

Effective and Useful Audits of Pulp and Paper Machine Processes

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ABSTRACT:

Paper machine audits are essential to the papermaking process. These audits can include weekly felt moisture scans, fabric audits during shutdowns, reviews of specific subsystems (stock approach, chemistry, vacuum, the reel, etc.), or they can include study of the largest systems in the paper, board or pulp mill. These system studies can be performed by a company-led team, fabric suppliers, paper machine manufacturers, or just one person specializing in a particular process. The value of the audit is influenced as much by preparation by, and engagement of, mill personnel as it is by the capability of the auditing team or individual auditor. This discussion will include essential concepts for preparation and planning for an audit, what to expect during the audit, and ideas on execution of key findings of the audit.

DISCUSSION:

Audits which provide the mill with valuable information to increase efficiencies, minimize fiber loss, improve sheet quality, etc. are influenced by preparation, planning, scheduling, execution, follow-up and follow-through. Hundreds of man-hours can be consumed in the fact finding efforts and many valuable opportunities may be uncovered during an audit. However, many factors will determine the impact and results of the audit on mill performance and each is emphasized in this presentation.

Preparation: Someone in the mill has likely asked one of these questions:

- “There is a problem that we can’t resolve, so do we need to audit a specific process?”
- “Does the entire paper machine (or pulp dryer) need to be examined?”
- “Our vendor has offered an audit at no charge, so how do we get the most from this effort?”
- “Can a team audit of our pulp/paper/board machine help to resolve our problems?”

These are all valid questions. A good, thorough process audit is time consuming and can be expensive (for the vendor, corporate team, or consultant) so how do you maximize the benefit to the mill?

The key influence for a successful audit is preparation.

Several essential steps are necessary to plan an audit. Depending on the scope of the audit and number of specialists coming into the mill, this planning could begin 2 – 3 months in advance. A Mill Audit Contact needs to be in charge of coordinating the effort and to “own” the audit. This person needs both accountability and authority. Without authority, decisions can get bogged down during approval of every detail. Also, the audit needs to have full support from mill management. Many excellent audits are accomplished, only to result in a report being stored on a shelf or lost among thousands of electronic files.

Mill culture is vital to the success of any process study, of any size. Some mills have evolved with little outside support and developed a mindset that all problems can be solved internally, and outside help is not needed or even appreciated. Other mills include management and supervisors who have encouraged relationships with suppliers, vendors and consultants, and welcome advice (free or paid for) to allow continuous process improvement. Then there are those with a culture which contain a mixture of these examples and although they may support suggestions for improvement and optimization, there is a lack

of willingness to try anything new. Once the Mill Audit Contact responsible for planning and organizing the audit has been selected, their job will include necessary management and coordination to maintain support which can lead to successful execution of findings made during these system reviews.

An immediate next step is determining who performs the audit. Depending on the scope, this can require a single person for three days, or a team of 10, 20, 30 or more people to be on site for a week. Someone needs to determine where specialists are required, and how generalists can also contribute. When corporate driven, audit planners may have already made these selections which can include audit teams from clothing suppliers and machine builders. Sometimes, a few specialists are included with either approach to review areas including stock cleaning or screening, vacuum systems, or the reel and winder.

Small audits of a specific process are made to resolve particular problems and these usually require an experienced specialist. The person may be a consultant, work for an equipment supplier, or may be with one of the fabric or chemical vendors of fabrics who is already associated with the mill. If a specialist is identified as preferred above anyone else, then begin the effort early to be able to secure their time. These experts, if they are really good, will keep their schedule full for 2 to 3 months in advance. Since the effort necessary by mill personnel will change little, depending on who is coming to the mill, it makes sense to look for the preferred specialist or team with a backlog of projects. As one client told me, the mill management needed to decide if they wanted the first person available or, could they wait for quality.

Whoever the team or individual may be, it will be important to let them know a goal is to separate problems from symptoms. Solutions can be presented as short and long term efforts. If suppliers are providing these services, be sure that the outcome of the audit is much more than a proposal for a piece of everything they sell. There is a difference between what the audit may cost, compared to what it is worth.

