

Market Baseline Evaluation Report Executive Summary

Fan Speed Reduction in Pneumatic Conveying Systems in the Secondary Wood Products Industry, No. 1

prepared by

SBW Consulting, Inc.

in conjunction with

Quantum Consulting, Inc.

Argo Blower & Mfg. Co.

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NORTHWEST ENERGY EFFICIENCY ALLIANCE

www.nwalliance.org

529 SW Third Avenue, Suite 600
Portland, Oregon 97204
telephone: 503.827.8416 • 800.411.0834
fax: 503.827.8437

SBW Consulting, Inc.
Report No. 9906

MARKET BASELINE EVALUATION REPORT

Fan Speed Reduction in Pneumatic Conveying Systems in the Secondary Wood Products Industry

Submitted to

NORTHWEST ENERGY EFFICIENCY ALLIANCE
522 SW Fifth Street, Suite 410
Portland, OR 97204

Submitted by

SBW CONSULTING, INC.
2820 Northup Way, Suite 230
Bellevue, WA 98004

in conjunction with

QUANTUM CONSULTING, INC.
ARGO BLOWER & MFG. CO.

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Executive Summary

The Northwest Energy Efficiency Alliance (Alliance) has funded a project to increase the energy efficiency of low-pressure pneumatic conveying systems (PCS) in the secondary wood products industry. In these systems, centrifugal fans provide the suction needed to remove and transport wood waste generated by various steps in the manufacturing of wood products. The project intends to improve PCS efficiency by demonstrating and promoting the benefits of a fan speed reduction strategy for these systems.

Starting in March 1999, PacifiCorp, and two subcontractors, QEI Energy Management and Carroll, Hatch, and Associates, Inc. took responsibility for carrying out this project over a two-year period. For the purposes of this project, they work as a team using the name Just Enough Air (JEA).

The Alliance has retained SBW Consulting, Inc. to conduct an evaluation of the JEA project. Our first objective for this evaluation is to complete a market baseline evaluation of PCS in the secondary wood products industry, with particular emphasis on attitudes and practices related to energy efficiency and JEA's fan speed reduction concept. This report documents the methodology and results of that market baseline evaluation.

Background to the Fan Speed Reduction Project

The goal set by the Alliance for this project is to make optimization of energy use in pneumatic conveying systems (PCS) in the secondary wood products industry common practice. The primary purpose of the project is to build market awareness of and demand for the potential energy savings from fan speed reduction. Further, the project will develop a service industry of engineering consulting firms, and potentially others, who will translate the increased demand into a new business opportunity that will continue after Alliance funding has ceased.

The project is focused on low-pressure PCS in the secondary wood products industry. Typical uses for low-pressure PCS in this market include:

- Planer mill shaving removal
- Trim saw sawdust removal
- Molding machine shavings removal
- Finger joint particle removal
- Ripsaw sawdust removal
- Chipper material conveying

JEA intends to train private service providers so that they can take advantage of business opportunities with medium or large end users (PCS fan motors of 50 hp or more). These providers will be trained to offer an energy efficiency service that will result in reduced fan speed for applicable systems. It is anticipated that small end-users will be served through a utility-based program to be developed later by the JEA.

Evaluation Overview

This market baseline evaluation serves two distinct purposes. First, it will provide information that can be used by JEA in refining their strategy and work plan for the project. Second, it provides a baseline for measuring the impact of the JEA project on the secondary wood products industry and its attitudes about fan speed reduction for PCS. To satisfy these purposes, we have gathered data via telephone interviews with employees or owners of firms recruited from random samples of end users and external specifiers¹. These data have been used to prepare estimates and draw conclusion related to the following topics for the population of secondary wood product plants in the Pacific Northwest:

1. Typical system configuration and operation, by size and region.
2. Estimates of PCS energy use.
3. Market structure, e.g., who buys and who sells, who designs and specifies.
4. Decision processes, particularly related to innovations.
5. Attitudes concerning energy efficiency
6. Level of awareness of PCS efficiency opportunities and the JEA project
7. Barriers to adoption of JEA's fan speed reduction strategy
8. Strategies for overcoming market barriers

Evaluation Findings

The primary findings of this market baseline evaluation are:

1. Eight percent of plants with PCS (119) have total PCS horsepower (hp) in excess of 200. They account for 74 percent of regional PCS energy use. Sixty-nine percent of plants (1024) with PCS account for five percent of use, and can only be reached by a subsidized utility-based program.
2. External specifiers are more likely to be responsible for specifying PCS than are internal specifiers. Most external specifiers provide services to all of the regions, defined by JEA, derive a large fraction of their business revenues from wood product plants and have been in the business for many years.
3. A large fraction of end users do not know whether used or new equipment was used in assembling their PCS. Seven percent of PCS are built up entirely from used equipment. Portions of about a third of systems are made from used components, but systems made from entirely new components are common. Used equipment is specified by both internal and external specifiers of PCS.
4. There are substantial variations in end user attitudes and PCS characteristics across the regions defined by JEA. For example, minimizing energy use is very important to 80 percent of plants in "Eastern WA & ID Panhandle," while only 14 percent feel it is very important in "Western &

¹ Person primarily responsible for determining what type of low-pressure, centrifugal-fan-powered pneumatic conveying equipment will be installed at an end user site. A specifier can be a member of the end user staff (internal specifier) or on the staff of a manufacturer, reseller or consulting engineering firm (external specifier).

