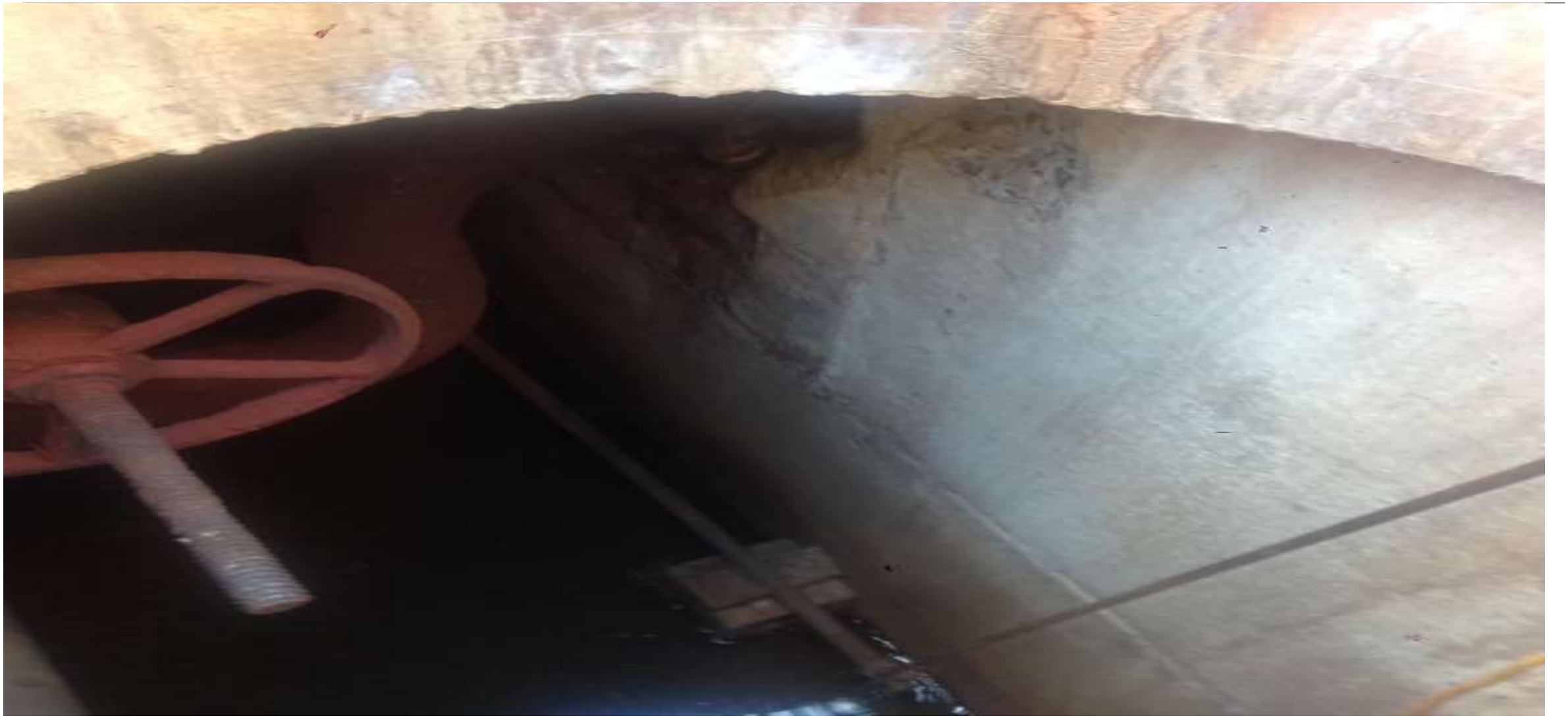
Manual valve actuators in steam in steam distribution applications

- Manholes and vaults can be aggressively corrosive environments because:
  - Road salt (magnesium chloride, sodium chloride, calcium chloride, potassium chloride) run off from snow melt sometimes drips directly onto the gearbox / bracket and accumulates in the vault.
  - Low pressure steam heats the water but does not boil it dry.
  - Valves and piping suffer little corrosion because the heat from the steam thru the piping evaporates road salts.

