Energy Savings by Integrated Production in Stainless Steel Industry

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My Project in Energy-SmartOps

➢ To develop, test and implement creative solutions for energy (cost) savings in stainless steel industry focusing mostly on melt shop and hot rolling mill area, as well as their integration

Problem statement

➢ Optimize grouping, assignment, sequencing and timing of production batches, i.e. heats, to ensure continuous caster feed
➢ Minimize make span, hold-up times and energy losses
➢ Integrate different production processes and
➢ Coordinate those with energy demand as well as hot rolling mill in order to increase ratio of hot charged slabs

Methodology

➢ Interviews
➢ Data mining
➢ Modelling
➢ Optimization (MILP)
➢ HMI development
➢ Testing and implementation in a real production environment
➢ Customization
➢ Integration with other plant IT systems (e.g. PCS, EMS, HSO)

Results - Production scheduling (r)evolution

➢ Past
  ➢ Paper and pen
  ➢ A big (re)scheduling effort
  ➢ Limited accessibility and storage
  ➢ Standalone
  ➢ Short-term (up to 2 days)
➢ Now
  ➢ PC software
  ➢ Reduced (re)scheduling effort
  ➢ Plant-wide accessibility
  ➢ Integration with other IT systems
  ➢ Both short- and medium-term
  ➢ Automation and optimization
  ➢ Energy awareness

Conclusions

➢ Increase in throughput up to 5%
➢ Reduction in energy costs up to 10%
➢ Reduction in hold-up times, i.e. energy losses, up to 10%

Future Work - Further Integration

Optimal Scrap Purchase and Basket Loading

Optimal Energy Purchase and Management

Optimal Scrap Purchase and Basket Loading

Optimization objectives
Maximize throughput
Minimize energy costs

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