TEACHING TROUBLESHOOTING

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What is Troubleshooting?

It is not following a recipe book

It is not Root Cause Analysis

It is efficiently and effectively assessing the condition of an abnormal process to:

- Determine the cause
- Plan corrective action
- Safely return the process to normal

"Problem solving is what you do when the logical system of rules breaks down (otherwise known as troubleshooting) or when the logical system doesn't quite apply (otherwise knows as thinking creatively).

Figuring Things Out, 1992
R. Zemke and T. Kramlinger

Introductions

Who are we
and why are we here?

Agenda review

Target

Effective Troubleshooting from Every Technician

Minimize negative impact of process variations

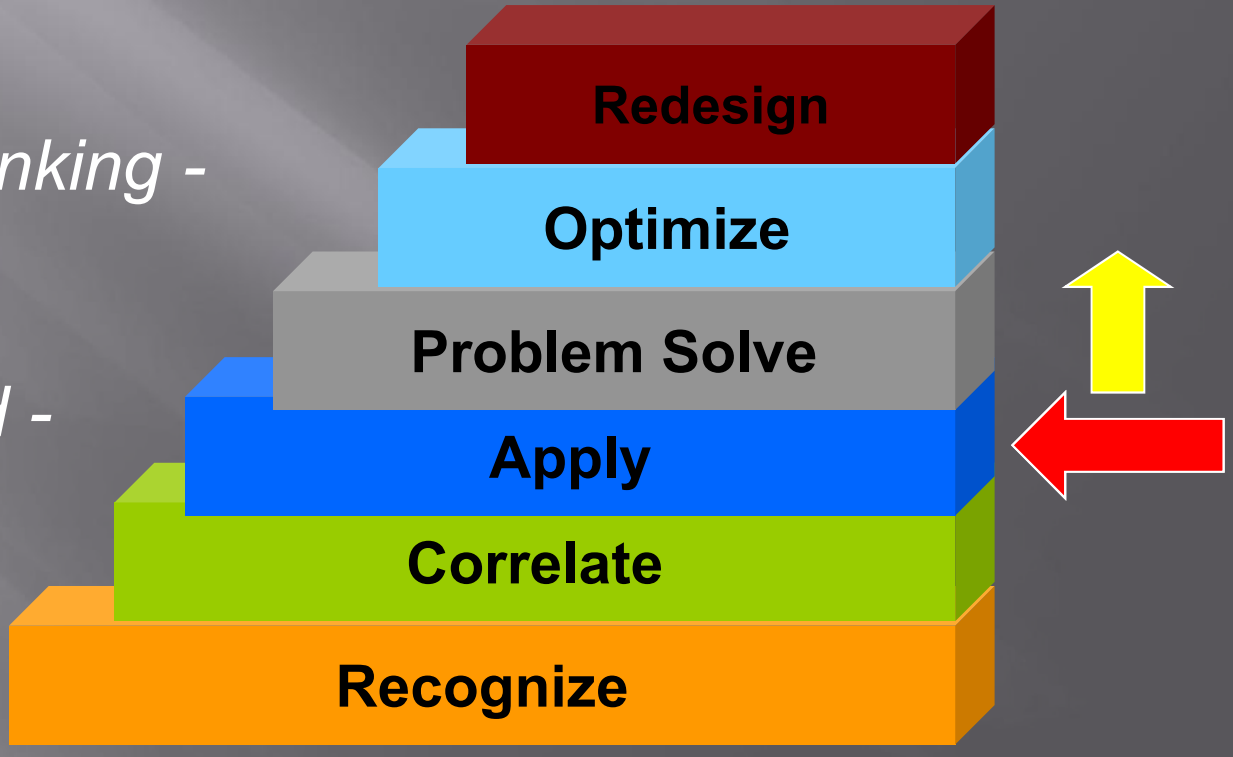
Be quick, be efficient, be right

Learning Hierarchy

Performance

Critical Thinking - Proactive

Task Based - Reactive



Main Components

- A step-by-step process that learners can apply in a broad variety of situations
- Tools that clarify, validate, and expand what is known about the current process conditions

"The most complex tasks or job element that anyone can be asked to perform, at the top of his pyramid, is problem solving."

Military Training and Principles of Learning

Gagne, American Psychologist, December, 1962

Key Elements

- Relevant to the job
- Build on what the learners know
- Address different learning styles
- Begin with simple problems
- Focus on the Tools and Method
- Become progressively more difficult

Key Elements

- Learning – Method and Tools
- Application – actual problem solving with coaching
- Practice – troubleshooting in teams and individually with minimum guidance
- Evaluation – competency demonstration with feedback
- Performance

Prerequisites

- Science and Math
- Basic Process Operations
- Process Variables
- Basic Process Control, Instrumentation
- Process or System-Specific Knowledge or Information

T/S Tools

- Material Balance
- Energy Balance
- Interrelationship of Variables
- What's Expected
- Time Factor
- Process Knowledge
- Science – Heat Transfer, Hydraulics, Pneumatics

T/S Method

Determine the Condition of the Process

- Collect Data
- Evaluate Data
  - What's changed, unchanged
  - In what direction, how much
- Make some Judgments
  - Concise statement on condition of the process

