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# **FLAT ROLLING**

## **PROJECT REFERENCE LIST**

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## **ENGINEERING STUDIES AND GENERAL CONSULTING**

- Engineering Design & Detail Drawings for Upgrading of Temper Mill Mandrels to a 2 Step Mandrel design
- Study to investigate upgrade of Snorkel Lifting Device. Upgrade included hoist, carriage and columns. Engineering Study for 166" Plate Mill Hot Leveller
- Engineering Evaluation of Reversing Cold Mill
- Engineering analysis of existing system, design and supply of a new 63,000# capacity coil car.
- Engineering study and capital budget for Blooming Mill revamp
- Investigate causes of strip hooking at a new hot strip mill.
- Process selection, mill layout, capital budget and operating cost evaluation Study for new universal beam rolling facility.
- Engineering study of Flat Cold Rolling Mills with a view to improving the present process with regard to equipment suitability, throughput rates, operating costs, and automation.
- Study for new electrical and mechanical drive system for hot mill located downstream of caster.
- Study to investigate upgrade of rolling mill to cold roll Aluminum strip to tight tolerances. Process calculations were done as well as proposed modifications to mechanical and electrical equipment.
- Study to investigate capability of mechanical drive system for hot rolling mill for aluminum.
- Study to evaluate the feasibility and establish associated budget costs of upgrading the existing United 4 Hi mill for rolling of aluminum strip.
- Engineering services to identify, evaluate and engineer modifications to used equipment: inspect existing Algoods equipment; and specify, source and procure quotations for mill systems.
- Engineering study, capital budget, design & supply of equipment to convert Edger ahead of Planetary Mill from under driven to overdriven unit for stainless steel strip rolling.
- Provided a resident expert for all Finite Element based stress analysis and failure analysis of equipment failures to both the Melt Shop and the Rolling Mills as part of a maintenance delay reduction program, company wide, for a period of more than one year
- Process engineering study for root cause analysis of KOBM steel making furnace shell failure (premature cracks in the shell). Conceptual design and detailed a novel "barrel

staving” system to allow continued operation of the severely cracked steelmaking furnace shell.

- Process analysis, conceptual design and detail design of a novel scraper system for online cleaning of the #1 Galvalum line pot roll.
- Complete detailed redesign of tank lids, brush roll assemblies, backup roll assemblies, and wringer roll assemblies of the cleaning section in galvanizing line.
- Developed a state of the art flatness and shape simulation program in collaboration with world leading flat roll operating company’s Research and Development group for prediction and control of strip shape on Coupled Pickle Line/Tandem Cold Mill.
- Design analysis of the roll necks and chocks in a Hot Strip Mill, roughing stand and redesign recommendations for increased mill reliability.
- Technical evaluation and engineering of a rougher-edger width control system in Hot Strip Mill.
- Study to improve quality performance in a Hot Strip Mill.
- Hot Strip Mill Roughing Mill Roll Assembly FEA Analysis
- Feasibility engineering study & design of Roll Removal Lifting Rig to upgrade of HSG-HCD
- Process engineering study of a Looping tower system including:
  - Investigation of proposed looper rolls to establish whether smaller diameter rolls are acceptable for loads and deflection.
  - Investigation of drive system as to capability to handle new operating conditions.
  - Concept layout of proposed solution in order to develop budget.
  - Establish budget costs for looper modification.
  - Assessment & FEA analysis of structural mounting system for strip width gauge
- Process study to increase mill throughput with recommended process changes, modifications to mechanical & electrical equipment for a 30" Single Stand Cold Rolling Mill.
- Process study of 3-Stand Tandem Cold Mill to increase throughput. Rationalization of production on Tandem Mill and 30" Single Stand Mill was considered
- Feasibility study including process layout, engineering and detailed capital budget for a 56" Hot Strip Mill
- Engineering evaluation of existing ladle design with recommended improvements.
- Installation engineering for a surface inspection unit for 120" plate mill.
- Process engineering and conceptual design for a new hot leveller entry pinch roll.
- Engineering design of a Cooling bed entry plate transfer.