Manual Valve Actuator in steam distribution applications



Manual Valve Actuator in steam distribution applications

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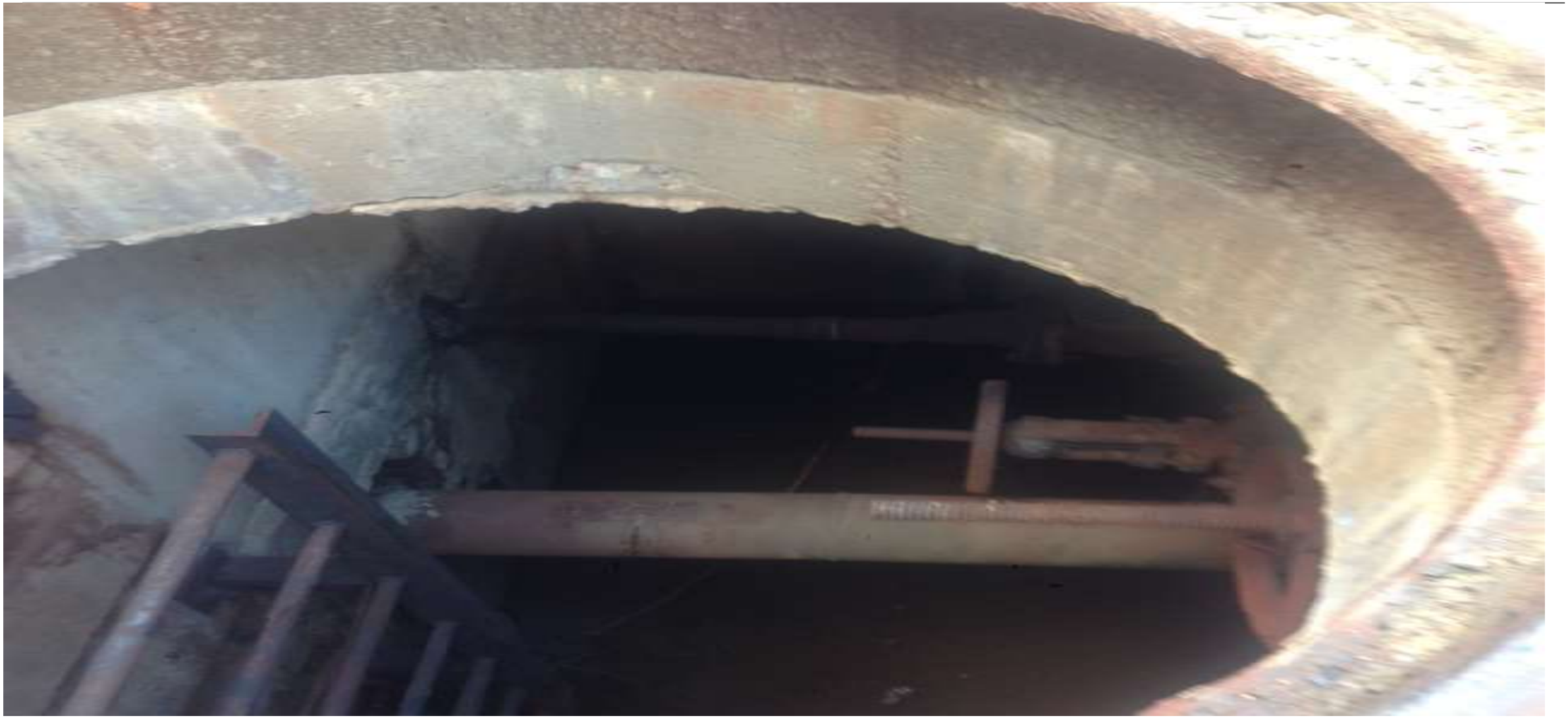

