



The Total Cost of Ownership of Control Valves

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The Total Cost of Ownership of Control Valves

Observation (Agree ? Dis-agree ?)

“For the amount of impact on plant efficiency and profitability, control valves are one of the most under-rated instruments in process plants and refineries, when it comes to improving performance.”

Attributes of Control Valve Repairs

- process downtime
- repair cycle is long due to parts availability
- improvements seldom done “on the fly”
- premium cost for fast return to service
- root cause of failures not always understood



The Total Cost of Ownership of Control Valves *Engineering*

- *effort specifying a control valve will determine **LTCO***
- *software tools cannot replace engineering judgement*
- *“rules of thumb” + computer selection = garbage (20 psid)*
- *‘satisfying’ the program will not yield good results*
- *energy consumption often overlooked in design stages*
- *maintenance can always “fix it later”*
- *reduction of engineering cost without considering **LTCO***

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Engineering

Words Mean Things

And so does process data !

	UNITS	MAX FLOW	NORM FLOW	MIN FLOW
FLOW	<i>SCFH</i>	2500	800	20
P1	<i>PSIG</i>	80	80	80
P2	<i>PSIG</i>	50	50	50
TEMP	<i>C</i>	150	100	75
SG		1	1	1



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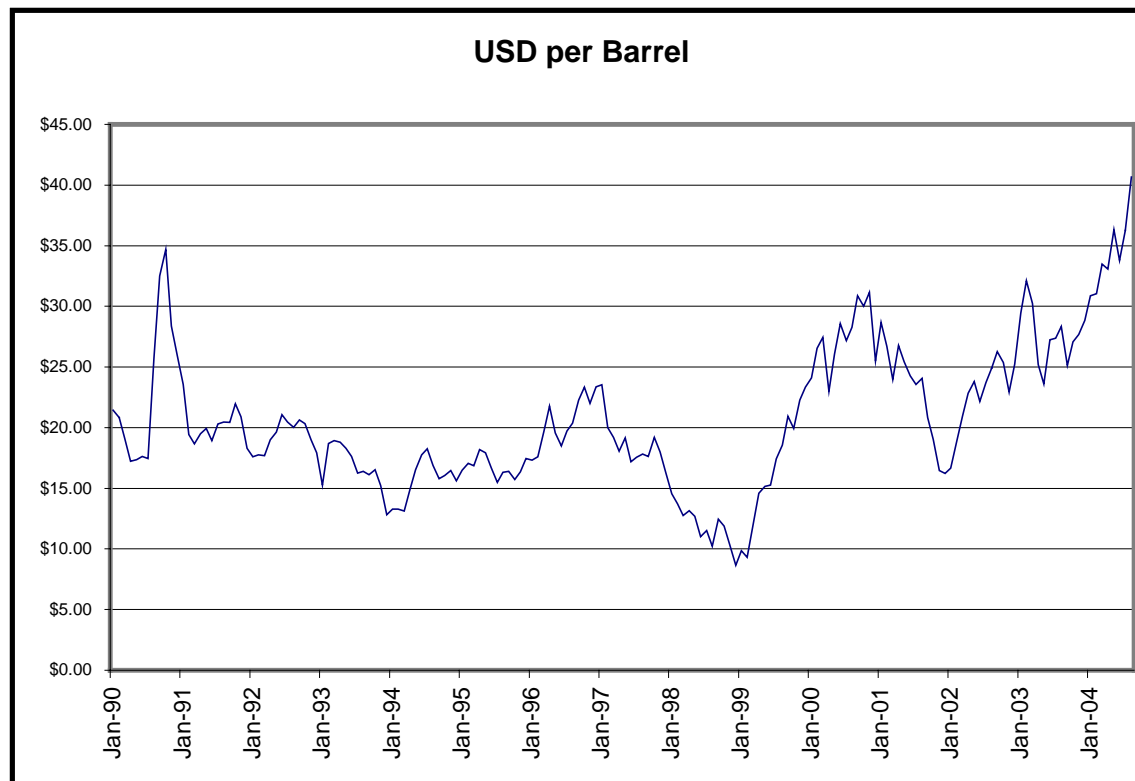
Engineering

Common Mistakes

- Using “band-aids” = expensive trims to compensate for excess pressure in the system
- substituting lined valves because they are more “economical”
- over-sizing automation by using multiple “oversize” factors (under specifying air supply, supplier practices, control quality)
- by-passing exchangers or other equipment for extended periods of time (bypass line restriction needed)
- not considering the use of variable speed drives on pump and compressor motors because of initial, not long-term cost basis
- Unrealistic expectations for control performance of a valve configuration
- In corrosive service, packing studs are wetted parts.....