Besides evaluating and determining who will provide the assessment, from outside the mill, it is important to include participation from inside the mill. Members of the audit effort should include key operators, foremen, planners, E&I techs, etc. All will add to the knowledge base of the team and those who participate will personally gain from the experience. Remember that an audit is only a snapshot of a few days of a process, unless a mill has extensive process trending capability. Therefore, these hourly employees can greatly contribute because they see problems which may only arise occasionally. Often, senior operators will have many more years of experience at a mill, and even if they may not thoroughly understand why an event happened, they can at least explain what happened. This can be valuable information.

Scheduling and Logistics: After available dates for the audit have been established by the outside auditor, check the calendar for conflicts with holidays and production schedules. Bringing people into a mill the week after school is out for the summer, or following a major holiday can be difficult because it can conflict with vacations. Air travel can also be a problem around holidays. Also, avoid audits just prior to major shutdowns because key mill personnel will be tied up in planning meetings.

A good scheduling plan which has been observed, is to set up a kick-off meeting for a Monday, early in the afternoon. This allows travel to occur or be completed earlier that morning. In some cases, Sunday travel will be required. Well organized team audits can complete assessments and mill presentations can be concluded by the end of the day on Thursday, allowing everyone to travel home on Friday.

The Mill Audit Contact needs to find and reserve a place for everyone to work during the audit. Consideration for suitable working locations for many visiting people can include needing tables, chairs, power supplies, printing capability and internet access. With all of these extra people on site, planning for meals is another task to be considered.

Working Location: Although the person or team will be spending a majority of time in the machine room or control room, some office space will be helpful for everyone. Operators don't need a half dozen visitors hanging out in the control room with their associated laptops, instrumentation, tools, jackets,

backpacks, etc. Depending on the size of the team, a location should be set up specifically for the audit team. Consider having coolers with water and soft drinks and a coffee maker especially when a large group is involved.

Meals: It is highly recommended to have lunches brought in for the audit team and mill personnel who are participating. This saves the time for travel and keeps the process moving all day with minimal interruption. Discussions by participants during meals usually continue through lunch and everyone can stay on track.

GETTING THE AUDIT STARTED:

Safety Indoctrination: Plan to have an indoctrination for the whole team as one of the first items to accomplish. Often, the mill's safety manager will get involved and personally address the team. Discuss if it is recommended for the team to offer safety related suggestions as part of the assessment. New sets of eyes from visitors often can identify potential safety issues which have been overlooked by mill personnel.

Kick-Off Meeting: This should include all key players, including all mill participants. The purpose is to review the audit scope, expectations, schedules and goals, and these are typically upbeat presentations. They can include brief mill histories including specific milestones for paper production, major projects, and rebuilds. Adequate time needs to be allowed for introductions of everyone including experience and responsibilities.

During the kick-off meeting, or any other time, do not add unreasonable, last minute requests to expand the scope of the audit. A casual request which begins, "While you are here...", and ends with an invitation to add significant items or processes to study needs to be avoided.

Documents Required by the Auditor or Team: Requests are made for specific data to be gathered ahead of time, and to have this available to give to the audit team on day one. This can include P & C drawings, DCS screen print samples, manuals, equipment drawings, etc. All of this can be printed ahead of time. Where electronic data is available, it can be presented on memory sticks and can be copied to laptops as needed. This sends a positive message immediately to visitors participating in the audit.

Encourage Interaction: Include mill personnel who are participating in the assessment. They may feel they do not have the experience to contribute, but are essential to add valuable information. These people deal regularly with issues and problems which may not be present during the time of the assessment.

Daily Follow-Up Meetings: These meetings can be very useful and often are 15 – 30 minute sessions at the end of lunch, end of the day, or at the beginning of each day. The purpose is to review the status of the assessments and inquire if there is missing information or additional data required. Progress and schedules can also be reviewed to be sure the overall effort remains on track. This can also be a good time to include a safety related discussion which keeps mill safety on everyone's mind.

PRESENTATION OF FINDINGS AND THE EXIT MEETING:

Schedule: It is important to hold to the initial schedule. Two, to two and a half hours of presentation time is about the maximum to maintain attention and accomplish this important task. Don't try to move up this meeting time by several hours, or shorten the length of the meeting. Allow adequate time for presentations, but minimize small details which can be covered in a written report.

