

CHAMPION INTERNATIONAL'S LONG LOG PINE CHIP MILL: A NONTRADITIONAL PROJECT APPROACH

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USING A FORMAL TEAM APPROACH, CHAMPION INTERNATIONAL DEVELOPED A NEW PINE PROCESSING FACILITY AT ITS CANTONMENT, FL, PULP AND PAPER MILL.

JUST NORTH OF PENSACOLA, FL, IS THE SMALL TOWN OF Cantonment. In 1984, Champion International Corp. acquired the assets of St. Regis Paper Co., including the Cantonment pulp and paper mill, which had been operating since 1941. The mill currently consumes about 2.2 million tons of pine and hardwood per year, in both batch and continuous digesters, and produces about 520,000 tons/year of printing and writing grade paper.

Hardwood fiber is received both in tree length form, processed through an on-site chip mill installed in 1988, and as purchased chips. Prior to construction of the new Long Log Pine Chip Mill, however, pine logs were being processed through a system that was originally constructed in 1964. The system consisted of a flume for direct infeed of shortwood by rail and truck, a slasher deck that cut tree length wood into 6-ft bolts and discharged to the flume, an inclined jackladder that transported the wood to a chain distribution conveyor, three 67-ft long debarking drums, and a series of belt conveyors that transported the wood to one of two drop-feed chippers. Due to the configuration of the belt conveyors between the debarking drums and the chippers, the wood had to maneuver three 90° turns. The configuration also restricted wood length to 6 ft.

The age and design of the pine processing system made it extremely labor intensive, both in operations and maintenance. The physical condition of the facility had deteriorated to the point where major rebuild work was required continuously. Operator and maintenance access to equipment was inadequately addressed due to

equipment type, location, and arrangement. These factors, combined with increases in tree length wood deliveries, drove a need to examine alternative pine processing systems.

Early in 1993, a feasibility team was commissioned to investigate and recommend potential alternatives. This study, completed in June 1993, determined that an on-site tree length pine processing facility was the most cost-effective long-term strategy for furnishing pine fiber to the mill's continuous digester process. Upon management approval to proceed with further project development, a project manager was named, and a second team was formed in November 1993 to develop an implementation plan. This article describes the team-based project process model and the facility that resulted from its effective use by this second team.

The process was unique for the Pensacola Mill in that it was the first major capital project to be developed through a formal team approach. The assemblage of 13 primary and auxiliary stakeholders included project engineering, wood processing operations and maintenance, forest resources (responsible for fiber procurement), materials (purchasing), control team (accounting), and organizational development personnel.

Early efforts concentrated on identifying team member roles and responsibilities, team building activities to create an atmosphere that promoted an open exchange of ideas, and establishment of the team's mission. Two primary purposes for the team's existence were formally identified:

1. Develop the conceptual and detailed technical operations and maintenance parameters for a new Long Log Pine Chip Mill. The goal was to create a facility that could be efficiently operated, effectively maintained at minimum cost, and readily furnished with an adequate supply of tree length pine.
2. Develop the financial justification for funding the project. The goal was to reduce costs, as compared to the existing wood processing facility, and achieve an attractive rate of return on the capital investment.

The team utilized an eight-step "Phases of a Project" process model. With the first phase (feasibility) already completed and approved, it was agreed that this team's mission would be fulfilled upon completion of the following three phases:

1. Conceptual
2. Preliminary design
3. Detailed design.

The final four project phases—construction, checkout and startup, operation, and post project assessment—were to be completed by another team, although many of the individual members would continue in their roles.

Each phase had a defined set of objectives and a clear decision making point, where a determination would be made either to progress to the next phase or discontinue the project. The first four project phases, which required investment of time but comparably little investment of funds, offered the greatest opportunity to influence the project's final outcomes. Subsequent phases would absorb the bulk of the financial resources and provide little opportunity to influence the project's success. Most importantly, emphasizing the early phases would minimize the potential for costly field modifications through construction and initial operation.

PROJECT DEVELOPMENT

The team's initial tasks focused on assembling a historical cost database including wood, maintenance, and operational costs; developing operating and conceptual design parameters for a new facility; and identifying potential turnkey vendors to furnish equipment, engineering, and construction services. It was decided that the investigation would include presentations to the team by several turnkey vendors and site visits to numerous competitors' facilities that were conceptually similar to the proposed new chip mill.

