

WOOD PRODUCTS PLANT OPTIMIZATION

OPTIMIZATION = INCREASED MARGIN

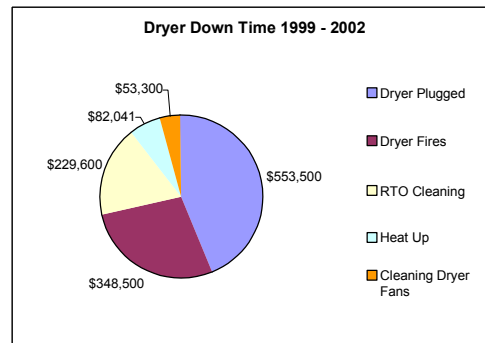
“Margin Enhancement Should Drive All Process Improvements”

Evergreen Engineering will help your facility focus on margin enhancement through a well-directed review of process, plant operations, and maintenance procedures. With our plant engineering, maintenance, and operations background, we can help you increase your margin. We will identify opportunities, develop budgets for low cost solutions, and formulate long range plans to prevent future bottlenecks. With our engineering and plant expertise, we can quickly solve problems and increase margins through identifying improvements, developing action plans, and implementing projects.

Approach

- ▶ **Identify** procedural and technical issues to address immediate needs and provide fast payback
- ▶ **Evaluate** failure modes using root cause analysis techniques
- ▶ **Assess** and budget short term projects which require minimal investment
- ▶ **Develop** prioritized plans with scope, budget, schedule, and payback
- ▶ **Report** on anticipated margin enhancement of short term projects
- ▶ **Implement** low cost improvements for process and productivity which provide a quick payback
- ▶ **Provide** a preliminary assessment of long term goals

Total Cost of Down Time \$ 1.3 Million



Cause and Cost of Down Time



(continued on back)



EVERGREEN ENGINEERING

Eugene, Oregon (541) 484-4771 • Fax (541) 484-6759
Hillsboro, Oregon (503) 439-8777 • Fax (503) 439-8767

www.evergreenengineering.com

Process Enhancement

The development of short and long term goals for plant process improvements, margin evaluation and prioritization, combined with a detailed maintenance survey, gives plant management substantial insight into issues that will positively effect the profitability of the facility for years to come. Evergreen Engineering's professional staff includes former plant managers, technical directors, maintenance managers, and engineering professionals who are uniquely qualified to assist with these tasks. We are ready to help you evaluate potential process upgrades, with low cost solutions, which may include:

- Improve Raw Materials Management
- Improve Moisture Control
- Refining and Milling Upgrades
- Dryer Emissions Reduction
- Reduce Panel Thickness Variation
- Former and Forming Line Optimization
- Improve Continuous Press Belt Tracking
- Reduce Continuous Press Belt Damage
- Process and Waste Water Management
- Reduce Resin Cost and Improve Control

Energy Optimization

An energy survey is an evaluation tool to determine the energy usage of the facility, including electrical, natural gas, and steam. An energy survey can lead to a reduction in energy usage by looking for improvements in energy efficiency that can enhance the operating margin of the plant. The energy survey evaluates items such as:

- Electrical Power Factor Correction
- Thermal Systems
- Lighting
- Environmental Controls
- Milling and Refining Equipment
- Drying Equipment
- Compressed Air Systems
- Electrical Load Leveling



Maintenance Enhancement; Survey and Programs Upgrade

The maintenance survey is a detailed review of the maintenance program aimed at identifying opportunities to reduce maintenance costs, increase plant utilization, improve maintenance safety, track and evaluate failure root causes, reduce labor costs, and improve spare parts management. The maintenance survey includes:

- Maintenance Mgmt. Training
- Management by Benchmarks
- Planning and Scheduling
- Reliability Engineering
- Maintenance Safety
- Maintenance Training Development
- CMMS (Maintenance Mgmt. Software)
- Preventative and Predictive Maintenance
- JIT (Just In Time) Spare Parts Mgmt.
- Scheduling and Organizing Effectiveness



EVERGREEN ENGINEERING

Eugene, Oregon (541) 484-4771 • Fax (541) 484-6759
Hillsboro, Oregon (503) 439-8777 • Fax (503) 439-8767

www.evergreenengineering.com

PROCESS ENHANCEMENT

PROCESS IMPROVEMENT = INCREASED MARGIN

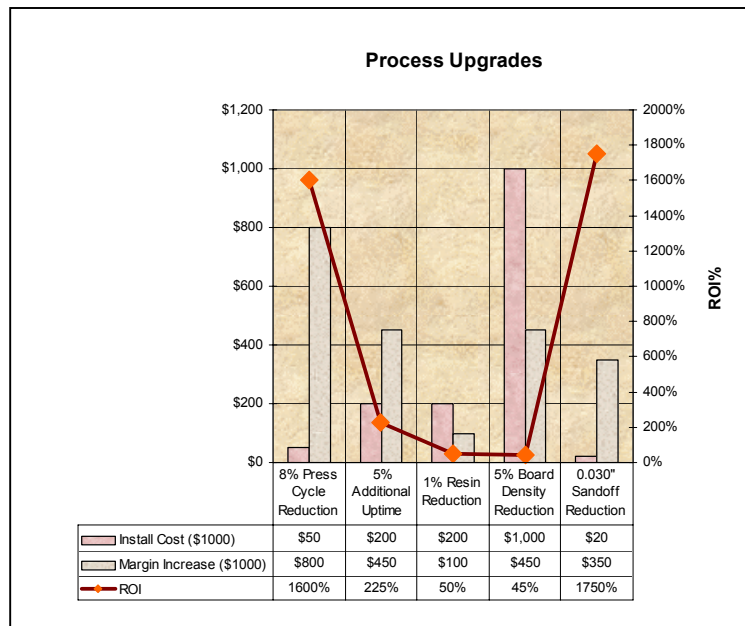
“Does Your Process Maximize Operating Margin?”

