

Steam System Optimization Program

SSOP®

Peace of Mind through Steam System Optimization

TLV®

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How is plant steam managed?

“We know how much we generate, but that’s about it...”

Production Process



Managed Precisely

Steam



Often Not Managed

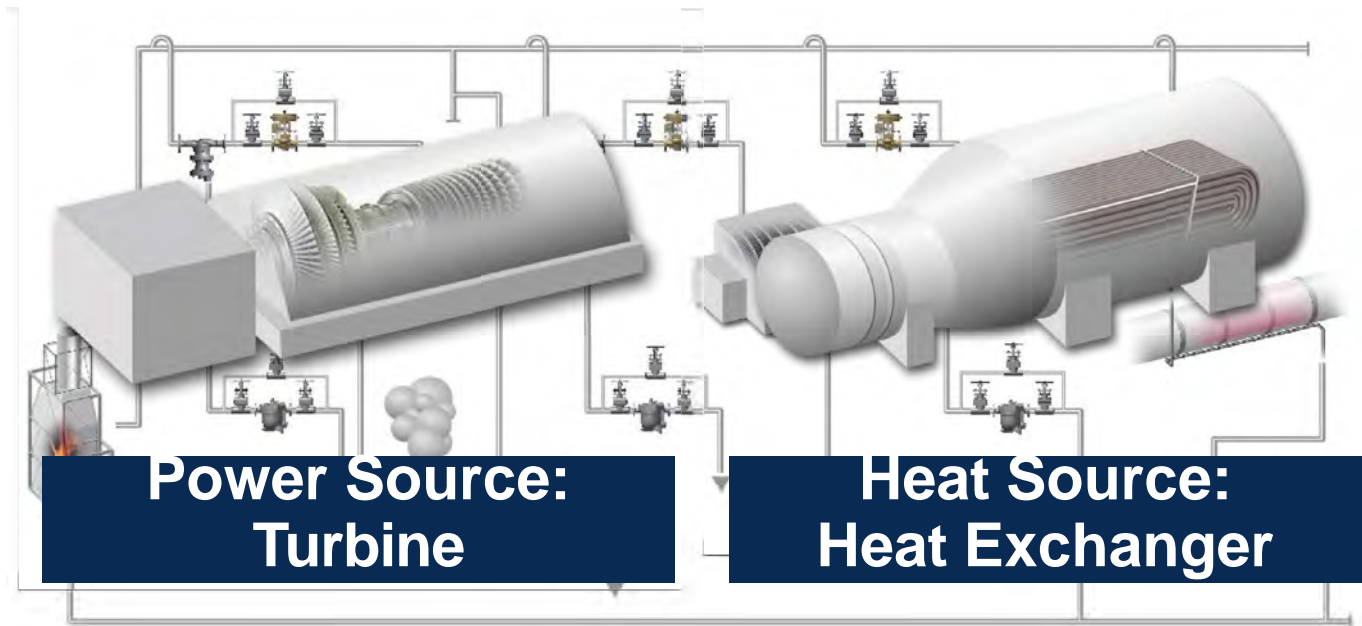


Steam System Optimization

**Generate significant value from
efficient use of steam**

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Steam Plant



“Ideal Steam Supply”

“Quickly Discharge
Condensate”

Bring forth full potential of equipment

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Principles of Steam Utilization



- 1 Supply “dry steam” at the optimal pressure and flow rate
- 2 Discharge generated condensate quickly without leaking steam
- 3 Fill steam-using equipment with steam at all times