Cost data from the existing pine processing system provided the basis for identifying cost reduction oppor-

tunities. It was clear that significant reductions would be required in order to justify the substantial capital investment that was anticipated.

As conceptually envisioned, the new chip mill would be a straight-line system, processing tree length wood in sufficient quantities to furnish 100% of the mill's pine fiber needs. Site selection, which ultimately placed the facility adjacent to an existing bark storage pile, was based on the following criteria:

1. Ability to maintain the existing operation throughout the construction and checkout and startup phases.
2. Consolidation of truck routing, which included purchased chips and bark, and tree-length hardwood.
3. Proximity of tie-ins to existing chip and bark handling facilities.
4. Site construction constraints.

Production parameters were established as follows:

1. Species—southern pine; 15 ft minimum, 60 ft maximum length; 2 in. minimum, 24 in. maximum diameter; 14% average bark, by weight; 45% to 50% moisture content.
2. System throughput—1.25 million tons/year, at a design rate of 300 tons/hour (green tons); operating on a 21 shift per week basis.
3. Truck receipt volume—175 average per day, 200 peak; 4 min average unloading cycle; receipts scheduled Monday through Friday.
4. Residual bark content—less than 1%, by weight, before screening.
5. Chip size—22 mm long, 4 to 8 mm thick.
6. System reliability—individual equipment components, 95% availability based on scheduled operating hours; average total system availability of 75% or better.

Building from this baseline, the team developed minimum design criteria and site-specific special conditions to ensure that the system met these parameters. Particular emphasis was placed on identifying potential bottlenecks and providing operational flexibility to eliminate them.

Concurrently, with the system's conceptual development, vendor presentations and site visits to eight similar facilities were conducted between November 1993 and March 1994. The team developed evaluation criteria for the vendors and their respective facilities, including comparisons of preliminary cost proposals. As a result of the team's analysis, it was determined that the system that

best met the needs of the Pensacola Mill was a combination of components from three separate vendors.

SYSTEM CONFIGURATION

By May 1994, the conceptual phase of the project was complete, and the chip mill's equipment configuration was established.

Two cranes—one new Fulghum 125-ft fixed radius, rail-mounted crane, and one existing LeTourneau JC-40, 120 ft radius crane—relocated from the existing woodyard are now configured on opposing sides of a gravity infeed chute. The shallow slope and offset angle of the infeed chute ease the transition into the debarking drum, thereby reducing breakage. The chute feeds a Manitowoc trunnion-mounted debarking drum 12 ft in diameter x 110 ft long. The drum was extended from the more common 100 ft length to increase retention time and eliminate the need for a discharge gate.

Wood exiting the debarking drum is transported by two chain conveyors to a Carthage 15-knife, 116-in. diameter horizontal feed, bottom discharge chipper, powered by a 2000 hp Westinghouse motor. A 72-in.-wide belt conveyor conveys the chips to a pre-screening tower. Since the existing chip handling facility already includes a chip thickness screening system, only gross oversize material and fines are removed at the new chip mill.

Oversize material is first removed by a Rader scalping screen and processed by a Carthage 8-knife, 60-in. diameter rechipper, discharging to a cyclone. Accept chip flow, with surges regulated by a Nicholson star feeder, passes through a Nicholson double-deck gyratory screen for fines removal. Fines are conveyed to the existing waste fuel system. The screening tower includes bypass arrangements that allow continued production in the event of screening system failures.

Chips are discharged from the screening tower and conveyed approximately 1000 ft on a 42-in.-wide belt conveyor to an existing transfer tower. The system is configured so that chips may be fed either to existing outside storage systems or directly to the continuous digester process.

Bark handling systems begin with three General Kinematics vibratory conveyors—under the debarking drum, drum discharge conveyor, and chipper feed conveyor. The vibratory conveyors transfer to a 48-in.-wide belt conveyor, which discharges to a transfer tower. Bypass arrangements within the tower allow bark to be diverted to an existing bark hog, which serves the purchased fuel system; to a second bark hog, which was relocated from the existing woodyard facility; or to the ground. The system's flexibility virtually eliminates the bottlenecks normally associated with bark handling systems.

Auxiliary components of the new facility include a two-story pre-engineered building, housing a knife grinder on the ground floor. Employee meeting areas, office space, and restrooms are on the second floor.

