Obstacles to Industrial Implementation of Scanning Systems

Group #2 Discussion Summary

Anders Åström
Olof Broman
John Graffman
Anders Grönlund
Armas Jäppinen
Jari Luostarinen
Jan Nyström
Daniel L. Schmoldt
(Discussion Leader & Author)

Introduction

Initially the group discussed what is meant by *scanning systems*. An operational definition was adopted to consider scanning system in the current context to be nontraditional scanning. Where, traditional scanning is defined as scanning that has been industrially operational and relatively common for several years—a mature technology. For example, log profile scanning would be considered traditional, whereas other forms of optical scanning, as well as ultrasonic scanning, microwave scanning, x-ray scanning, etc., would be treated as nontraditional, and fall within the purview of this discussion. These latter scanning systems do not yet qualify as mature technologies.

Some discussion also occurred regarding the sectors of wood processing that suffer most from scanning system nonadoption. It was suggested, and there was general consensus within the group, that primary processing (sawmilling) has adopted scanning systems *less* than secondary manufacturers. Secondary processors have been much more willing to invest in scanning systems, or at least, seem to be more receptive to their potential.

The following list of obstacles is not in any particular order. Each one was discussed by the group, and is briefly described here. The group also provides one or more suggestions to help mitigate each obstacle and identifies a priority for each obstacle that indicates how much it hinders scanning system implementation. A 3-value scale (high, medium, low) is used to assess priority.

1. Industry Ignorance About Scanning Systems (SS)

2.In general, most industry personnel do not clearly understand scanning systems, including the potential benefits of SS, their operational and technical limitations, and their practical capabilities. There seems to be a dichotomy, where either manufacturers are overly zealous regarding SS, or they are very negative about them. Realistic expectations are often lacking. The group suggested three solutions: (1) lots of post-delivery training, so that operational limitations and practical capabilities become part of a manufacturer's knowledge base, (2) present and discuss operational issues related to system installation prior to sale and delivery, and (3) help generate realistic expectations of the technology, so that a wood processor enters into a project with open eyes. This obstacle was rate as *high* priority.

3. Over-Selling of SS by R&D

4.A fine line exists between inadequate product/technology promotion and out-right lying/misrepresentation. If there is too little promotion, it is unlikely that the technology will be adopted—the result is technology failure. On the other hand, misrepresentation leads to unrealistic expectations, which often cannot be fulfilled by an operational system. The result, again, will be technology failure, as the system may later be scrapped, or at least receive a bad evaluation. To help mitigate this obstacle, the group felt that we must continually be aware of our tendency to promote personal R&D, and promote in an extreme way. One group member suggested that more objective testing and comparison of SS should occur. Other group comments indicated that these types of tests are fraught with technical and practical limitations. For example, in cases where there are closely integrated processing operations that materially change test samples at the same time they are scanned, it may be impossible to run the same set of lumber through each system. In other cases, each SS may have been designed to solve a slightly different problem, so that applying them to the same test samples from a single mill may not be a fair test. Often, system testing can become one of comparing apples and oranges. This obstacle was assigned a *high/medium* priority, owing to some differences of opinion within the group.

5. Operational Flexibility Under SS Technology vs. Traditional Mill Processing

6.The current view of mill operations is that they are extremely flexible. That is, specification changes can be made quite quickly, and present mill infrastructures are capable of handling them. Machines can be adjusted for different sizes and tolerances, for example. Mill operators fear that SS's will require them to surrender some manual control of operations and their operational degrees of freedom will be reduced. This obstacle can be greatly minimized by promoting the advantages of SS. These advantages include processing consistency, ability to handle complex decisions, and efficiency. This obstacle was given a *low* priority.

7. Industry Conservatism

8.Mills have a large capital investment in equipment. It would be bad business to dispose of large portions of it without good reason. Therefore, industry is risk averse concerning new equipment purchases, especially ones, such as SS, that could change mill layout and existing processing methods. Most heavy manufacturing industries have this inertia, which can be interpreted as *conservatism*. There is not much that we can really do about this, however. We can, nevertheless, be aware of their capital-investment situation and incorporate it into our dealings with them. By mitigating some of the other obstacles mentioned here, conservatism will become less of an issue. The group assigned this problem *medium* priority.