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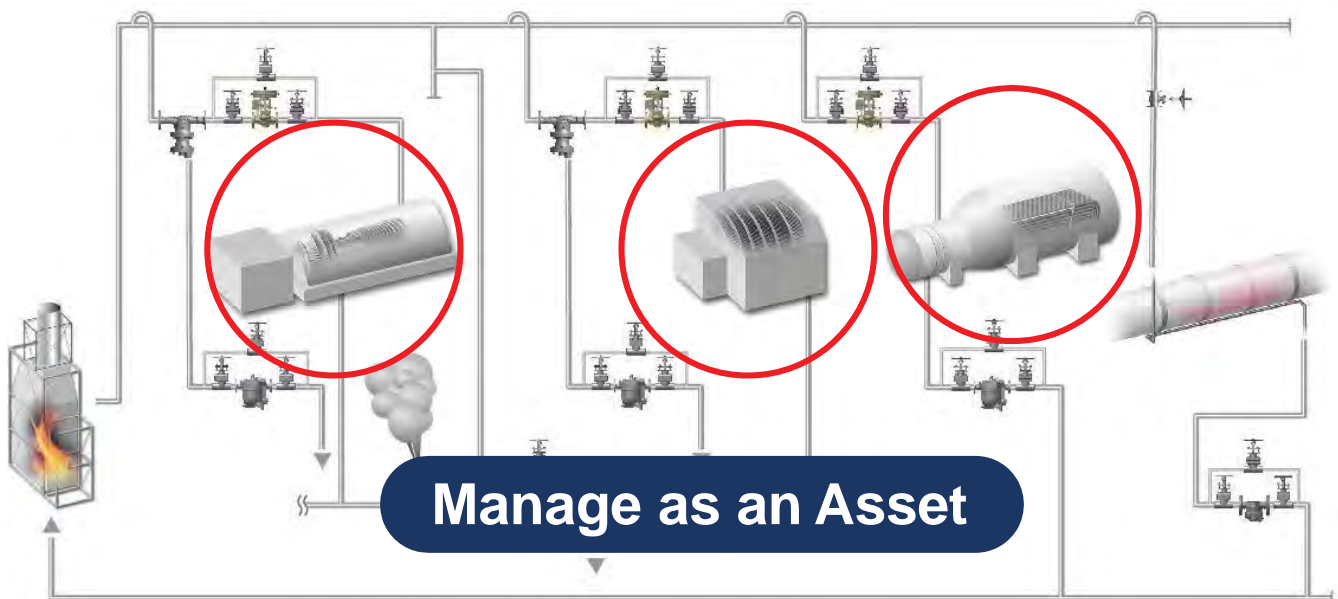
Is steam being used in an optimum state?

NO

There is a problem with the current definition of assets

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Steam Plant

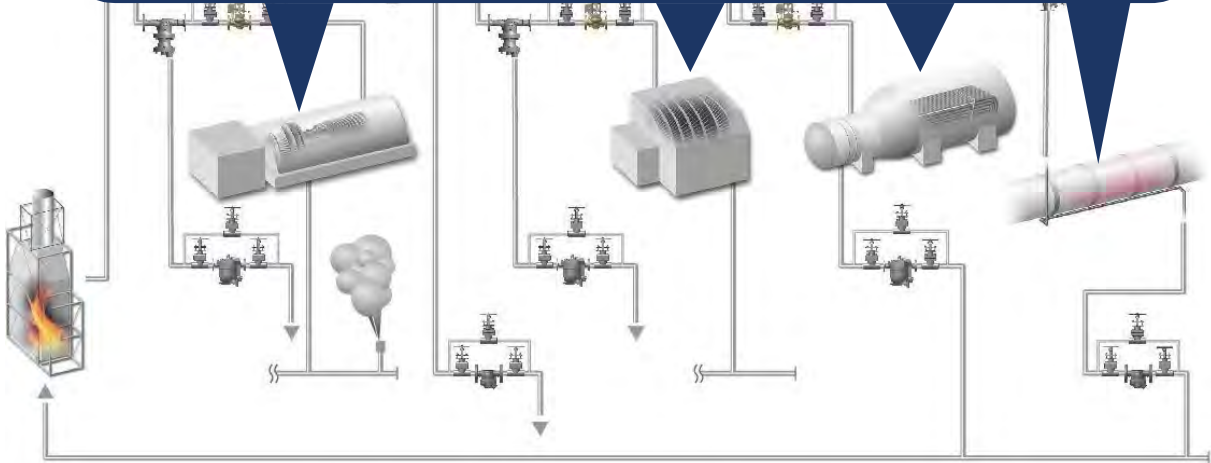


Stand-alone management of equipment is inadequate

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Contributing to Safe & Stable Plant Operation

Bring Forth Full Function and Capability of Equipment



Steam is an Asset

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The Structure of SSOP®

3

Phase

How can the entire steam system be optimized?