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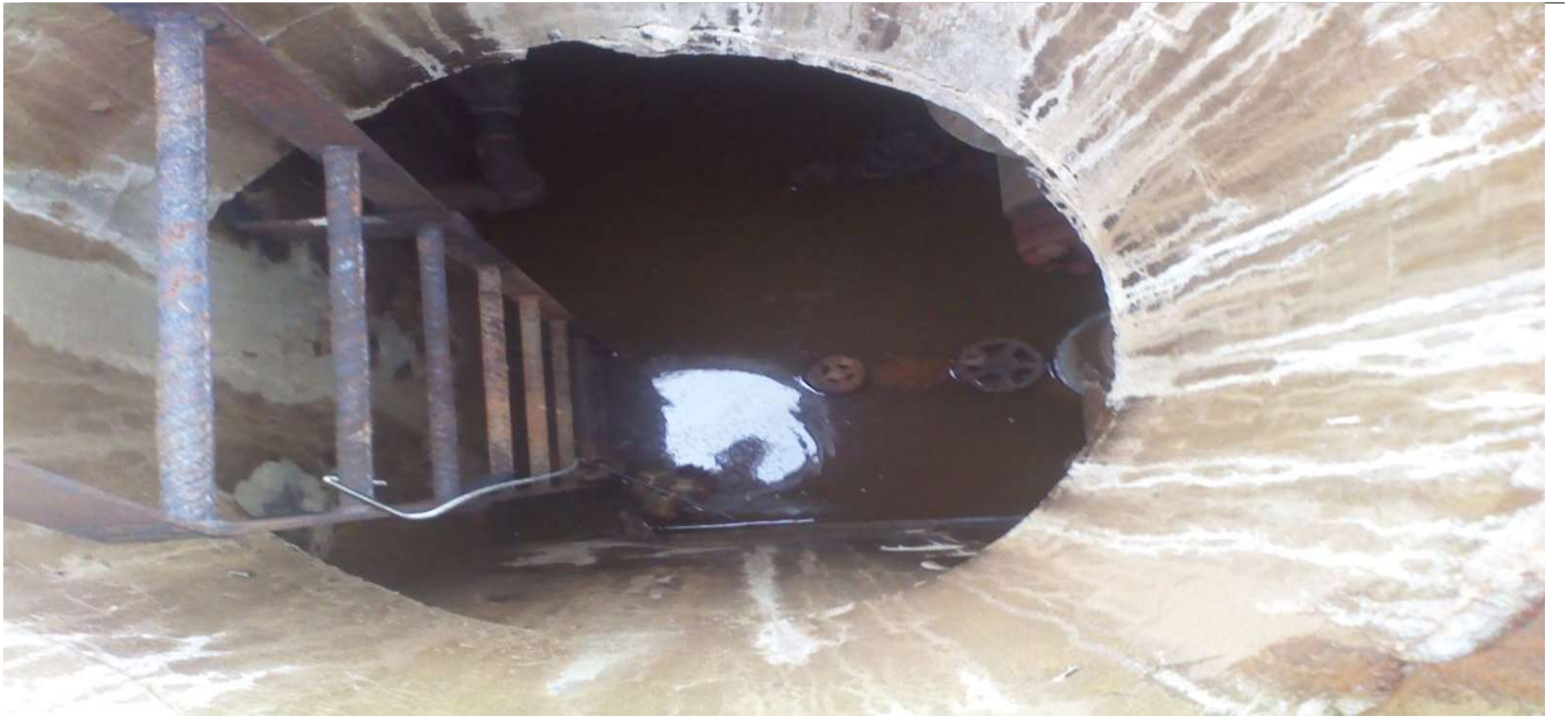

Manual Valve Actuator in steam distribution applications

- Average industrial service gearbox / bracket will last 6 to 12 months. Typically these are bent metal which delaminates the steel crystal structure and decreases corrosion resistance.
- Gears and brackets can be coated to last longer but if coating is chipped, issues lie just beneath the coating.
- Once gear fails – the valve is inoperable causing multiple valves to be closed for isolation.
- Replacement of the gear / bracket in field is a costly and major job estimated at $5k to $7k per hole entry.

