

Petrochemical Industry

CASE STUDY

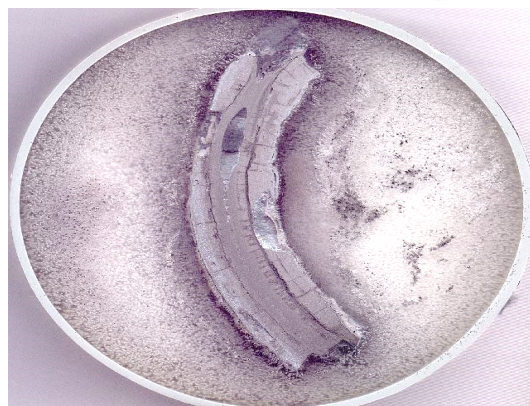
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Key Facts

Sector	Petrochemical Industry
Category	Investigation of Guide rod of U-bend in xylene heater

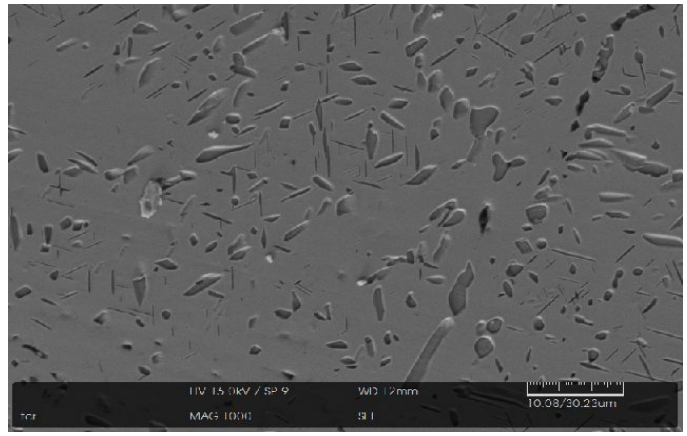
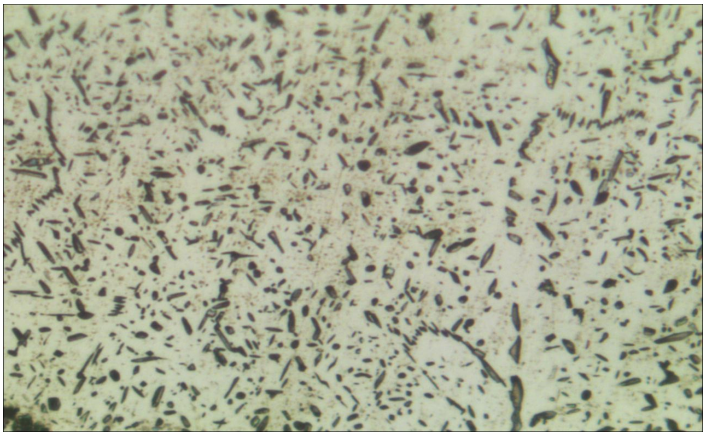
Problem

- Guide rod of U-bend in xylene heater, train-3, aromatics complex was found to have broken into two pieces during regular surveillance. The guide rods were found cracked on the U tube bends.
- Initially around 3 guide rods were found detached from the U-bend. However, after cleaning of the heater tubes, 7 more guide rods were found broken.
- The xylene heater was commissioned in the year 1999 and failure was noticed in September 2015. The service life of the failed guide rod is around 15 years. MOC of the guide rod is SA 304. There is only one guide rod for single U-bend.



Diagnosis

- The guide rod metallurgy in terms of MOC, microstructure and hardness values appear to be normal.
- Extensive scale formation on both OD and ID along with the significant sigma phase formation is noticed on the damaged portion of the guide rod.
- The guide rod failure by breaking into two pieces is because the damaged portion getting exposed to a temperature level of 870-950°C and it got detached from the other part due to sigma phase formation that rendered the material brittle.



Solution/Recommendations

- While the temperature conditions inside the U-bend are not exceeding 300°C, the guide rod exposure to such a high temperature level needs to be deliberated from the heat transfer conditions, flame impingement due to improper functioning of the burner or any other related reason.
- Use of 310 alloy will improve the life of the guided U bend.

Contact Us

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