- Engineering study of Temper Mill to determine modifications to equipment and process and would increase utilization and throughput.
- Engineering for second payoff reel to improve productivity of pickle line.
- Feasibility study including a complete facility layout for new cold rolling facility. New facility includes push pull pickle line, combination reversing cold mill/temper mill, batch annealing and recoil line. Engineering included coil routing, storage and inventory calculations, process thru put calculations and equipment specifications, and complete plant cost estimate.
- Trained the entire operating crew and foremen of Hot Rolling Mill including 2-Hi Slabbing/Reversing Roughing Mill and Steckel Mill. Training subjects included: Rolling theory, mill setup, profile, shape, and gauge control, and computerized pass design.
- Process study on Blooming mill and Steckel Hot Rolling Mill for increased productivity and improving product quality.
- Process engineering, design and supply of upgrades to 4 Hi Reversing Mill to roll depleted uranium, tantalum and other exotic metals. Upgraded AGC system, feed tables, drive system and controls.
- Compact Hot Strip Mill Study including layouts and capital cost estimates for conventional and compact hot strip mill options.
- Process engineering study for a cold rolling facility coil transport system utilizing self propelled coil cars with rotating coil elevators.
- Complete process design and equipment design for 80" Single Stand 4-hi Temper Mill for cut-to-length line. Mill includes hydraulic gap control system, housing block work roll bending, and work roll/back up roll change system.
- Engineering evaluation of used mill stand for upgrade to roll special metals.
- Engineering for repair of cracked mill housing Including finite element analysis and design of special housing bracing system.
- Study to investigate possible mill layouts and rough budget costs for a new Hot Strip Mill.
- 2-hi High Cold Mill modulus process engineering study.
- Design & Detail of Modifications to Strip Mill Transfer table Actuation
- Analysis study of Hot Strip Mill Rougher Motor Thrust Loading & work roll offset
- Process engineering study on Two Stand Tin DCR/ TPM Upgrade which included field investigation, determination of mill redesign requirements for increased mill productivity and correction of chronic operating/quality problems.
- Feasibility study, preliminary engineering and project budget costs for improved mill productivity and product quality including addition of: Work Roll Bending; Quick Work Roll Change; Hydraulic AGC; Delivery Shape Meter; Back Up Roll Polishers;

Dust Extraction System; Wet Temper System; New Rolling Solution and Roll Coolant Headers; Inter Stand Vacuum Roll and Strip Air Blow Offs; New Fume Exhaust System; Coil and Sleeve Handling Improvements; and Strip Threading Improvements.

- Feasibility study to investigate upgrade of Rolling Mill to cold roll Aluminium strip to tight tolerances. Evaluation included process calculations, mechanical drive system capability, proposed modifications to mechanical and electrical equipment and specifications of required equipment for the rolling of new products.
- Feasibility Study to investigate capability of Hot Rolling Mill for aluminium.
- Process study and basic engineering to evaluate the feasibility, establish budget costs, engineer equipment modifications, specify electrical and automation equipment for upgrading a used 4-hi mill to roll of aluminium strip.
- Process study failure analysis of a Hot Rolling Stand gearbox to establish the rating, then developing a new design for the gearbox.
- Process engineering investigation of differential wear characteristics on tension reel components using contact finite element analysis.
- Process engineering for analysis and recommended upgrades of drive train for vertical edger for 80 Hot Strip Mill.
- Feasibility study to evaluate Plate Mill capability for possible acquisition by client
- Engineering design and detailing plate mill design improvements including retrofit Larger Work Rolls, addition of load cells & new stripper guides
- Process study and layout drawings for Plate Heat Treat Facility
- Process and detailed Engineering for Widening Of Existing Rotary Side Trimmer For 160" Plate Mill
- Feasibility and detailed design of roughing stand Rocking system
- Process engineering analysis of Flat Mill Vertical Edger
- Feasibility Engineering, Installation engineering, project management, design and supply of 2 Stand 4-Hi Tandem Copper Mill incorporating Uncoiler, Recoiler and Coil Cars. Mill systems included Hydraulic AGC, Mill drives, motors, controls and automation.

