



## ***Improved Operations and Maintenance: The Low Hanging Fruit***

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November 16, 2017



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### **Session Objectives**

- Share about Improved O & M experiences
- Inspire each other to look for new opportunities and revisit old ones
- Emphasize inclusion of workers as a source of ideas and successful implementation

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### **Session Flow**

- Improved Operations and Maintenance Overview and what we are seeing in the TUR Plan Summaries (Heather)
- Transitioning to Safer Chemicals (Steve)
- Break
- Company Experiences (Medtronic, Tech-Etch, GE)
- Exercise

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## Six TUR Techniques

Input Substitution

Product Reformulation

Production Unit Redesign/Modification

Production Unit Modernization

**Improved Operations and Maintenance**

Recycling

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## Improved Operations and Maintenance

- Improved housekeeping, system adjustments, product/process inspections, or process control equipment or methods

Examples:

- Institute employee training programs
- Install splash guards and drip boards
- Implement inventory control program to prevent expiration of chemicals

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## Improved Operation and Maintenance

Cost effective

May involve:

Changing operating procedures

Operator training

Preventive maintenance programs

Improving inventory management and control

Other administrative efforts

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## Key tools

- Process Flow Diagram
- Workers on the floor
- Maintenance Department

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## Improved O&M examples



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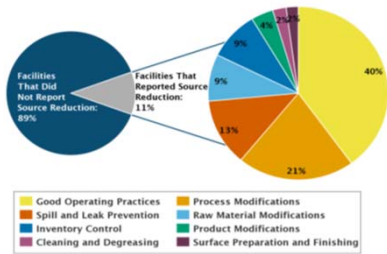
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## Newly Implemented Source Reduction Practices, 2015

Facilities Reporting to TRI    Source Reduction Activities Reported



Note: Facilities report their source reduction activities by selecting codes that describe their activities. These codes fall into one of eight categories listed in the graph legend and are defined in the [TRI Reporting Forms and Instructions](#).

Source: 2015 TRI National Analysis

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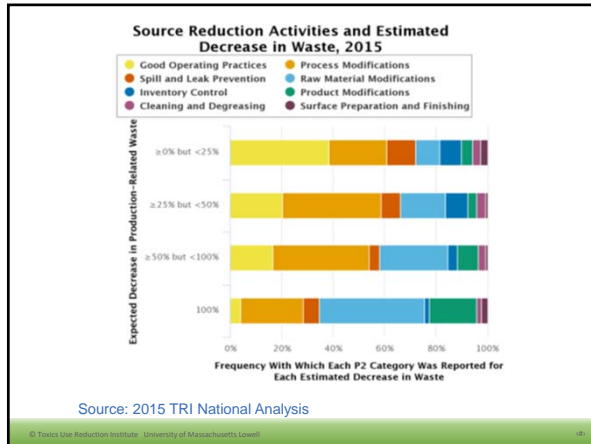
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## 2016 Plan Update Summaries

- ~ 100 reports of Improved O&M
- Many for chemicals that have been reported at the facility for a long time
- Report Options Considered/Options Implemented/Additional Info

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## Improved Operations and Maintenance Activities Reported on Plan Summaries: Raw Material Control

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The new peristaltic pumps have been installed in an attempt to dispense formaldehyde more efficiently.

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Our dye addition has been incorporated into our distributive control system allowing us to control dosage more exactly as we change paper grades and machine speeds.

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Dye addition point was determined where lowest quantity of dye could be used

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**Improved Operations and Maintenance  
Activities Reported on Plan Summaries:  
Raw Material Control**

Reducing length of starting billet to reduce machining losses

Locking of glue applicators to prevent discretionary adjustments

Bulk storage of nMP instead of totes

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**Improved Operations and Maintenance  
Activities Reported on Plan Summaries:  
Losses**

Improve storage temperature

Enclosed mixers to reduce air losses

Leak detection – reduce fugitive losses

Utilize covers to reduce evaporative losses

Reduce fugitive air emissions from storage tank

Insulate acetone containers to reduce temperature of material to suppress volatility

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**Improved Operations and Maintenance  
Activities Reported on Plan Summaries:  
Scheduling**

Maximize production runs to minimize tank cleanout

Optimize production schedule to reduce batch changes

Improve scheduling to reduce waste

Re-evaluate existing production scheduling to try to maximize production runs of the same color to reduce scrap generated

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**Improved Operations and Maintenance  
Activities Reported on Plan Summaries:  
Tracking**

Daily tracking of acetone usage by machine to identify opportunities for improvement

Improve polymer waste tracking to identify potential improvements

Scrap tracking program for yield improvement

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**Improved Operations and Maintenance  
Activities Reported on Plan Summaries:  
Defect Reduction**

Improve filtering process to reduce defects

Reduce run time to first successful quality control test by improving thickness measurement and operator training

Implement a scrap reduction project to reduce mix variability and production variability

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**Improved Operations and Maintenance  
Activities Reported on Plan Summaries:  
Maintenance**

Preventative Maintenance on pumps

Improved maintenance of coating rolls will result in more accurate manufacture of coatings, reducing waste

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**Improved Operations and Maintenance  
Activities Reported on Plan Summaries:  
Worker Training**

Improve training to ensure gun operators are spraying more evenly and with more narrow spray breadth from gun, reducing over-spray and waste; reconfigure production area to increase size allowing larger batches and longer curing times

Transfer checklists to reduce potential for operator error, formalize corrective action process

Improve start up procedures

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**Improved Operations and Maintenance  
Activities Reported on Plan Summaries:  
Miscellaneous**

Improve flow rate control

Improved mixing – high speed dispersion

Reduce trim

Use alternative roto-stator mill for one vessel process

Mix directly to reduce transfer step

Reduce cleaning/plating bath size

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**Improved Operations and Maintenance  
Activities Reported on Plan Summaries:  
Miscellaneous**

Reduce coating weight

Alter baskets used for parts

Bottom feed cans, can liners, reduce cleaning of cans, use totes instead

Review procedures to maximize use of raw material and energy

Contamination reduction process to eliminate need for dumps

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**Improved Operations and Maintenance Activities Reported on Plan Summaries: Miscellaneous**

Increase size of coagulation tank to improve yield

Decrease blade size in reflow oven

Improve pre-emulsion strainer cleaning procedures

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**Measuring Results**

- Try to get baseline numbers for the process before implementing changes
- Numbers for the specific part of the production unit affected can be helpful
- Improved O&M typically pays off easily
- Success garners support for future projects

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**Results**

Ethyl acetate was expected to stay steady as it was substituted for MEK and toluene between 2013-2015. A reduction in use of 29,804 lbs occurred due to 2014 implementation of a panless coating delivery system on Line Coater 2.

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## Continuous improvement

- Companies that revisit options generated find that they are able to implement later on
- Small improvements add up

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## Going Further than the Low Hanging Fruit ...

- Be systematic
- Revisit past ideas
- Enlist the right team



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