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Engineering



Energy is becoming a major cost of production !



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Engineering - Summary

Begin with the end in mind !

- ▶ Define control expectations up front (+/- 100 lbs/hr)
- ▶ Understand the limits of the valve design (lin/rot/lined)
- ▶ Don't apply "rules of thumb" where data is available
- ▶ Design for efficient use of energy
- ▶ Understand your automation provider's practices

Be Practical - Continuously Improve !

- ▶ Leverage learning experiences to improve selection process
- ▶ Don't be afraid to call on the experts
- ▶ Use good engineering discipline consistently
- ▶ Let process and instrument engineers not be strangers to each other
- ▶ Integrate the use of Reliability Data into your engineering process



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Installation and Commissioning

What to Look Out for:

1. Have a good equipment protection plan
2. Following OEM installation guidelines (lined valves !!)
3. Over-torquing of end connections / pipe alignment
4. Backwards flow direction installation
(actuator sizing/Cv/Severe conditions)
5. Insulating over areas that need to be accessed
6. Water collection, bug screens, etc.....
7. Proper pipe clearing procedures on new projects



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Installation and Commissioning

Insulation: Be Aware of the following

1. Poor insulation practices can hide process leakage until it becomes a major problem
2. Weep holes should be used under insulated valves
3. Contaminated insulation can expose personnel to process chemicals
4. Process leakage can travel down insulation cover to other locations
5. Insulated carbon steel piping can hide severe corrosion



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Installation and Commissioning

What to Commission on Control Valves- A Short List

- Verify that the tag#, material, model and trim size are in the right locations (use P&ID's and specification sheets)
- Visual Inspection of automation components
- Check packing to ensure that it is tight and secure
- Verify installation direction and orientation
- Pneumatic connections tight and lines routed properly
- Verify control valve response to control signal on loop
- Diagnostic signatures on “key” control valves



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Installation and Commissioning

Why Commission Control Valves?

- **They are not simple devices, and many people are involved before they are put into service. Supplier practices vary.**
- **Often they are handled roughly, resulting in damage to automation components and linkages**
- **Sometimes damaged by work in area after installation - heavy equipment**
- **To avoid unpleasant process spills and potential injury/exposure**
- **That you may have confidence they will perform**
- **To avoid surprises**



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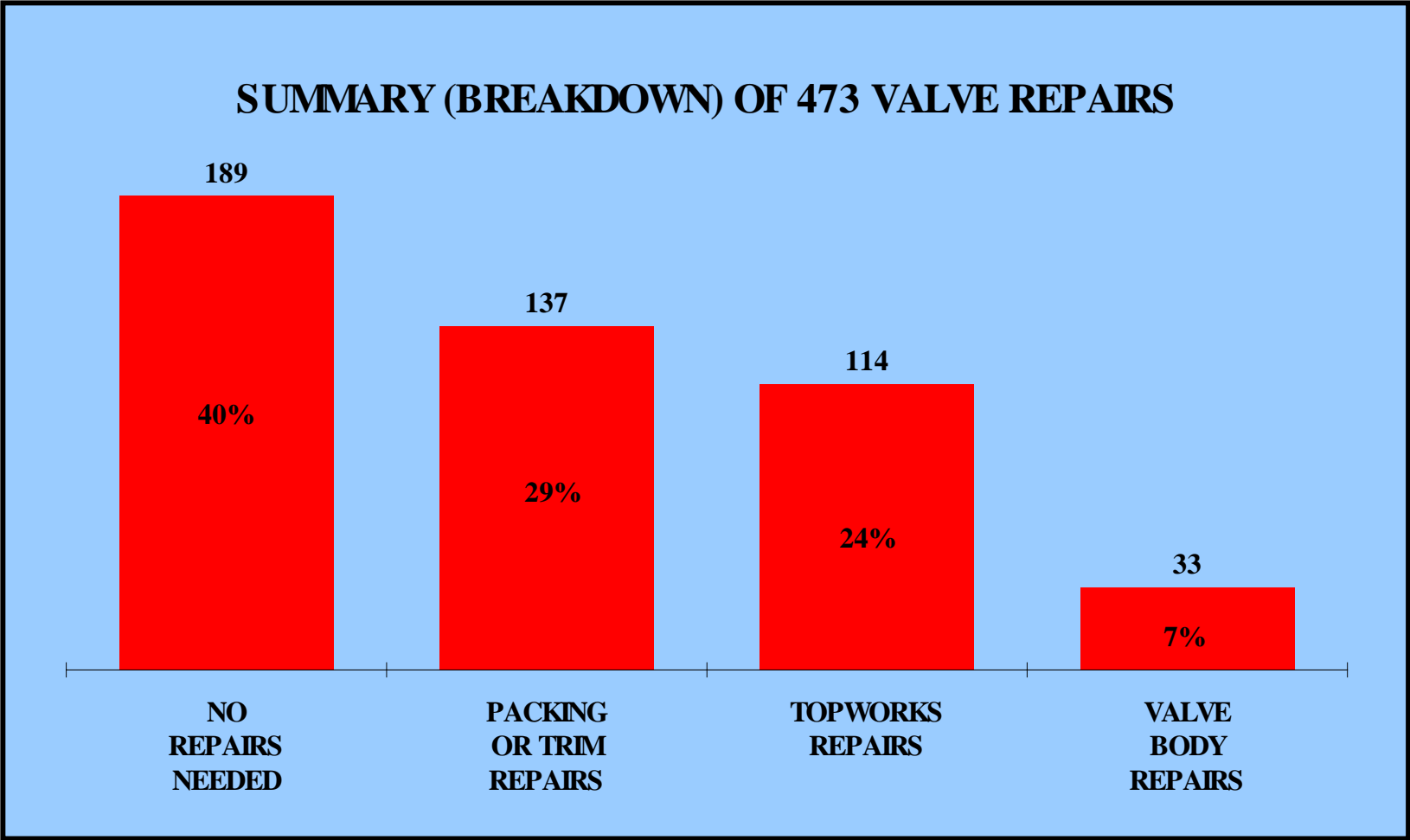
Maintenance and PPM