Create optimum balance with the entire steam system treated as a valuable asset.

2

Phase

How can all SA (Steam Applications such as steam-using equipment, tracing) be optimized?

Newly define everything from steam supply to condensate discharge as an asset.

1

Phase

How can all CDLs (ex. 10,000) be optimized?

Necessary conditions for the steam system to function.

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The Structure of SSOP®

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How can the entire steam system be optimized?

Phase

Create optimum balance with the entire steam system treated as a valuable asset.

2

How can all SA (Steam Applications such as steam-using equipment, tracing) be optimized?

Phase

Define everything from steam supply to condensate discharge as a new asset.

1

TMS (Trap Management System)

Phase

- ✘ Eliminate Problems Caused by Condensate
- ✘ Reduce Steam Loss

Create Infrastructure

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The Structure of SSOP®

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How can the entire steam system be optimized?

Phase

Create optimum balance with the entire steam system treated as a valuable asset.

2

BPSSM® (Best Practice of Steam System Management)

Phase

- ✘ Safety, Reliability & Productivity Improvements
- ✘ Recover and Re-use Condensate and Waste Heat

Optimize Steam Applications

TMS (Trap Management System)

Phase

Eliminate Problems Caused by Condensate
Reduce Steam Loss

Create Infrastructure

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The Structure of SSOP®

3

Steam System Balance

Phase

- ☒ Steam System (Electricity & BFW) Balance Optimization
- ☒ Steam Load & Generation Balance Optimization

Optimize Steam System

2

BPSSM® (Best Practice of Steam System Management)

Phase

- ☒ Safety, Reliability & Productivity Improvements
- ☒ Recover and Re-use Condensate and Waste Heat

Optimize Steam Applications

Phase

TMS (Trap Management System)

- ☒ Eliminate Problems Caused by Condensate
- ☒ Reduce Steam Loss

Create Infrastructure

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From a steam trap manufacturer to a trusted **alliance partner**



Surpassing the limits of a manufacturer to be **"The world's No. 1 steam specialist"**.



Solve the problems of the steam system, to contribute to **safe and stable plant operation, energy efficiency, economy, and realization of a low-carbon society.**

SSOP®

Steam System Optimization Program

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Barriers that inhibit the optimization of Condensate Discharge Locations

- 1 There are more than **10,000** condensate discharge locations in an average petroleum refining plant

Efficient and sustainable systems are needed.

- 2 The existing “**Stereotype**” that, “Steam traps are consumables, so cheaper is better”.

By considering the characteristics of each CDL[®], a selection that delivers energy efficiency, long service life, and excellent life cycle cost should be made.

- 3 Steam traps are seen as a matter for the maintenance team, **not for Top Management.**

Investment and budgeting from the viewpoint of asset management, is needed.

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Condensate Discharge Location (CDL[®]) Management Program