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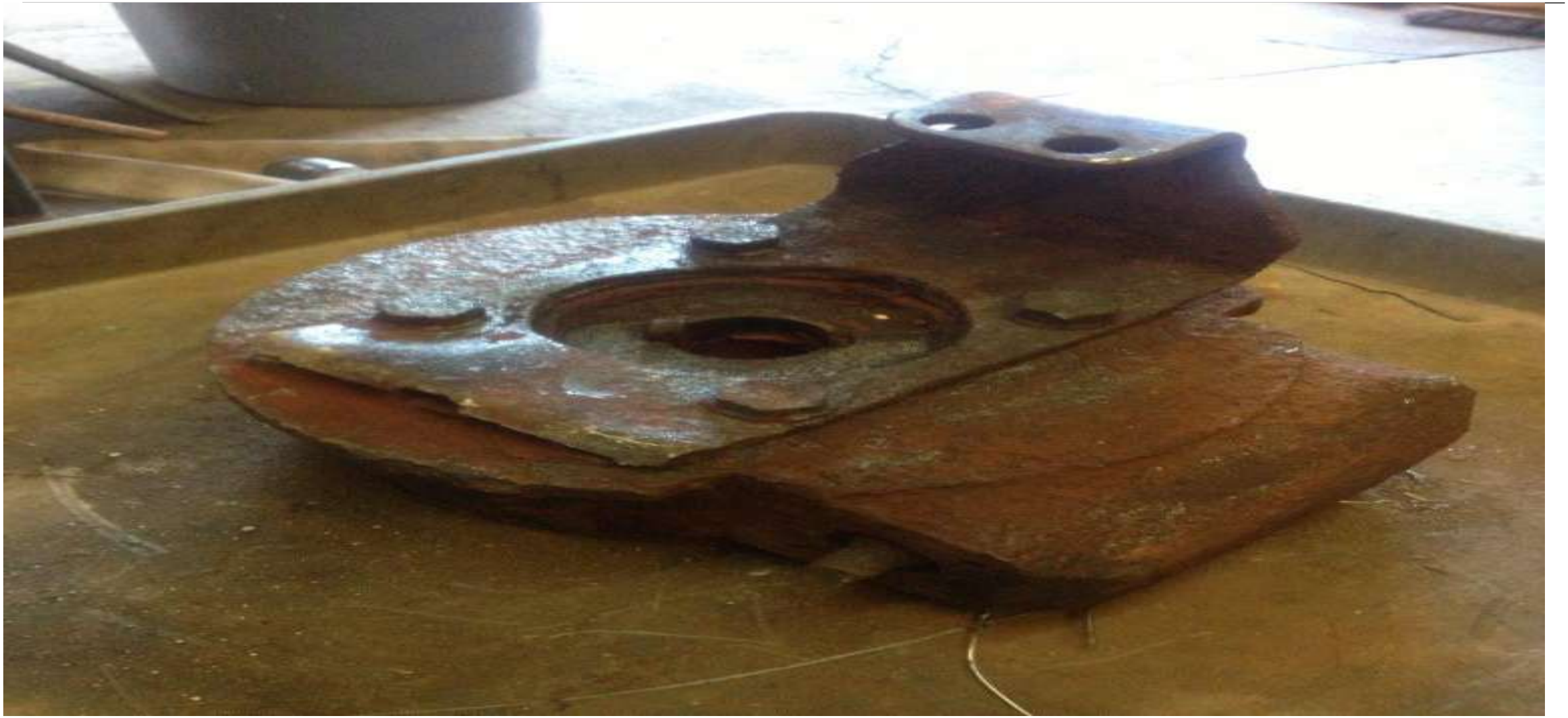