## **EQUIPMENT DESIGN & SUPPLY**

- New equipment to upgrade rolling mill for cold rolling of Aluminium strip. New chocks and roll subassemblies as well as new motorised screwdowns were supplied. System for complete automation of equipment and new operator's interface was supplied.
- Design & Supply of pup coil handling system for Temper Mill including coil crushing.
- Design & supply of Snorkel Lifting Device, including hoist, carriage and columns.
- Design & supply New 63000# capacity coil car.
- Vertical Edger Pivoting Heads for edging of stainless steel sheets in the planetary mill.
- Engineering Analysis of downender and upgrades to handle larger coil size.
- Roll change rig for a Slabbing Mill.
- Two high prestressed scalebreaker mill stand for continuously cast slabs including: entry and exit side guides and tables, pinion stand, spindle supports.
- Plate Heat Treatment Facility.
- Process engineering, layouts and equipment specifications for new 160" Plate Heat Treat facility.
- 160" Plate Mill – Mill Stand Upgrade. Complete engineering for process and equipment design for upgrade of 160" plate mill stand. New work roll chocks, housing blocks with roll bending, and complete quick work roll change system was designed as well as the supply of new housing blocks.
- Side trimmer for 160" plate mill. Complete upgrade engineering to widen 110" sidetrimmer for 160" wide product. Design of new entry roller table as well as modifications to side trimmer, scrap choppers and scrap handling equipment.
- Design of upgrades to seven stand Hot Strip finishing mills including: New work roll chocks, New housing blocks and work roll bending , New work roll change lift tracks, New quick roll change system with direct transfer of work rolls to roll shop.
- Investigation and detailed design corrections for Hot Strip Mill 4-hi Reversing Rougher rocking problems.
- Installation engineering and contract supervision for the installation of plate surface inspection system.
- 56" Hot Strip Mill auxiliary equipment including: furnace entry equipment, furnace discharge equipment, mill tables, and hot run tables.

## **INSTALLATION, AUTOMATION & COMPUTER SYSTEMS**

- Engineering services for production of functional block diagrams
- engineering services for the design of a new mill control pulpit
- Study of the existing mill performance with the goal in mind to improve the product quality and streamline mill operation.
- In-depth study of A 6 stand hot strip mill to upgrade existing AGC system.
- Replacement of existing MG sets with the new SCR drives.
- Preliminary engineering for outdoor 138 KV substation.
- Investigation of existing level 2 system for replacement or upgrade.
- Design, supply, software development, and commissioning of the DC Drives and Control system for Reversing Hot Aluminium Mill.
- Developed and implemented a new thickness gauge for the on-line thickness measurement, storage and display for quality control purposes.
- Aluminium flat rolling mill supply of drives, controls, retrofitting of existing drive, supply of new additional drives and controls.
- 30” reversing mill performance evaluation. Data acquisition and analysis of tension control and dynamic drive response, recommendations and budgets.
- Dust collection system for EAF #4. Basic engineering to define process equipment, development of the process control specification, development of the PID diagrams, motor list, power distribution single lines, PLC interface diagrams..
- Reduction mill for spring flats production. Investigation and feasibility study of upgrading and automating the reduction mill facility.
- Designed and supplied a 2 stand computerized control system, hydraulic AGC control system, Mill drives, controls and automation
- Supply of Roll Shop Management Computer system, [QMOS]<sup>FLAT</sup>, that includes tandem and temper cold mill product scheduling, roll order management, roll inventory, roll accounting, roll grinder and shop management/planning.
- Supply of computerized product setup system that monitors chock and bearing use, and produces setup sheets and work orders on line for rolls, mill setup and product changeovers.