The entire system is operated through an ICOM WIN-telligent graphical operator interface system, located in an elevated operator control room adjacent to the drum discharge conveyor.

VENDOR RESPONSIBILITIES

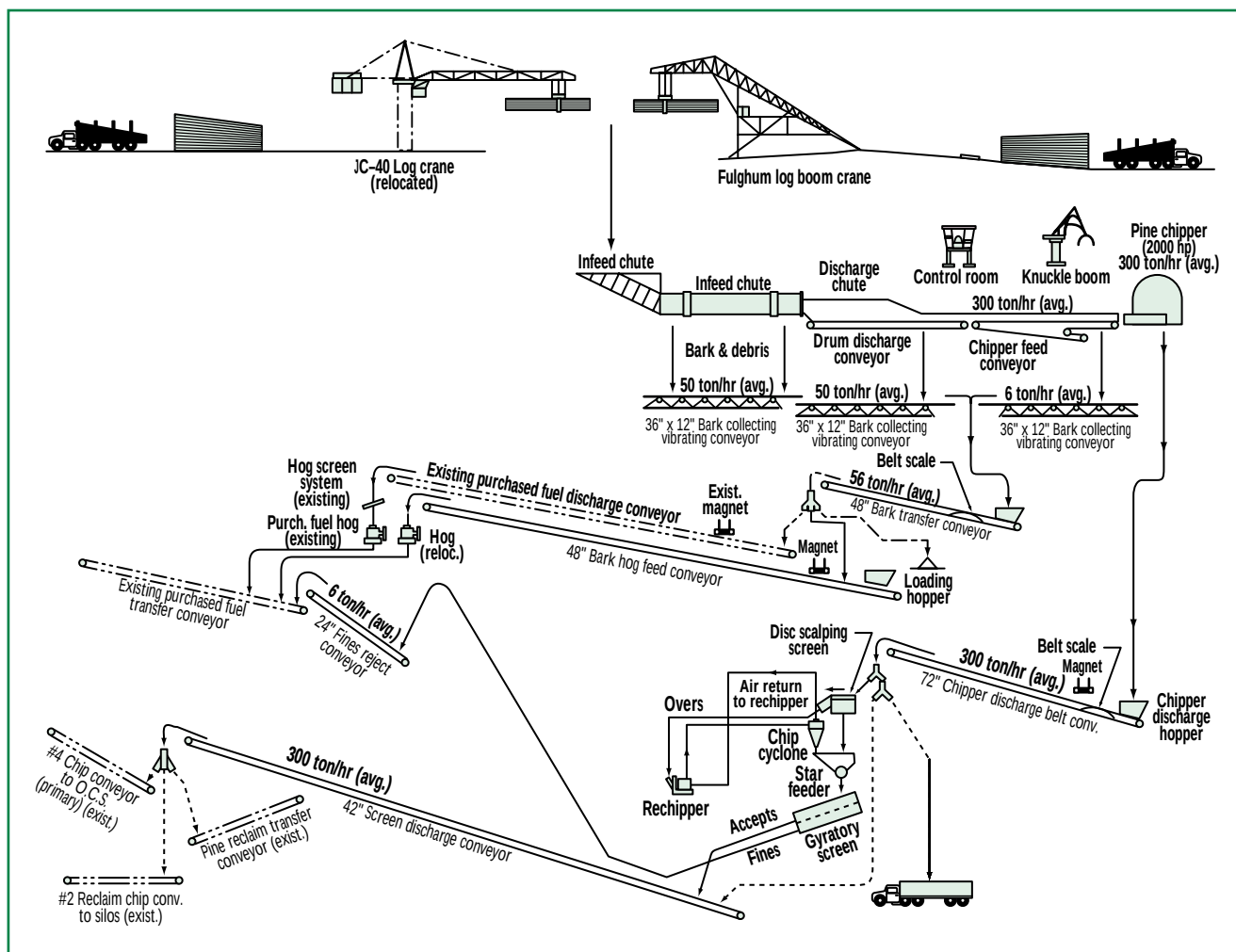
Through the preliminary engineering phase, begun in late May 1994, a unique partnership was forged between Champion's project team and the three competing vendor organizations selected to furnish various portions of the project. Champion provided overall project management, geotechnical and sitework engineering, site clearing, log storage mound construction, paving, drainage, primary utilities services, construction testing, and other miscellaneous services. The respective vendor's responsibilities are outlined as follows:

