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"Procedure-based maintenance" will be invaluable in this era of growing skills shortages. Machine complexity, coupled with the impact of the skills crisis and business needs for improved performance, has created a situation where detailed work instructions are a must-have/must-use maintenance approach. While "craft-based maintenance" has served us well for generations, we can no longer rely solely on the talents of general mechanics, machine repairers, electrical/electronic technicians and others to figure things out.

To recap, this two-part article began with the designating and defining of "detailed work instructions" as the "World's Best Maintenance Tool" (*MT June 2012*). Detailed work instructions are foundational in driving out the natural human variation that's common among a group of individuals performing a task. In last month's column (
MT July 2012—Part 1: A Style Guide
), we explored a proven process for developing and deploying maintenance work instructions. This development process included three critical points:

1. Focus on the most penalizing equipment (focus on results).

2. Follow a structured developmental and deployment process.

3. Use a standardized document format.

This month's column will continue to explore some of the finer elements of detailed work instructions: procedure statements, their sequence and deployment. These elements are essential to assure task performance efficiency and effectiveness.

Procedure statements

Think of a procedure statement as a single step in a TASK, as opposed to many different steps combined into a complex task statement-—*not too long, not too short.* The procedure statement should provide a clear and accurate performance standard for anyone who performs the task. End-users should be able to follow the procedure to the letter. The end goal is flawless human performance, regardless of who performs the task.

It's important to identify the end-users before developing detailed work instructions and writing the step-by-step procedures. Consider the following with regard to those end-users:

- Technical skills and knowledge
- Current job role
- Experience on the targeted equipment
- Reading abilities

Are the end-users newly hired maintenance employees? Are they your top long-term skilled maintainers? Are they equipment operators? Do they have the basic hands-on skills and knowledge of the tools and materials needed to perform the procedure?

Be careful NOT to develop work instructions for a dramatically lower level than current end-users or future employees. Likewise, be careful NOT to assume that just because they are "skilled-trades" personnel that they don't need a little extra coaching on important points during the performance of a critical maintenance procedure.

When drafting procedures, engage a variety of potential end-users to help develop the appropriate level of detail—*and avoid thinking that "everyone knows how to do that."* Such an assumption can get you into trouble quickly on some critical and complex tasks.

Step 1. Isolate the procedure statement. Here's an example maintenance-procedure statement taken from the OEM manual for a Quad Machine:

"Clean dust, debris and glue from the antenna surface and securing blocks."

This statement assumes that the end-user 1) knows the machine terminology (“antenna surface” and “securing blocks”); and 2) knows how to clean “dust, debris and glue.” These assumptions could be right on target—*or not.* When in doubt, we must provide diagrams and more detailed information on how to clean.

Step 2. Consider if there are additional manufacturer recommendations. In the example here, there are some specific OEM recommendations for “cleaning” the antenna and securing blocks that MUST be included with our procedure statement for the Quad Machine:

“Use neutral solvents or soaps for cleaning. Do NOT use solvents that could damage the antenna components.”

Step 3. Include any clarifications within the procedure statement rather than in a note elsewhere in the work instructions. Keeping this in mind, our Quad Machine procedure statement would read as follows:

“Clean dust, debris and glue from the antenna surface and securing blocks. Use neutral solvents or soaps for cleaning. Do NOT use solvents that could damage the antenna components.”

Step 4. Get specific. At the beginning of the maintenance-work-instruction document, we should have listed the required materials. Don’t just leave it there, however. In some cases, it’s important to *re-list* the required supplies, parts and tools in critical steps. Thus, we have included “lint-free towels,” “Product ABC” (the exact cleaning solvent to be used) and a “CAUTION” in the following example:

“Clean dust, debris and glue from the antenna surface and securing blocks with lint-free wiping towels. Use only ‘Product ABC’ solvent for cleaning. CAUTION: Other solvents could damage the antenna and blocks.”

Now we have a brief, to-the-point procedure statement that includes exactly what the end users need to know and do. It is brief and to the point.

Step 5. Eliminate unnecessary words. The following example from a technical writer is full of "clutter words." *Do NOT write like this:*

***"*Carefully *clean dust, debris and glue from the antenna surface and securing blocks* on the Quad Machine by using**
lint-free wiping cloths.
Be aware that the
use
of
neutral solvents or soaps for cleaning
is highly recommended by the manufacturer of these components. And by all means
do NOT use solvents that could damage the antenna components
in ways that could force replacement
."

The 31 clutter words in the revised procedure statement above do nothing to improve clarity. Again, do NOT write like this. Although you may see this style reflected in some OEM manuals, you should strive to be brief and to the point in the procedure statements you develop.

Sequence of steps

Step-by-step work instructions can be organized in a number of ways to provide a sequence for the task being performed. Imagine the person performing the work with minimal back-and-forth travel—*i.e., keeping the work efficient.* For example, the sequence can be:

- Organized in a sequence that is required to properly do the work.
- Organized in an efficient sequential route around the equipment.
- Starting at the top of the equipment and working down to the floor (for lube and cleaning tasks).
- Starting with "power-on" inspection tasks grouped together, followed by "power-off" internal tasks, or vice versa.

Try to keep tasks and/or steps that require the same tools or type of activity grouped together. Avoid mixing lube steps, adjustment steps, filter-change steps and cleaning steps.

The following box shows steps organized in the *OEM-required* sequence to properly maintain the Quad Machine. Notice that our previously written cleaning procedure is now Step 3.

“Clean and check the SHIELD antenna unit:

1. Check and re-tighten each of the screwed antenna joints and couplings.

2. Check and re-tighten the screws of the plastic supports that secure the antenna to the machine.

3. Clean dust, debris, and glue from the antenna surface and securing blocks with lint- free wiping towels. Use only ‘Product ABC’ solvent for cleaning.

CAUTION: Other solvents could damage the antenna and blocks.”

In this example, we’ve illustrated a maintenance TASK STATEMENT that sets the stage for the steps to follow. Each of the three subsequent steps is then listed in the proper numbered sequence.

Deployment

Detailed work instructions are invaluable for improving the efficiency and effectiveness of maintenance tasks, equipment performance and safe reliable human performance. But these benefits are ONLY realized when the work instructions are *deployed* within disciplined (organized and consistent) maintenance work processes. Disciplined deployment of detailed maintenance work instructions occurs when:

- They are included in a maintenance management system: EAMS, CMMS, or a manual system.
- They are planned and scheduled to maintain desired levels of equipment performance.
- The right tools are used properly.
- The right supplies, materials and mission-ready spare parts are used.
- Employees are trained and qualified to perform the assigned tasks safely.
- Leadership holds all employees accountable for consistently following the procedures.
- There are periodic measurements and audits of the procedure being performed and its results.

The “World’s Best Maintenance Tool” will continue to show its value every time it’s used. Detailed work instructions developed for critical equipment, deployed in an organized manner, by skilled and knowledgeable people, will definitely improve equipment performance and reliability—*and likely reduce operating and maintenance costs along the way.* **MT**

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