Presentations: Power Point is the typical mode for presentations. Use common sense when preparing these presentations to minimize extensive text in each page. Include photos where necessary as this

adds greatly to explanations. Details can be included in written reports. The meeting room should be equipped with a white board and/or chart pad with an assortment of colored markers to allow sketches or help to clarify and enhance the presentation. Spreading the task of presenting among the team keeps the meeting interactive and shares the effort. These should be rehearsed as everyone is not an experienced public speaker.

Questions should be encouraged throughout the presentations. Avoid trying to get into problem solving or engineering solutions during this meeting because of time constraints. Be sure to create lists of items which can be acted on immediately, or can be easily accomplished during the next shutdown. Don't wait for a full written report to be received before acting on a good suggestion. Do it while ideas are fresh.

RESULTS ARE THE EXPECTED OUTCOME:

Follow through makes the difference between a good and great audit. Advance planning and acquiring the best participants are almost worthless if findings are not evaluated and acted upon. Also, lack of execution leaves a negative message to audit team members from the mill. Usually, enthusiasm created during the audit will continue as mill personnel experience positive results during the weeks and months afterward.

Critiques: Audits should be critiqued because any process can be improved. Many mills evaluate or critique every shutdown to encourage continuous improvement.

Create project lists that include responsibilities, schedules and timelines. Determine which items need to be accomplished first and the criteria for making these choices. This should include a combination of:

- Cost
- Time to make modifications
- Impact of expected outcome

Measure and track progress following the audit. Some positive results can be expected even before any physical changes are made as a result of the intensity of the audit process and increased awareness made upon operators.

Audits are not just a large event with visitors studying every portion of the mill. Review the audit process and determine how to include the most important items into daily and weekly rounds by operators and maintenance personnel. Additional simple instruments may be added to the tools used during daily rounds. For example, an infrared thermometer is useful to inspect bearing temperature, sheet temperature into and out of the press, and verifying adequate seal water flow to vacuum pumps. Adding a few IR guns in the control room, and encouraging their use, can result in better understanding of cause and effect through enhanced process understanding by operators.

Other positive outcomes.

- Mill acquires a list of people who can be helpful for future problem solving efforts.
- Mill operators get exposed to talented technical specialists and will usually take away positive ideas and techniques.
- Everyone usually experiences a good networking event.

CAUTIONS:

All recommendations can be considered: Avoid responding to a suggestion by saying, "We tried that before and it didn't work". An earlier recommendation may have failed for many reasons, including poor

and inaccurate data collection or erroneous interpretation of results. Process variables may have changed since the earlier trial, so a good opportunity may have been discovered.

Be aware of agendas: Although successful audit involvement by more than one supplier of similar products (fabrics or chemicals) is possible, be aware of competitive issues and even withholding of suggestions due to fear that the other supplier may benefit. Generally, this is not a problem. Most supplier representatives know each other and have even worked together, so their combined efforts should be beneficial.

Evaluate audit schedule and compare to corporate schedule for submission of capital projects. Planning of the audit should also consider these corporate budgeting schedules. Do not compromise the quality of the audit and execution of ideas to meet rushed schedules required for annual budget preparation.

Has another audit been performed recently (within the past few years), but no action has been taken? This has been observed occasionally. It may happen because the mill changed ownership, and/or management, or was involved in financial issues which restricted execution. Be sure to understand the circumstances fully and proceed as necessary. It can be demoralizing to mill personnel to repeat the audit effort again unless they understand why nothing was accomplished before. Recall Einstein's quote about doing the same activity over and over, but expecting different results.

CONCLUSION:

Successful audits are a result of adequate planning and execution of action items which were recommended during the process assessments. The quality and experience of the audit team are only responsible for discovering opportunities and cannot directly contribute after they have left the mill. Follow-through and action should begin immediately where suggested items are included to be acted upon during the next shutdown. A positive outcome is an increased level of awareness by mill personnel, especially with hourly employees who participated.

Another consideration is the development of improved daily, weekly and monthly audits to be incorporated into routine procedures and practiced by mill operators, maintenance, E&I and even management personnel. Again, this sends a positive message to mill personnel about the value and appreciation placed on audit participation.

SUCCESSFUL AUDITS = (Energy and Cost Savings) + (Improved Efficiencies) + (Safety Awareness) + (New Knowledge and Employee Engagement)

SUCCESSFUL AUDITS = THRIVING...NOT JUST SURVIVING