#### Mitigating MOV Stem Nut Failure Through Proper Maintenance and Wear Measurement

**Chris Warnett** 









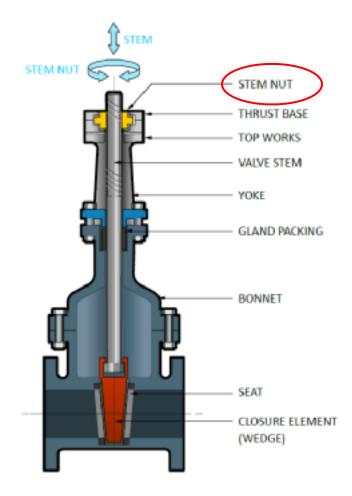
# Many Critical Valves are of the Rising Stem Type which require a Stem Nut.





#### Where and What is a Stem Nut?

- Located in the thrust base of the actuated valve
- Converts rotary to linear motion
- Converts torque to thrust
- Maintains stem position
- Mechanically inefficient





### A Typical Pipeline Facility





#### Pipeline and storage facilities

A failed Stem Nut here could cause a safety or commercial disaster





### Causes of Stem Nut Wear

**Design & Operation** 

- Excessive stem loads
- Excessive valve stroketime
- Excessive valve use

#### Maintenance

- Insufficient lubrication
  Hardened Grease
- Wrong Lubrication
- Contamination Water
   Particulate
   Process product



#### Water Contamination





#### **Process Product Contamination**





#### Excessive/Hardened Grease





#### Even Enclosed Valve Yokes are Vulnerable



An enclosed yoke will capture;

- Process product leaking from packing
- Rain from leaking stem protector
- Lubricant from leaking actuator gearbox lower seal

The captured slurry will cause the stem lubricant to become compromised



## Periodic Maintenance can Extend the Stem Nut Life. Cleaning the Stem and Stem Nut



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#### Cleaning the Valve Stem





### Applying New EP Grease



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But Stem Maintenance Gives no Data on the <u>Stem Nut Thread</u> <u>Condition</u>

# Do you take an "out-of-sight, out-ofmind" approach to stem nut maintenance?

## **Run-to-Failure**



### **Stem Nut Maintenance Options**

- Run to Failure
- Periodic Replacement
- Periodic Removal and Inspection
- Stemnut MD Testing

#### All options should include periodic lubrication replacement and contamination mitigation



### Run to Failure



- If the valve doesn't have redundancy, a cost associated with lost production must be considered.
- Premium-time labor charges may apply.
- If a replacement stem nut is not in the store room, lead time and threading cost for the new stem nut may be very high.



Periodic Replacement

 A threaded stem nut must be available for every MOV whether the stem nut has high wear or not.



- The valve will be out of service during replacement.
- Should require 5 to 20 man-hours.



#### **Periodic Removal and Inspection**



- When performing this method, a threaded stem nut should be available in the event high wear is found.
- The valve will be out of service during inspection.
- Should require 5 to 20 man-hours.



### Consequences of Stem Nut Failure



- False Position Detection
  - Position indication is taken from the actuator worm shaft or drive sleeve
- Misdirected Process Product
  - Potential Safety, Financial, Environmental Impacts
    - Undesired Product Blending
    - Unscheduled Downtime
    - Emergency Manpower Callouts
    - Undesired Product Release

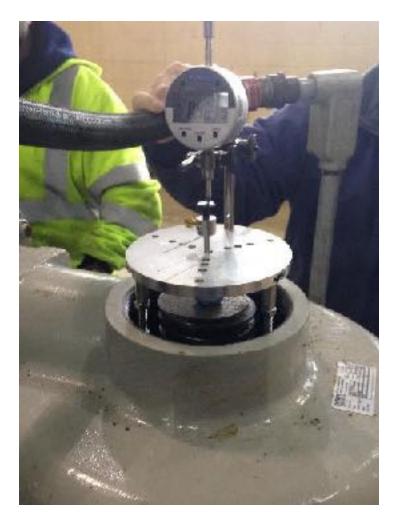


A More Scientific Approach is Needed to Measure Stem Nut Thread Wear

- A fast and easy measurement that could be performed at an annual or programmed valve maintenance check.
- Data that can be collected over time to determine the rate of Stem Nut Thread wear
- Analysis of the data to determine the necessity and timing of Stem Nut replacement.



#### Stemnut MD In Use on a Motorized Gate





## **Stemnut MD Testing Benefits**

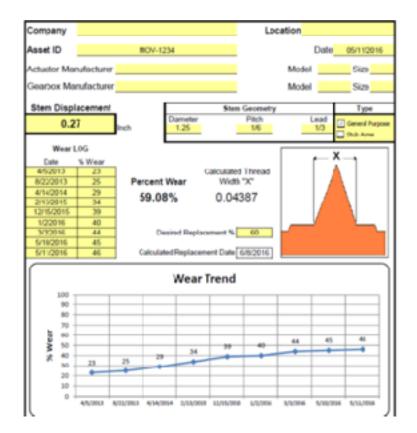
#### Quick Test

- Less Than 1 hour (usually much less)
- Minor Disassembly
- Minimal Downtime
- Accurate
- Enables Trending
- Eliminates Stem Nut Failure (where





# A record of measurements enables an informed decision on when to take action..



#### StemNut MD takes the guesswork out of valve stem nut maintenance

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#### Questions

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