1. Fulghum Industries of Wadley, GA, furnished the new 25-ton capacity rail-mounted electric crane, including engineering, fabrication, and erection.
2. Heavy Machines, Inc., of Memphis, TN, relocated the existing LeTourneau JC-40 crane, including foundation engineering and installation. Also included in their scope of work was engineering, fabrication, and installation of the gravity infeed chute, and Manitowoc debarking drum.
3. FMP/Rauma Co. (now Sunds Defibrator Woodhandling, Inc.), of Birmingham, AL, furnished all remaining foundation, electrical, and utilities design and installation services, and served as the lead vendor in coordinating the project. Their scope of work included engineering, fabrication, and installation of all components, from the discharge of the debarking drum, including the vibratory bark conveyor beneath the drum, to the final tie-in points at existing chip and bark handling systems.

By utilizing the same mechanical/structural installation contractor, Heavy Machines, Inc. and FMP/Rauma Co. were able to effectively coordinate the work sequences to ensure an efficient construction schedule.

MILESTONE SCHEDULE

Based on preliminary engineering completed in July 1994, the team prepared a funding request document that clearly defined the scope of work, responsibilities, cost reduction criteria, and return on investment of the project.



1. Process flow diagram for the Long Log Pine Chip Mill

The project received final approval from upper management, and the detailed engineering phase began in September 1994. It was during this phase that a value engineering effort was undertaken to realize the most cost-effective total project, and final contract negotiations were completed, including performance guarantees. Although this project phase brought closure to the team's mission, most of the members continued their roles through the implementation phases.

Continuity through the final four phases of the project—construction, checkout and startup, operation, and post project assessment—was maintained through the project manager, operations manager, and maintenance coordinator, who continued their lead roles to ensure that the project followed its designated course.

Site clearing and preparation began in November 1994, and by March 1995 foundation installation and equipment fabrication were underway. An on-site construction administration complex was established, and regular progress meetings were held with all participating vendors and construction contractors.

Mechanical and structural erection began in July 1995, as underground utilities and foundation installation continued. Pensacola Mill operations and maintenance personnel, supporting the project management effort, were involved throughout the construction and the checkout and startup phases.

On Dec. 30, 1995, exactly on schedule, the first grapple load of wood was fed into the system. Since the existing woodyard, including the LeTourneau JC-40 crane that was to be relocated, was still operating, the new chip mill started up utilizing only the new Fulghum log crane.

Through January 1996, the existing woodyard continued to operate two shifts per day, while the new chip mill was operated during the day shift for checkout and debugging. By the end of the month, the existing JC-40 crane and second bark hog were relocated to the new facility, and the old woodyard was decommissioned.

Figure 1 provides a process flow diagram for the new Long Log Pine Chip Mill.

ORGANIZATIONAL DEVELOPMENT

Operating along the same timeline as the project team, and partially resulting from new operational requirements of the chip mill, groups of wood processing employees set about the task of redesigning their department. The result was an entirely new organizational structure that emphasized skill training, shared responsibilities, and flexibility.

Training coordinators helped to establish the operational criteria and skills required for the new Long Log Pine Chip Mill, utilizing design and equipment data furnished by the project team. Successful implementation helped to shorten the learning curve toward efficient operation of the new facility.

CONCLUSION

The chip mill, which was completed on schedule and within budget, consistently operates within the established production parameters. Through the post project assessment phase, the following benefits have been identified and will be compared to the measures of success criteria contained in the original funding request document:

1. Reduced operational and maintenance manpower and costs
2. Reduced pine chip variability

3. Eliminated the dependence on outside purchased pine chips
4. Reduced waste fiber
5. Provided operational flexibility
6. Eliminated the bottlenecks inherent in the old shortwood handling facility
7. Improved equipment access for operations and maintenance personnel
8. Improved safety and housekeeping
9. Improved employee working conditions.

Without question, the hallmark of the project was its participative approach, where competing vendors established a true partnership with Champion's diverse project team. The success of the Long Log Pine Chip Mill was due to this collaborative effort, in which individual contributors were focused on the project's total success.

This legacy is the result of adherence to the team-based Phases of a Project process model, a nontraditional project approach that effectively combines available resources to achieve success. TJ

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