TLV
TMSSM

Trap Management System

Database Establishment

Condition Monitoring

Database Analysis

CDL[®] Improvement Proposal

Zero Reset Maintenance

Database Update

Database Establishment

Condition Monitoring

Database Analysis

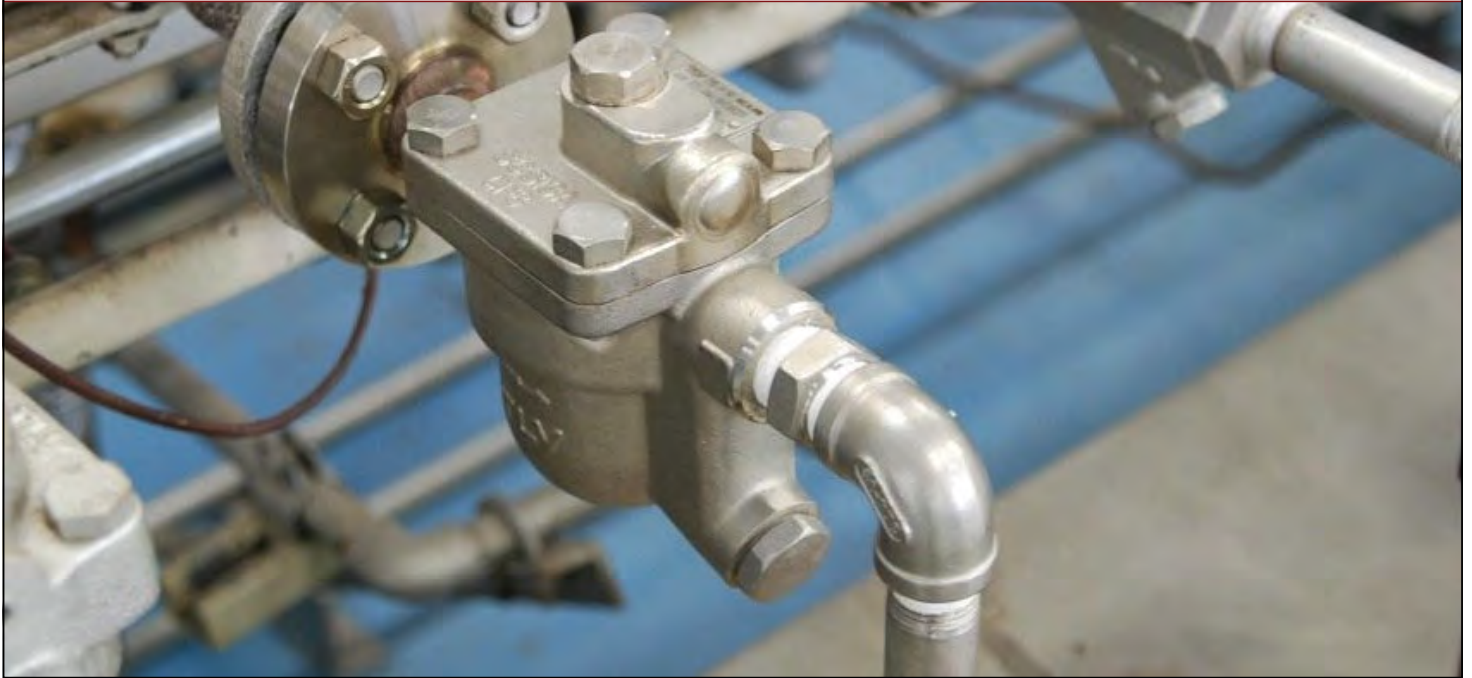
CDL[®] Improvement Proposal

Zero Reset Maintenance

Database Update

Comprehensive Database

Database with Characteristics of the CDL®



Comprehensive Database

Detailed Inspection

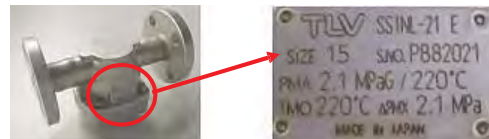
Data Analysis

Selection of Best Solution

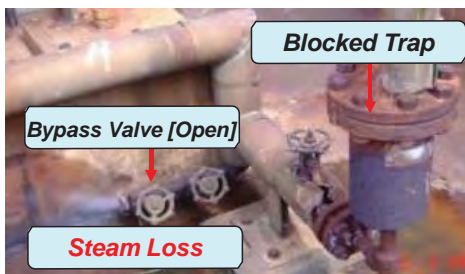
Installation Information

AP : EL :
 Ctrl L I B Mpa

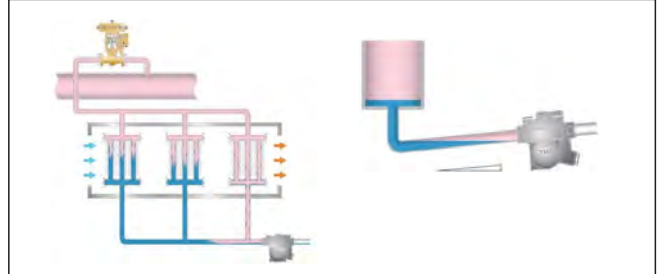
Steam Trap Information



Valves & Other Issues



Trapping Problems



Database Establishment

Condition Monitoring

Database Analysis

CDL® Improvement Proposal

Zero Reset Maintenance

Database Update

TMS Survey

TLV TrapMan® System



TMS Survey

TrapMan® Has Been Independently Validated as “Objective” & “Reliable”