“Since control valves are not usually replaceable without some process downtime, it is not good to ‘skimp’ on the repair quality. Having said this, it is also true that control valve repairs are costly and can be overdone, costing your company millions of dollars a year, wasted, on unnecessary maintenance.”

Discounting failures due to engineering, many of the failures seen with control valves can be detected with relatively little difficulty. Visual inspections can go along way towards identifying developing problems.

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Maintenance and PPM





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Maintenance and PPM

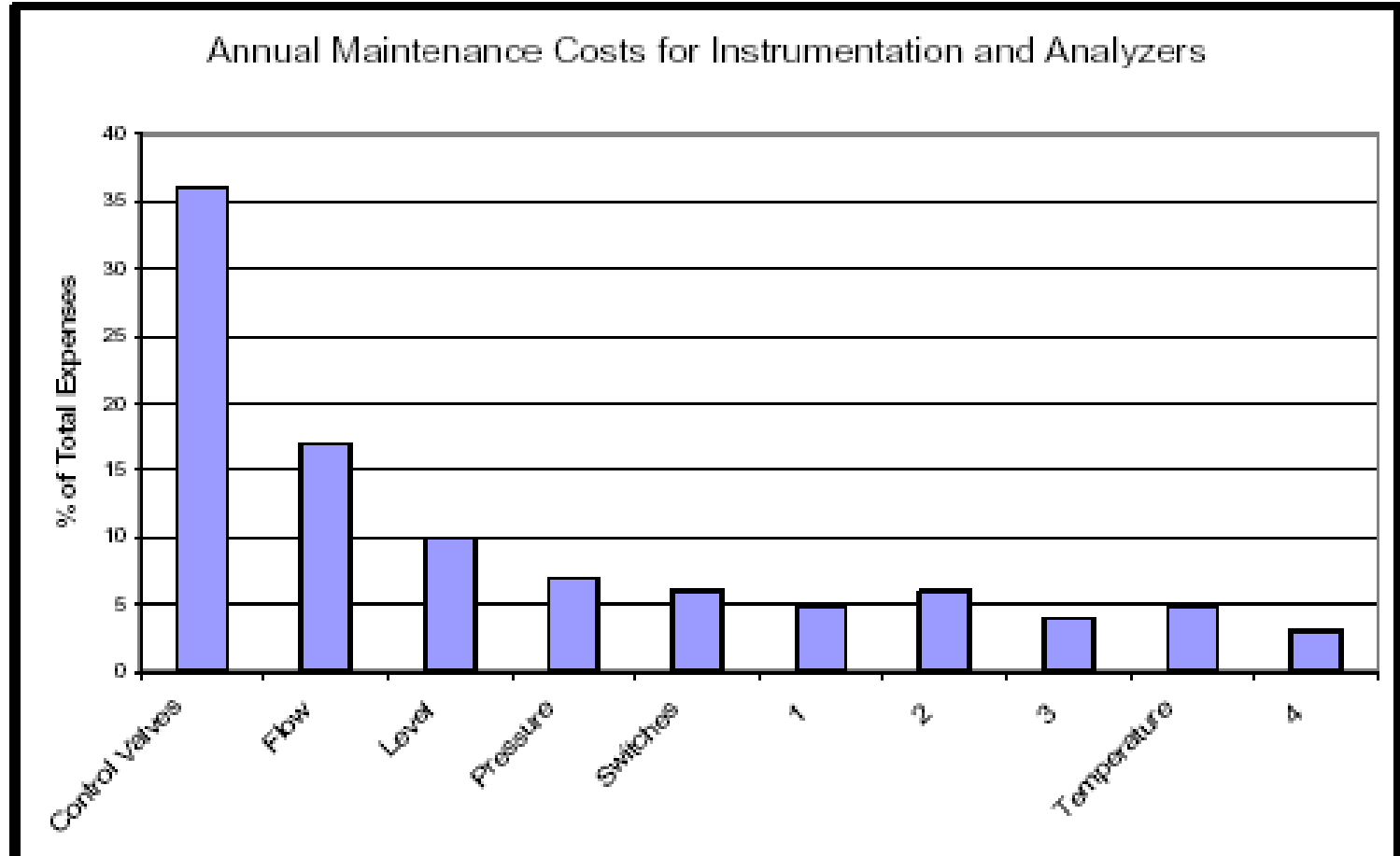
A good PPM program, composed of visual inspections is an excellent investment in your Technicians' time.