T/S Method

Determine the Cause for that Process Condition

- Develop Possible Causes
  - Mechanical
  - Instrumentation
  - Process/Chemical
- Verify the Most Probable

T/S Method

Plan and Execute Corrective Action

- Safety
- Environment
- Equipment

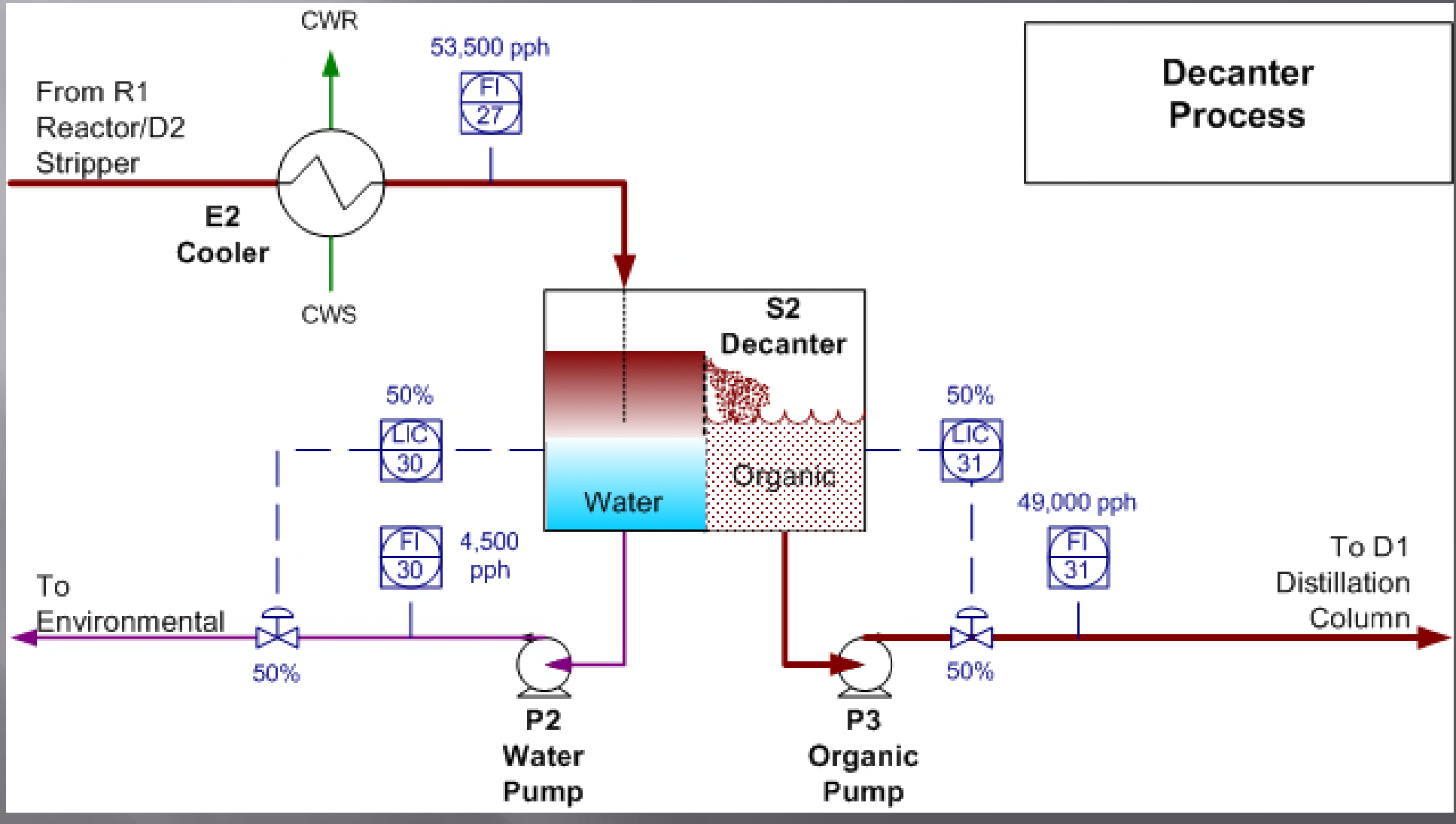
Steps in T/S Process

- Collect Data
- Evaluate Data
- Make some Judgments
- Develop Possible Causes
- Verify the Most Probable
- Plan and Execute Corrective Action
- Document and Communicate

Sample T/S Problems

- Process Description
- Process Drawing
- Set of Normal Data
- Set of Abnormal Data

DECANTER PROCESS



Teaching Troubleshooting

- Prerequisites
- Teach Tools
- Teach a Method or Process
- Apply the Method and Tools
- Practice
- Evaluate and Give Feedback

Tips for Success

- Start with simple problems and slowly increase the difficulty
- Make everything visible
- Respond to every relevant comment or question
- Turn every wrong answer into a learning event and reinforce the right answers
- Slowly move toward doing the steps mentally

Tips for Success

- Effective troubleshooting is about asking questions.
- Teach by asking not by telling.
- Model the behavior that you want to instill.

The best troubleshooters may not know all the answers, but they know all the right questions.

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Thank You

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