Verified Diagnoses in 5 Operating Statuses for 17 Typical Trap Models



TTS Certified Inspectors

All inspectors are certified professionals

Evaluation Sheet

Inspection Sheet for Certification	Inspection Sheet TMS Survey Certification				
	Inspected	Not Inspected	Pass	Fail	Not Applicable
1. Trap Model					
2. Trap Status					
3. Trap Location					
4. Trap Manufacturer					
5. Trap Model Number					
6. Trap Size					
7. Trap Material					
8. Trap Installation					
9. Trap Maintenance					
10. Trap Test Results					
11. Trap Test Method					
12. Trap Test Date					
13. Trap Test Location					
14. Trap Test Operator					
15. Trap Test Results Summary					
16. Trap Test Results Summary					
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49. Trap Test Results Summary					
50. Trap Test Results Summary					

Certificate



Inspector Certification

No. **105** Name **Masahiro Honjo**

Certificated Inspection Menus

- TMS Survey
- TrapMan Survey
- TMS Support

This is to certify that the person shown above has received the training courses listed and has successfully passed the examinations.



TTS LTD. President 

Database Establishment

Condition Monitoring

Database Analysis

CDL® Improvement Proposal

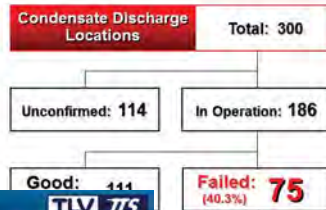
Zero Reset Maintenance

Database Update

Automated Analysis and Benchmarking Study

Survey Summary

TLV TTS



■ Survey Period
19 August 2013 – 20 August 2013

■ Steam Costs

LLP	10.00 \$/ton
LP	15.00 \$/ton
MP	20.00 \$/ton
HP	25.00 \$/ton
SHP	30.00 \$/ton

Overall Failure Analysis

TLV TTS

Failure State **40.3%** (75/186 CDLs)

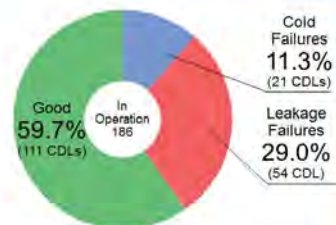
21

Leakage Failures: **54** (29.0%)

199 kg/hr

Losses

Leakage Losses **31,176 USD/yr**



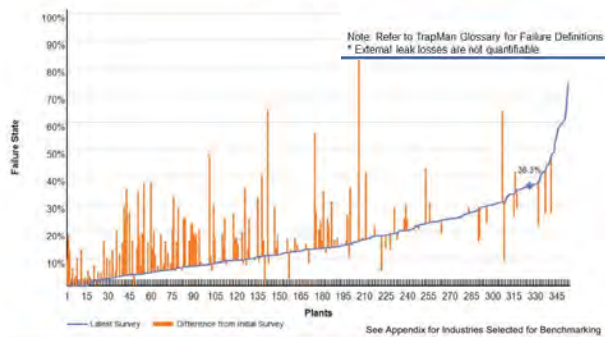
Judgment	No. of CDL	% Failure
LOW TEMP	12	42.9%
BLOCKED	9	57.1%
TOTAL	21	100%