- loosening bolting, on almost any part of the automation
- bent feedback linkages
- worn feed back connections
- leaking packing (especially bad in toxic/corrosive service)
- drips from other processes in the area
- leaks in air lines and at fittings
- corrosion on the outside of the valve

If you could reduce unexpected process downtime by 10 or 20 percent, how much would it be worth ?

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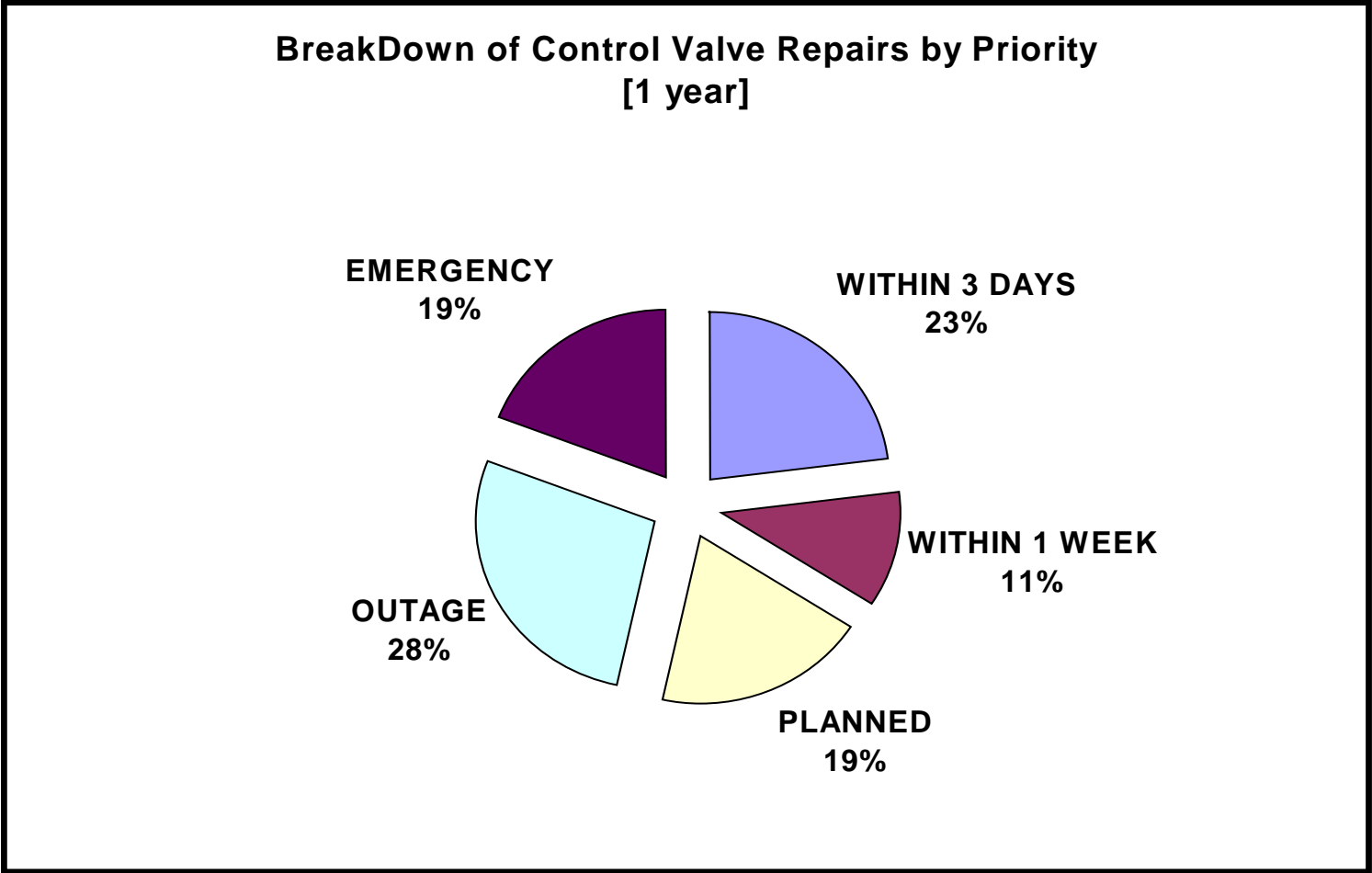
Maintenance and PPM



