

## MPS 34-1

**MPS 34: Trouble shooting** © copyright, Donald R. Woods, 2002

**Trouble shooting:** is the ability to apply problem solving skills, people skills and background experience to safely, efficiently, economically and effectively diagnose, correct and prevent the reoccurrence of unexpected performance on a process.

A trouble shooting problem tends 1) to have evidence that is fuzzy, incorrect or misleading; 2) to be subjected to constraints of time (get it corrected yesterday!), safety (don't endanger health of people) and fixed facilities (we must work with the current physical layout and availability of instruments and sampling ports; "if only..." doesn't work), 3) unexpected and not encountered before.

### Skill development:

1. Ability to talk about thought processes
2. Shift to a focus on accuracy (instead of on time)
3. Emphasis on being active and writing things down
4. Recognizing that others solve problems differently than they do
5. Acquire some skill at listening
6. Acquire some skill in giving and receiving feedback
7. Ability to create hypotheses
8. Through self awareness, begin to improve self confidence
9. Begin to realize that assessment is based on **evidence**
10. Begin to develop an environment of trust where risking is OK.
11. Ability to relate hypotheses to symptoms
12. Memorize experience knowledge and rules of thumb for trouble shooting.

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### Pretest:

**Awareness:** how aware are you of what you do when you solve trouble shooting problems? Rate with an "x"

0	1	2	3	4	5	6	7	8	9	10
Unaware				Aware of						Very aware
I just				Some						I can describe
do it										The details of
										how I do it

**Experience knowledge:** For chemical process equipment, such as centrifugal pumps, shell and tube heat exchangers, steam traps, control systems and distillation columns, rate your fundamental and experience knowledge as it relates to these

0	1	2	3	4	5	6	7	8	9	10
None		a little		some		quite a bit				extensive

**Skill:** how skilled are you in doing this activity? Rate with an "x"

0	1	2	3	4	5	6	7	8	9	10
Poor		Fair		Good		Very good				Excellent

**Comments:**

MPS 34-2

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## MPS 34-3

### Learning Objectives and example assessment

#### MPS 34 Trouble shooting

as trouble shooter:

These objectives apply to the goals of :

1) identifying cause; 2) identifying corrective action; 3) preventing reoccurrence.

3.1 given a trouble shooting situation, you will verbalize and illustrate your thought processes so that an observer will have evidence that you use an organized approach; that you do not intermix issues, search for causes, generate hypotheses, gather information, test hypotheses and propose corrective action.

3.2 given a trouble shooting situation, you will verbalize your thought process as you try to solve the problem and express "monitoring" statements at least once per minute.

3.3 given a trouble shooting situation, you will be able to state or demonstrate whether you are using a strategy that is "data gathering/ situation clarification/ asking fishing questions" or you are using a "hypothesis testing / shooting question" tactic. Your assessment will agree with the observer's assessment.

3.4 given a trouble shooting problem, you will be able to identify whether "exploring changes" or "checking fundamentals" might be the more profitable tactic to follow.

3.5 given a trouble shooting problem, you will be able to complete an IS and IS NOT analysis for the 5Ws and H.

4.1 given a trouble shooting situation, when posing hypotheses, you will be able to keep about five hypotheses "active" instead of

zeroing in on just one hypothesis. The evidence might include a written list.

4.2 given a written scenario about a trouble shooting situation, you will be able to correctly list the symptoms. The list should agree with that of the "expert system".

4.3 given a hypothesis, you will be able, via a checklist, cause/effect diagram or a tree chart, to identify correctly whether or not the hypothesis is consistent with all of the symptoms.

5.1 when brainstorming, you will be able to write out about 50 ideas in 10 minutes; these will be from at least seven different classes of ideas and throughout the process you will defer judgement.

5.2 given a wish to pose a task, you will write out the questions, tasks and activities with such clarity that the "plant operator (or -----) will be able to unequivocally perform and task" and the task will provide the answer you sought. The performance must be safe. Judgement will be made by either the expert system or the observer.

For the expert system.

6.1 given a package with the problem and "answer" you will study the scenario in such depth that you will be able to correctly answer the *trouble shooter's* questions. This judgement will be made by the trouble shooter or the observer after the correct cause has been identified.

6.2 given a question written by the *trouble shooter*, you will write out an answer that is succinct, correct and that does not provide

MPS 34-4

more information than was requested. No “hints” were given, in writing, verbally or by body language. This judgement will be made by the observer.

as observer

3.1 as observer, you will refrain from giving hints to the trouble shooter. You will perform the role of observer.

6.1 given the verbal and written evidence, you will complete a “feedback” form and discuss your assessment verbally with the *trouble shooter*. Concrete evidence should be provided to the trouble shooter to justify the rating. All dimensions of the rating form shall be included in the feedback.

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Example individual “exam” assessment.

1. Given the trouble shooting problem in Figure...., you will

1.1 list the symptoms

1.2. identify which might be a preferred tactic: identify change or explore fundamentals

1.3. brainstorm and write out 50 ideas for causes in 10 minutes

1.4. classify the ideas in step 3; identify the basis of classification.

1.5. identify six most feasible.

1.6. identify the “craziest” idea and write out your thought processes as this is converted to a technically feasible idea.

1.7. for one feasible hypothesis, identify whether the hypothesis is or is not consistent with all the symptoms listed in step 1.

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2. Given a trouble shooting problem, do an IS and IS NOT for 5Ws and H analysis.

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3. Given a trouble shooting problem... and the cause, you will

3.1 brainstorm and write out 50 ideas for corrective actions in 10 minutes

3.2. classify the ideas in step 3; identify the basis of classification.

3.3. identify six most feasible.

3.4. identify the “craziest” idea and write out your thought processes as this is converted to a technically feasible idea.

listed in step 1.