupled with Goldratt's Theory of Constraints (TOC) methodology to explore multiple what-if scenarios.



Potential increases to throughput depending on crane resource

SOLUTION

By studying worst-case scenarios and varying simulated shift patterns and resource availability, PMC showed the mill was capable of meeting its production goal of 600,000 tons per year.

Additionally, tight constraints and their potential impact on throughput were identified.

Finally, an ideal shift pattern that maximized throughput was delivered. This shift schedule illustrated that an additional 100,000 tons of steel could be produced annually if the Hot Mill operated six days per week rather than five.

BENEFIT

PMC's discrete event simulation model was used to both validate the production capacity of the steel mill and to identify constraining elements. Validation activities showed the mill could meet its goal of 600K tons/ year production level. Examination of potential bottlenecks allowed PMC to design a shift schedule capable of producing an additional 100K tons/year. Limited resources and constraints were ably identified so that any negative effect on production could be proactively addressed.

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