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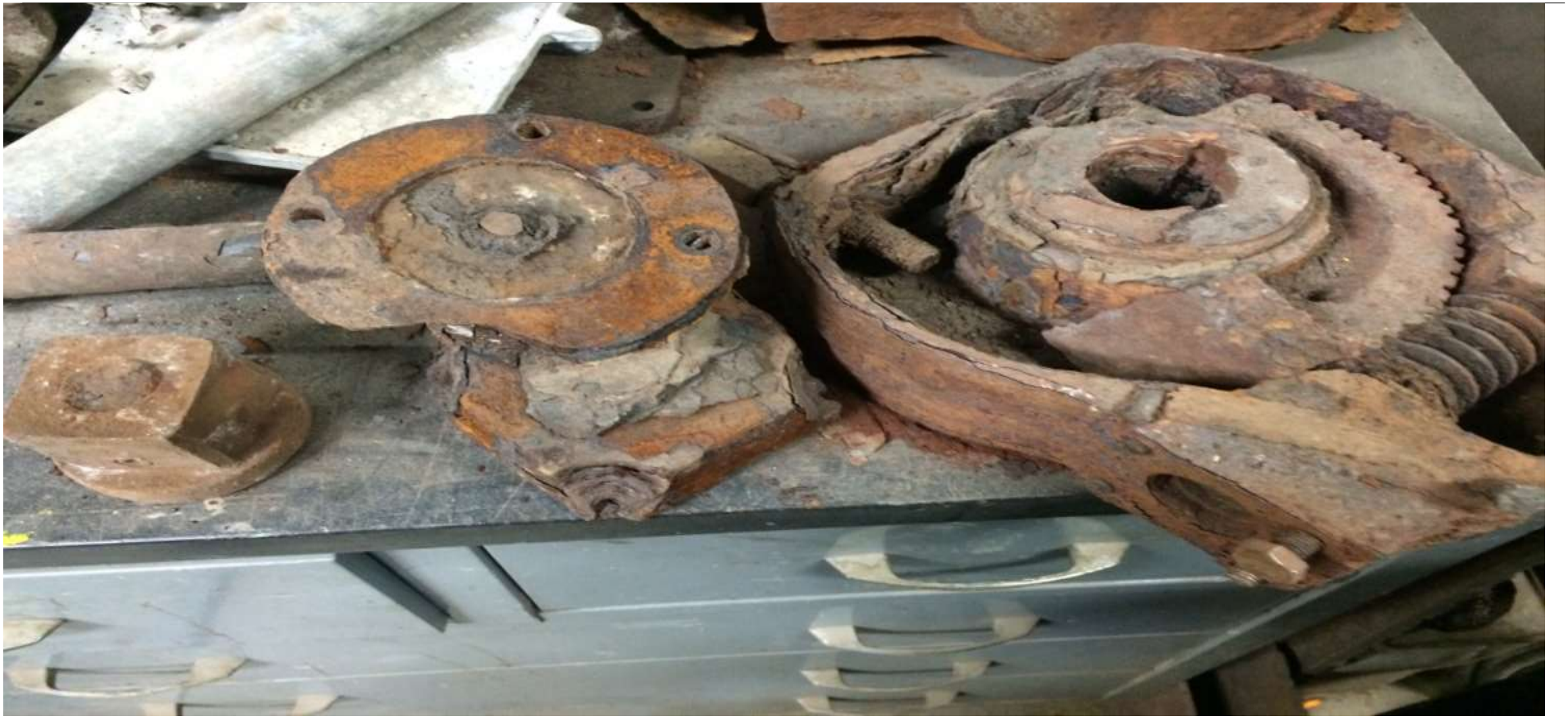