Process Survey and Enhancement

Evergreen Engineering believes that project spending should be evaluated on the basis of margin projection. The level of spending may be secondary to the enhancement in the plant’s operating margin.

Evergreen Engineering’s professional staff includes former plant managers, technical directors, maintenance managers, and engineering professionals who are uniquely qualified to assist with the full scope of process survey and enhancement. We are ready to help you evaluate the margin impact of potential low cost process upgrades, which may include:

- Improved Raw Materials Management, Storage and Processing
- Improved Moisture Control
- Refining Milling and Screening System Upgrades
- Improved Resin Utilization Through Improved System Control
- Reduced Dryer System Energy and Emissions
- Reduced Panel Thickness Variation
- Improved Former Performance and Forming Line Optimization
- Reduced Continuous Press - Belt Tracking and Belt Damage Problems
- Efficient and Reliable Process and Waste Water Management System Design



Comparison of Project Cost, Rate of Return, and the Impact on Operating Margin



EVERGREEN ENGINEERING

Eugene, Oregon (541) 484-4771 • Fax (541) 484-6759
 Hillsboro, Oregon (503) 439-8777 • Fax (503) 439-8767

www.evergreenengineering.com

ENERGY OPTIMIZATION

“Reducing Energy Costs Makes Good \$ense”

What is an Energy Survey?

An energy survey is a comprehensive review of your electrical, natural gas, fuel oil, and thermal systems; designed to identify areas where inefficiencies are negatively impacting the financial performance of the facility. The survey can also touch on environmental concerns with a review of the pollution control systems to determine if there are possible energy savings available by utilization of different or more efficient emissions control equipment. Savings found during an energy survey can contribute significantly to an improved margin condition. Evergreen Engineering can assist you with a total review of your plant's energy systems to identify energy opportunities that will enhance financial performance. Key components of an energy survey include:

- Review of the Compressed Air Production and Delivery Systems
- Steam Generation and Distribution
- Lighting Surveys
- Power Transmission Systems Review and Evaluation
- Pneumatic Conveying Systems Review and Evaluation
- Power Factor Correction Review and Evaluation
- Process Energy Conservation
- Building Make-up Air Systems, Ventilation, and Air Extraction
- Mill-wide Insulation Survey
- Burner Tuning Evaluation
- Refining Motor Efficiency
- HVAC System Evaluation
- Co-generation Evaluation and Suitability
- Motor Replacement Plan

Related Services Include:

- Power Rate Negotiation Assistance
- Utility/Customer Project Opportunities
- Energy Risk Assessment/Management
- Energy Sell-back Opportunities
- Utility Bill Accuracy Verification



REDUCED ENERGY CONSUMPTION = INCREASED MARGIN



EVERGREEN ENGINEERING

Eugene, Oregon (541) 484-4771 • Fax (541) 484-6759
Hillsboro, Oregon (503) 439-8777 • Fax (503) 439-8767

www.evergreenengineering.com

MAINTENANCE ENHANCEMENT

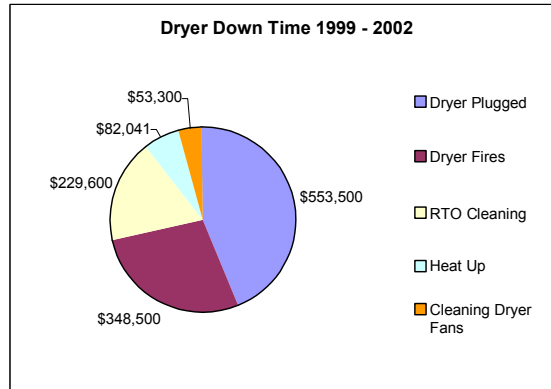
“Plan Your Work, Then Work Your Plan”

Maintenance Enhancement; Survey and Programs Upgrade

With better planned maintenance the machinery will run better. The maintenance survey is a detailed review of the maintenance program aimed at identifying opportunities to reduce maintenance costs, increase plant utilization, improve maintenance safety, track and evaluate failure root causes, reduce labor costs, and improve spare parts management. Conducting a maintenance survey will identify maintenance program needs. The maintenance survey includes:

- Maintenance Mgmt. Training
- Management by Benchmarks
- Planning and Scheduling
- Reliability Engineering
- Maintenance Safety
- Maintenance Training Development
- CMMS (Maintenance Mgmt. Software)
- Preventative and Predictive Maintenance
- JIT (Just In Time) Spare Parts Mgmt.
- Scheduling and Organizing Effectiveness

Total Cost of Down Time \$ 1.3 Million



Cause and Cost of Down Time

Maintenance Components

Maintenance Consists of Six (6) Major Elements:

1. Documentation and Data
2. Manpower and Management
3. Planning and Scheduling
4. PM, PDM, TPM
5. Tools and Supplies
6. Training

Maintenance Improvement Program

The Program of Maintenance Improvement Includes:

1. Collect Data and Assessment
2. Report with Recommendations
3. Assist with Upgrades
4. Long Term Reliability Plan

MAINTENANCE RELIABILITY = INCREASED MARGIN



EVERGREEN ENGINEERING

Eugene, Oregon (541) 484-4771 • Fax (541) 484-6759
Hillsboro, Oregon (503) 439-8777 • Fax (503) 439-8767

www.evergreenengineering.com