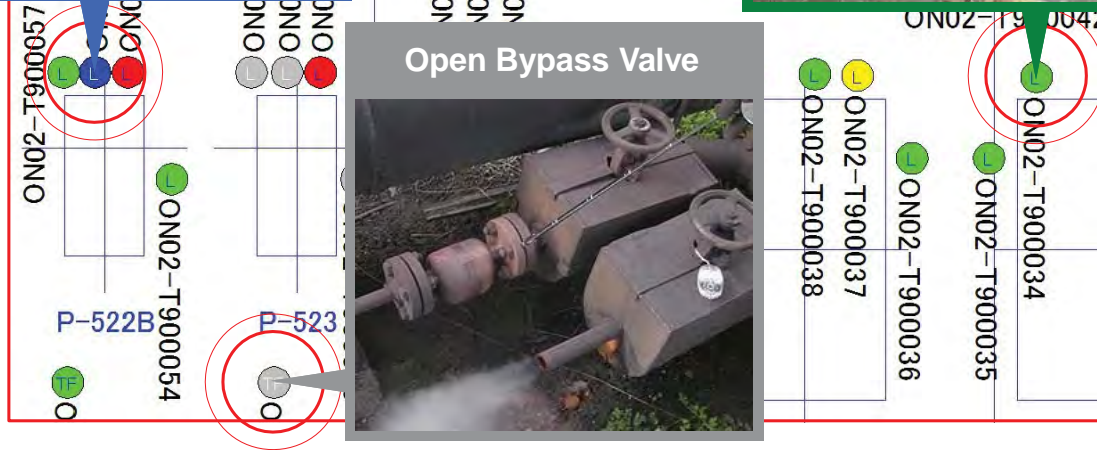
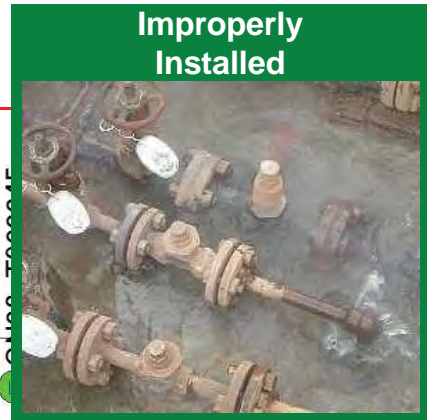
Judgment	No. of CDL	% Failure
BLOWING	3	5.6%
LEAK/L	13	24.1%
LEAK/M	7	13.0%
LEAK/S	11	20.4%
LGASKET*	10	18.5%
L/BODY*	10	18.5%
TOTAL	54	100%

Overall Failure Analysis - Benchmark

7/17/2014

Failure State





Condensate Discharge Location Management opens the door to Steam System Visualization