Central WA." There are also substantial variations based on PCS size. For example, PCS of less than 50 hp are operated on average about 1,500 hours per year, while PCS with more than 200 hp are operated about 5,300 hours per year.

5. A substantial portion PCS have characteristics that may create variable loads and thus it is not safe to assume that PCS are simple, steady-state systems. Baghouses are present in more than one third of PCS. In addition, systems often have multiple ducts and dampers or slide controls. All of these factors need to be considered in evaluating the potential savings from a fan speed reduction effort.
6. The most important strategy for overcoming resistance to fan speed reduction, both on the part of end users and specifiers is solid data on cost and savings estimates. End users representing a third of plants with PCS feel that minimizing energy use is very important, because it is a way to reduce operating costs.
7. Eighty-six percent of end users feel that their systems are sized "about right." If they are correct, the market for fan speed reduction may consist of less than 70 plants in the Pacific Northwest. If they are not correct, it will be a major challenge to overcome this belief. Only 20 percent of external specifiers believe that a majority of plants have excess capacity. Both end users and external specifiers had a hard time assessing system oversizing. Responses indicating that systems that are undersized may be the most reliable, as there are obvious indications, e.g., insufficient suction, of undersizing. Oversizing is difficult to observe and may exist for a variety of reasons, e.g., reserve capacity for future expansion or to accommodate seasonal fluctuations in production levels.
8. A large portion of end users report that they have heard of resheaving as a strategy for reducing energy use. Sixty percent of those associated with PCS having more than 200 hp have heard of this technique. All of the external specifiers have heard of this technique and a large portion report that they market the technique when they feel it is appropriate. Some report that they have had success selling resheaving.
9. External specifiers believe that the best way to market fan speed reduction is as part of existing sales efforts directed to wood product plants. Virtually, all of these firms feel that their staff is well suited to selling this service. They also feel that any effort to market fan speed reduction should be targeted at all low-pressure PCS not just those found in secondary wood product plants.
10. A substantially portion of small and medium end users (PCS with 200 hp or less) feel it is important to convey information about this strategy via case studies and recommendations from trade associations. This is not the case for large end users (greater than 200 hp).

Recommendations

Based on the data collected from end users and external specifiers we believe that JEA and the Alliance should implement the following:

1. On-site analyses should be conducted to identify the number and type of plants for which fan speed reduction is an appropriate technology. Upon completion of these analyses, demonstration sites can be selected that best demonstrate the benefits of this technique and reflect the typical conditions of plants that are good candidates for this strategy. This work would be outside the scope of JEA's current work plan.

The sites for on-site analysis should be drawn randomly from the 40 facilities used in this market baseline evaluation effort, excluding those plants with total PCS hp less than 50. By analyzing randomly selected plants, JEA and the Alliance will obtain the data needed to reliably estimate the potential savings from this technology.

2. The project should pursue strategies that will inform end users and external specifiers about the costs and savings associated with resheaving. End users associated with large systems and all external specifiers understand the technique. What they lack is convincing data on costs and benefits. The use of case studies and recommendations from trade associations should be pursued, especially for plants with PCS having 200 hp or less.
3. The project should build on existing relationships between end users and all market actors who are supportive of the resheaving strategy. Some of the external specifiers that participated in this study are supportive of the resheaving strategy, have pre-existing relationships with the end users and staff that is knowledgeable about fan speed reduction techniques. These firms already incur the overhead of staying in contact with end users throughout the Pacific Northwest, especially those that operate large systems. It would be very expensive to replicate this sales network. Relationships with these external specifiers could strengthen the sales and promotion network that JEA is building with interested utilities and consulting engineers.
4. The project should develop marketing strategies that are specially tailored to the needs of large end users. The small number of plants with PCS hp greater than 200 account for a large fraction of the potential for the resheaving strategy. These end users probably need intensive one-on-one marketing approaches.
5. The project should emphasize a whole-system approach to PCS energy efficiency. This will be a necessity at plants with systems involving baghouses, controls, and complex ductwork. In addition, the systems approach will uncover other measures such as adding return air ductwork to recover heated building air. A comprehensive package of improvements could produce larger benefits while meeting the same payback criteria. It may be easier to attract the necessary management attention when selling a comprehensive package of improvements, which delivers a larger stream of benefits than is possible with just the resheaving strategy.