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Considerations for the Human Aspects to Accomplish or Prevent True Maintenance-Related Machinery Improvement

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Introduction:

Financial payoffs promised by so many people. Magazine articles, tradeshow presentations, etc. Hopes and dreams are high. Yes, there are some truly great returns already being accomplished, but how much more can be accomplished with only a little bit more thought. Using various technologies such as infrared, ultrasound, oil analyses as well as machinery vibration to monitor machinery running condition and defects - is not what I call "machinery improvement." To use any of those technologies to analyze for root-cause followed by good corrections that will bring a machine's running condition and running smoothness to the level expected from a new machine - is not what I call machinery improvement. Machinery improvement is described as using proactive procedures to perform certain machinery maintenance functions "just a little bit better" and in such a way that the machinery comes out better than expected when new. But do the various people who should cooperate on machinery improvement really know the difference between "reactive" and "proactive"? We'll have to really look at that one!

Analysis and correction is NOT machinery improvement. Redesign of a machine would normally be called machinery improvement. However, for this presentation machinery improvement on a plant's existing machines (pumps, motors, fans, blowers, turbines, generators, centrifuges, special machinery and so on) is described as to what is readily accomplished by just introducing relatively small changes in some of the basic actions of regular machinery maintenance. You already know what they are. They have been preached over and over again at trade shows, conferences, seminars by instrument manufacturers, in magazine articles, and even at my own company, Update International.

Some of the usual areas described that should enable machinery improvement:

For machinery improvement, standards for precision balancing and alignment have to become company standards.

Rotors have to be precision balanced.

Overhung rotors have to be balanced in two planes, not just one.

Rotors have to be marked regarding "touch points" and assembled accordingly.

Bearings and their shafts or bores have to be more carefully measured and assembled.

Alignment for almost all machines (not just a few) requires offsets for thermal growth.

Shimming has to eliminate soft foot and also be much more precise.

Pipe strain has to be minimized.

Resonance in pipes, pedestals and other usual attached parts, has to be located in the beginning, before or at the time of startup.

Foot frame-related resonances have to be located and corrected by routine procedures, by the technicians/mechanics themselves.

And of course, there are a half dozen more procedures that are relatively easy to accomplish but are hardly ever in routine practice. This is what this presentation is all about. The learning of fine technical details for each topic takes days of “preaching” detailed knowledge and practice. This session will not concentrate on those. Instead, it will concentrate on the really hard part of getting a plant’s “culture for precision” changed. It involves the various levels of knowledge and attitudes of many plant people in different capacities. After traveling worldwide at hundreds of plants, a fairly clear pattern has emerged. Here are the main situations that too often keep precision maintenance for maximum machinery reliability from really happening.

What is keeping it from “making it happen”?

Whose job, whose job description?

Is it the job of the:

- Vibration (and other technologies), condition monitoring, analysis, correction leader?
- Reliability Manager, engineer, specialist?
- Maintenance Manager?

What are their individual perspectives on what they are supposed to actually do? What are they to aim for? Is it for any of them to actually work in a serious way on precision-related machinery improvement? It is really in their job description? More than that - is it in the **expectancy** from the **total management team**?

What do their reports describe? Do they describe problems and technical solutions or are they describing financial goals, failures and successes? Look at a pile of reports. What’s the focus - technical or financial?

It takes a total cooperating team:

It takes a whole team, not bits and pieces here and there that are not truly coordinated with each other toward real machinery improvement goals. What are the chances of success if any of the following people are not involved?

Plant Manager	Maintenance Manager
Vibration-related and Other Technologies, Supervisor/Manager	Supervisors of Mechanics/Technicians
Head Office People Involved in “Best Practices”, all Company Standards, Etc.	Mechanics and Technicians Who Align, assemble, Etc.

Consequences of incomplete coordination and cooperation:

Who should be left out? No, that’s too strong a term. We all know that all are involved. However, how many are involved only part way. What happens to any person involved, that isn’t truly helping I the goals toward

machinery improvement? It takes a whole team - all who understand the technology, the financial goals and agree to all do their part to really make it happen.

Showing each mechanic/technician that you really mean it:

technician/mechanic at the machine, alongside the specialist, after a reworked machine is ready for startup

monitoring each seal's date of installation, date of replacement, reporting all "bad actors"

You can't have machinery improvement to precision tolerances unless all involved know that those tolerances are. Sure, you can give good training - alignment, balancing, bearing installation, on and on. For the typical plant, what percentage of what was taught in good training courses is actually used on a routine basis? Update's guess is that less than 25% actually becomes part of the plant's culture for precision-related machinery improvement. Is the remaining 75% really that difficult? It was all understood in the classroom. What went wrong?

Mentoring the mechanics/technicians over a two to six-month period, one person, one job at a time. Determine those people who are the best at a specific task and who don't rally qualify. (There are other jobs for which they qualify.)

Showing each SUPERVISOR that you really mean it:

All have to approve spectral-related reports supplied by the specialist. If for example, a machine has more vibration than acceptable by a plant's precision standard, is approved for production, each person who approves gives the reason why they accepted less. That includes the vibration/condition monitoring specialist, the area maintenance supervisor and even the operations supervisor.

Showing the new machinery, plant expansion engineers and those who specify, purchase and accept - that you really mean it:

Those who specify and purchase also have to get a grip on what the plant is aiming for, regarding precision standards

They have to learn how little extra cost should be involved to go for the few extra balancing runs, few extra "moves" in alignment, little extra care for base preparation, ease for elimination of resonance during startup. When the delivered machinery is not right, they should not be able to turn it over to the maintenance department to make it right. The specifiers (who may have bought the cheapest) have to not only specify, but are responsible until the final acceptance.

Showing the new and used machinery suppliers that you really mean it:

Test reports filled out by the tester in actual results and not just "passed." Signed by the tester.

Test results faxed to the plant for approval before shipment.

"Rubber mat" or other means for testing rebuilt and new motors after they arrive at the plant.

Financial considerations (and the usual objections):

We don't have the people

We don't have the time

We don't have the money

In other words, "I don't know how to accomplish precision maintenance and true reliability, so I'll use every means to get out of it." For those who do understand the practical, easy-to-implement procedures, **they already know** that the main results from precision maintenance and machinery improvement are:

Improved machines mean that we can maintain more machines with less people (less non-scheduled - less "putting out fires" - less wrong answers)

Precision maintenance allows all involved, including managers, to have more time to think, to plan and to do it right the first time

Precision maintenance not only saves money, but at the same time enables more production output as the machines considerably increase their run time before failure.

Mr. Buscarello obtained Bachelor of Science degrees in both Mechanical and Administrative Engineering from the University of Denver. After working with others and as an independent for several years, Mr. Buscarello founded Update International, Inc. in 1966. As its Chief Executive Officer ever since, Mr. Buscarello is principally responsible for Update's reputation as the world leader in vibration-based machinery maintenance training. As a pioneer and leading authority on vibration analysis, he has conducted seminars in over 40 countries worldwide. Visit them at www.update-intl.com or email Mr. Buscarello at update@update-intl.com.