A large facility with over 80 operating plants.

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Maintenance and PPM

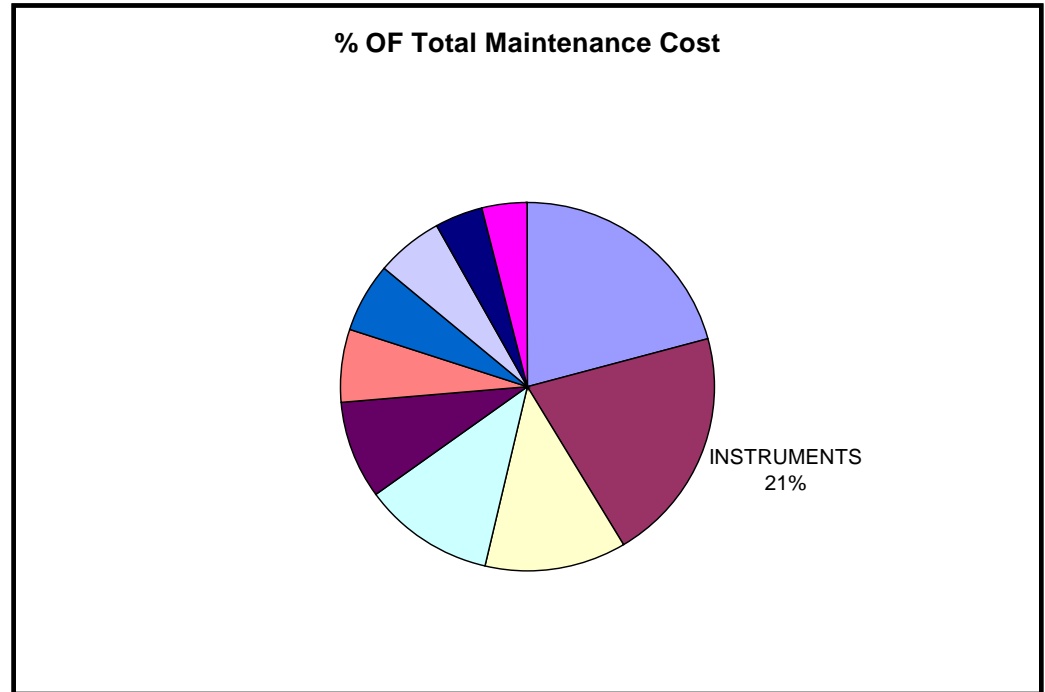


53% of Control Valves Repaired within 7 days

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Maintenance and PPM

If you consider how many times we work on instrumentation and the work order is assigned to a tower or some other job, this cost could easily be more.



How well do you document the work that is done on instrumentation?



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Maintenance and PPM Strategies

- Document, document, document
- Even without detailed root cause analysis, a good paper trail enables trends to be seen
- Don't assume that the same valve configuration will not fail again in the same service
- Account (\$\$) for process interruptions = justification for change
- Establish a good relationship with your repair provider
- Use the data to improve your engineering practices



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Summary

- Without good process data, a good control valve selection is a “shot in the dark”
- Don’t skimp on the engineering, use best practices based on learning experiences and expertise
- Un-utilized energy put into the process must come out in the chemistry, heat, motion or severe service
- The cost of commissioning is an investment in lower costs later (process downtime + maintenance)
- PPM does not have to be complex or costly
- Good documentation and maintenance records ++

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The Adventure Continues... !

ANY QUESTIONS?