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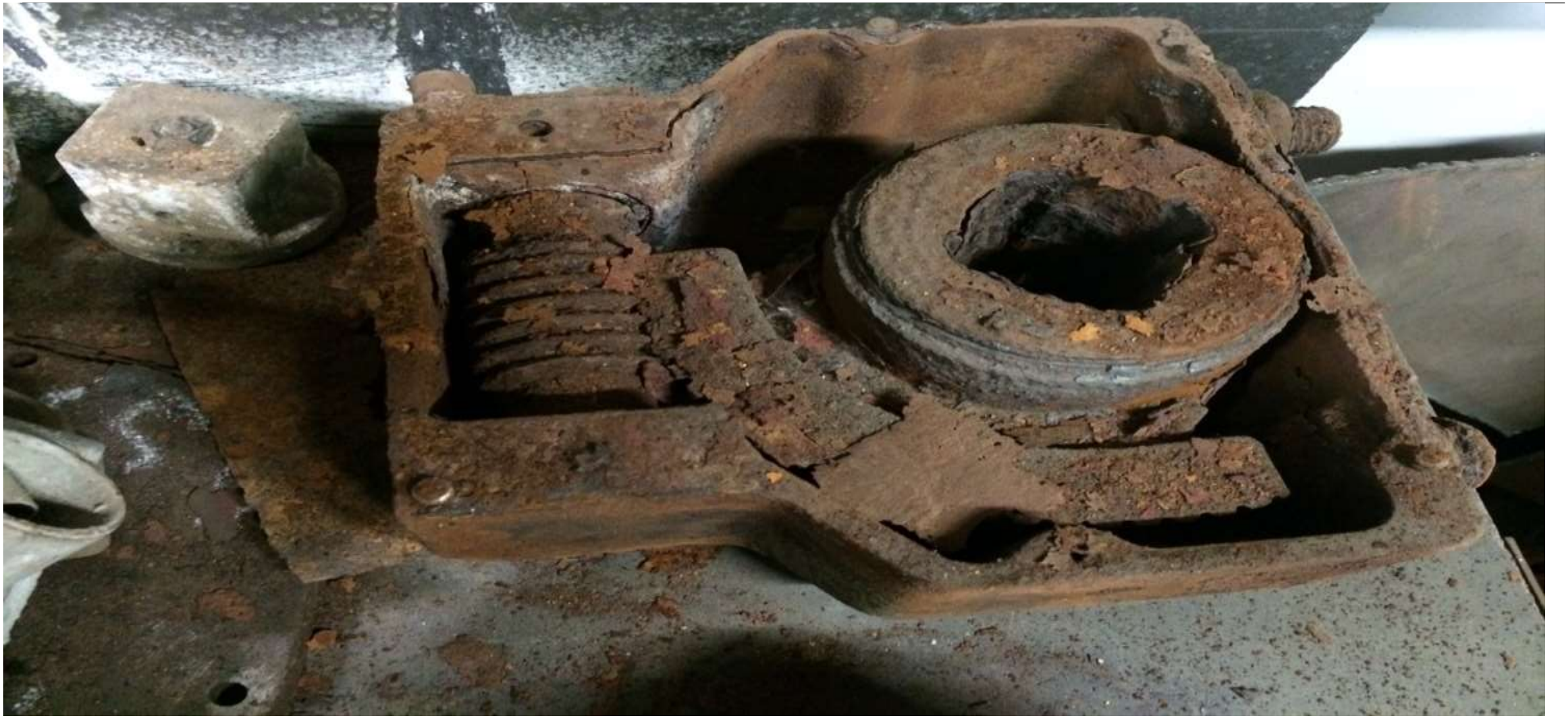

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- Solution is to change the materials of the gearbox and bracket to cast aluminum bronze that will withstand this corrosive environment.
- Bronze gear boxes and brackets have not been available in the market before.
- Two designs are possible – either a one piece gearbox with integral bracket or a separate gearbox / bracket as currently used.
- In field testing of one piece gears to prove materials of construction have gone well so far after two months of service.