9. Mill Employee Skills Are Lacking

10.Current mill employees are relatively untrained in the skills necessary to deal with SS. Most have been hired for their ability to perform manual labor tasks. While this workforce skill issue is not a big problem yet, it will become more prominent in the future as more SS are installed. University departments of wood science, forest products, and forestry need to be training mill workers (engineers) of the future. They need to do a better job of attracting students from engineering, information technology, and the quantitative sciences. The current mill workforce is not stupid; however, rather they are under-trained. Universities also need to work with industry to help train current employees, through extension programs

and through programs that allow employees time off to pursue college degrees. This obstacle was assigned *medium* priority.

11. Current Mill Layouts Often Do Not Accommodate SS

12.Most SS are designed, and operate most efficiently, as linear-feed systems. Softwood mills, on the other hand, are often set up as transverse-feed systems (and some hardwood mills, also). Installation of a SS, then, often requires substantial modification of mill layout and material flow. This is very costly and can add substantially to the total cost of an installed SS, which can make the mill's payback period much longer than the SS alone would normally require. The group suggests that new-mill designs and future mill expansions should be engineered to accommodate SS. In addition, SS R&D needs to work more closely with equipment manufacturers to design/modify materials handling systems that can easily accept, or adapt to, SS. This obstacle is given a *medium* priority.

13. Wood Processors Vary Considerably

14.Every mill is different—different in layout and material flow, different in product specifications and tolerances, different in quality control, different in raw material, different in final products and customers. Therefore, mill scanning needs are going to be different, as well. Current SS are one-off systems that are designed and parameterized for the application needs of each mill. SS do not currently possess great flexibility once they are installed. As R&D people become more comfortable with various scanning technologies, however, SS will improve and become more able to accommodate the tremendous variability in wood processors and their needs. The group assigned this obstacle *low* priority.

15. Current SS Man-Machine Interfaces Are Inadequate

16.As noted above, most current SS are relatively turnkey systems, which are designed and adjusted for each individual manufacturer. Consequently, there is little need right now for a sophisticated man-machine interface, that would allow mill workers to set up, troubleshoot, monitor, and adjust SS operation. As SS become more flexible, however, that need will change. Mill workers will need to make frequent adjustments to SS settings to optimize product quality and mill throughput, as more up- and down-stream processes are integrated. Interfaces can be added to SS as flexibility increases. Because the current needs are low, but anticipated needs are high, the group decided on *medium* priority.

17. Mill and Business Management is Not Tightly Monitored

18.Many mills do not adequately monitor and understand their operations, including inventory, materials flow, bottlenecks, quality assurance/quality control, volume/value recovery, etc. The mills that *do* understand their operations are the profitable ones; the rest are marginally profitable due to low raw material prices or currently good markets. To invest wisely in SS, mills must possess a good understanding of their operations and economics. Many mills, therefore, could benefit from some economic/business management training. This training needs to include front-office, as well as plant, employees. The group assigned this obstacle a *medium* priority.

19. Post-Delivery SS Evaluation Lacking

20.It is difficult to assess the pro's and con's of an installed SS without some sort of post-delivery evaluation process. Some of the questions that need to be answered are: Does the SS do what was claimed? How well does the SS perform?

What does the SS do well? Not do well? Has the mill's bottom line been improved? This obstacle is closely linked to the mill management issue above. Many of these questions cannot be answered without a good understanding and control of mill and business operations. The group assigned this obstacle a *medium* priority.

21. Vertical integration/Communication Lacking in the Wood Industry

22.The present structure of the wood processing industry is one of horizontal alignment. Most processors only deal with one or two segments of processing wood into final products, such as wood production, sawmills, driers/wholesalers, secondary processing, and product plants. Intermediate products flow one way, but there is little information flow in the other direction to help direct and optimize processing operations. Vertical integration involves a more strategic approach to business—not only looking ahead, but also looking around at other segments of the wood industry. To aid more vertical integration of wood processing, we need to develop SS that are robust and flexible, that can adapt to customer (and therefore processor) needs. We also need to promote SS as one part of a complete package for a wood processing business. This obstacle was assigned *high* priority.

23. Technology Adoption, In General

The adoption of technology is a heavily studied phenomenon. A large amount of scientific literature exists that could be potentially useful to understand and mitigate the obstacles faced by SS implementation. One of the important concepts in technology adoption is *advocacy*. That is, the adopting organization must have a champion or innovator that marshals support for the new technology. It is best, however, if advocates are present at several levels in the organization. Both, the guy that signs the check for the SS and the guy that works with it on the line, must be supportive. This support needs to be present before, and at, SS purchase, delivery, installation, maintenance, and evaluation. The group feels that this is probably the most important issue regarding SS implementation, and should not be overlooked; it is therefore *high* priority.