Database Establishment

Condition Monitoring

Database Analysis

CDL[®] Improvement Proposal

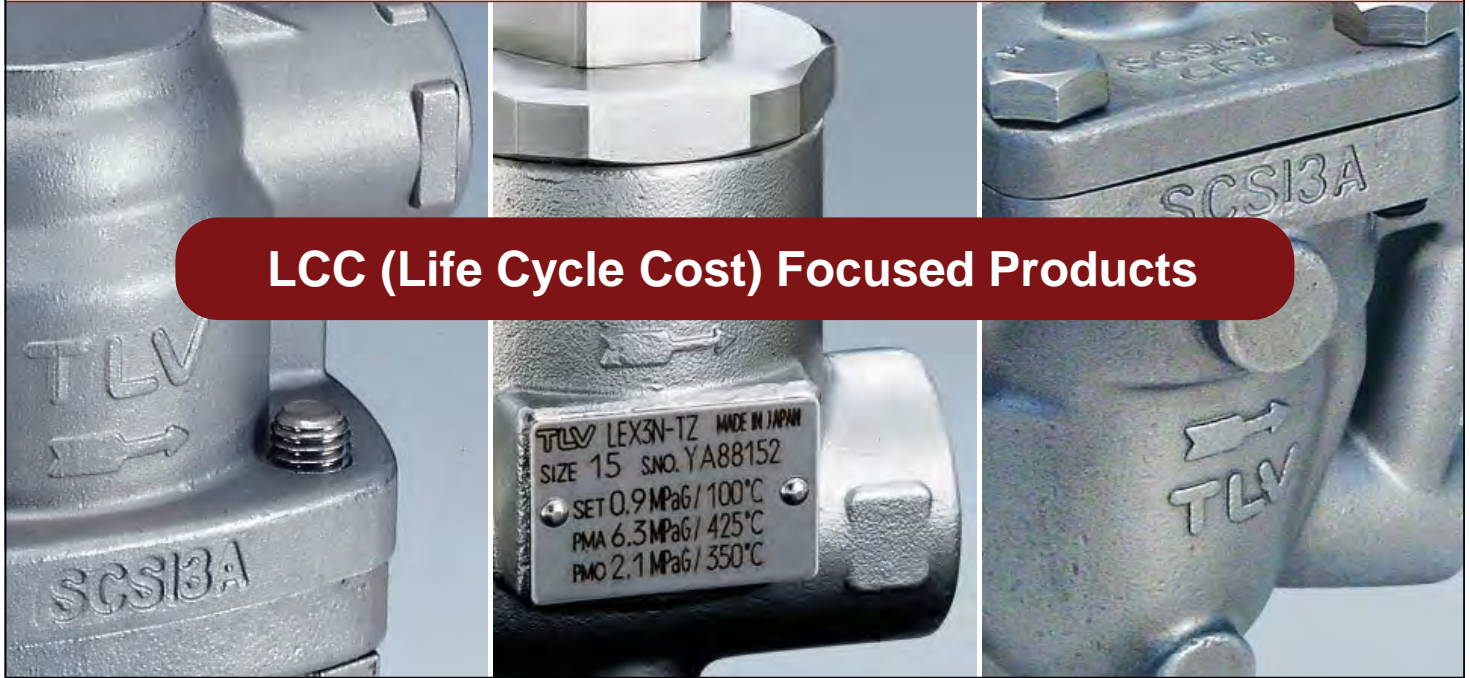
Zero Reset Maintenance

Database Update

Energy Efficiency

Long Service Life

Specific Application & Pressure



Database Establishment

Condition Monitoring
ZERMI
Database Analysis

CDL® Improvement Proposal

Zero Reset Maintenance

Database Update

Database Establishment

Condition Monitoring

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Database Update

Continuous & Sustainable Optimization

Failure Rate Simulation TLV TTS



Regular Surveys with 100% ZRM*

Achieve Low Failure Target with:

1. Replacement of all Failed Traps
2. Replacement with Suggested Trap Models
3. Regular TrapMan[®] Surveys

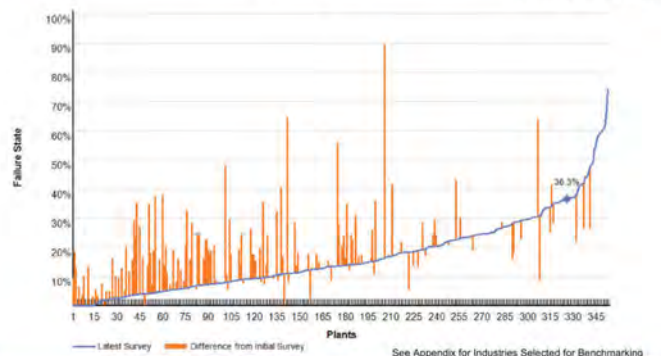
* ZRM = Zero Reset Maintenance, Replacement of not survey to verify proper operation of fixed traps.

Overall Failure Analysis - Benchmark TLV TTS

7/17/2014

Failure State

68 Industries (253 Plants, 286,312 CDL's)



Database Establishment

Condition Monitoring

Risk Assessment

Improvement Proposals

Zero Reset Maintenance

Database Update

Counter-measures

Improvements

Condensate Discharge Location (CDL®) Management Program

**TLV
TMSSM**

Trap Management System

The Structure of SSOP[®]



CES[®] Survey

Comprehensive Steam System Analysis

Optimize Steam System

Optimize Steam Applications

Phase

TMS (Trap Management System)

Eliminate Problems Caused by Condensate
Reduce Steam Loss

Create Infrastructure

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Optimize Steam System

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BPSSM[®] (Best Practice of Steam System Management)

Phase

- ✘ Safety, Reliability & Productivity Improvement
- ✘ Recover and Re-use Condensate and Waste Heat

Optimize Steam Applications

1

TMS (Trap Management System)

Phase

- ✘ Eliminate Problems Caused by Condensate
- ✘ Reduce Steam Loss

Create Infrastructure

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Steam System Optimization Program

~ Realizing a Low-Carbon Society ~

TLV[®]