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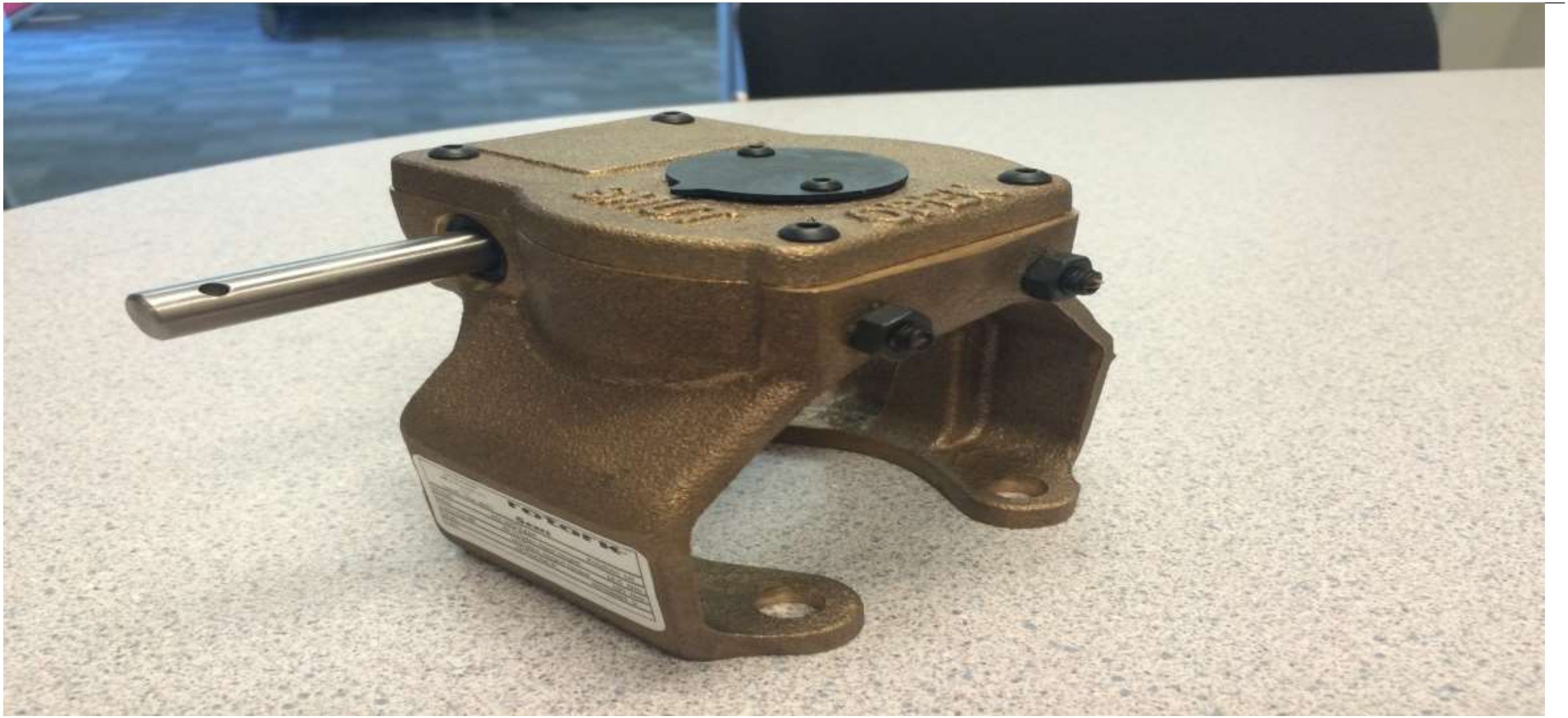
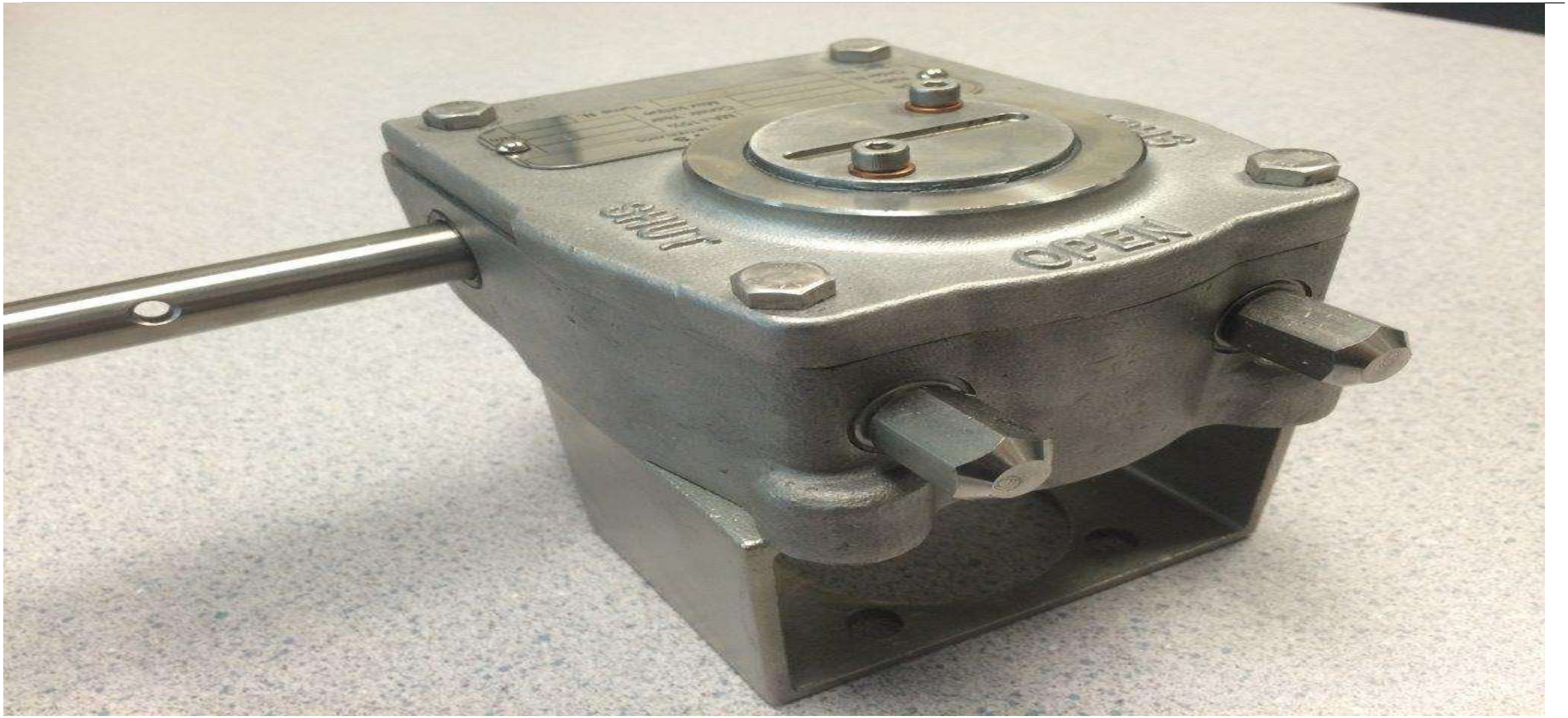


Manual valve actuation in steam distribution applications



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COMPONENT	MATERIAL	SPECIFICATION
Gear case	Aluminum Bronze	ASTM B148 C83600
Cover plate	Aluminum Bronze	ASTM B148 C83600
Quadrant	Aluminum Bronze	ASTM B148 C95800
Input Shaft	316 SS	Arcor treated
Gasket	Liquid seal	
Oil Seal	Viton	
Worm	Carbon Steel	AISI 1045
Needle Bearing	AXK-AS	Hardened Steel
Position Indicator	316 SS	Arcor treated
Grease	Renolit CLX2 Hi temp	

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- Questions?