Non-conforming Eyebolts Installed on LCLS-II Amplifiers

On February 14, 2018, a DOE employee from the Thomas Jefferson National Accelerator Laboratory (JLab) site office identified a potential suspect/counterfeit issue regarding eyebolts used on the LCLS-II RF Solid State Amplifier (SSA) units located at JLab. The eyebolts did not appear to be marked with the manufacturer's name or identification mark as required by ASME B30.26 (Rigging Hardware), which made them appear "suspect" and subject of further review to verify their quality traceability.

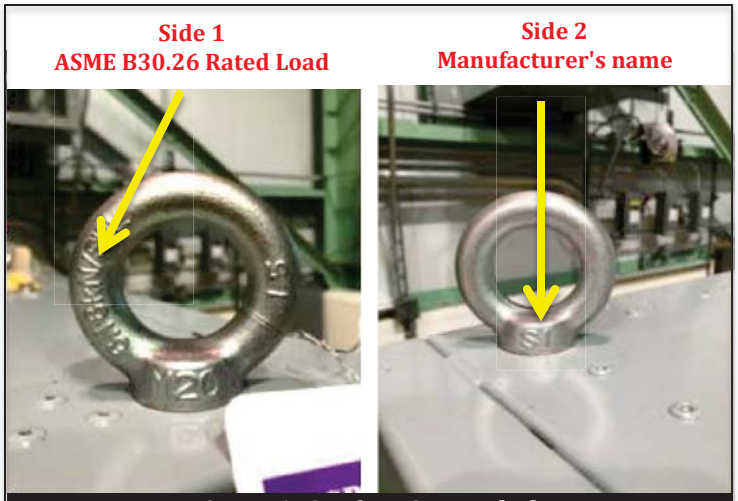

Figure 1: Conforming eyebolt

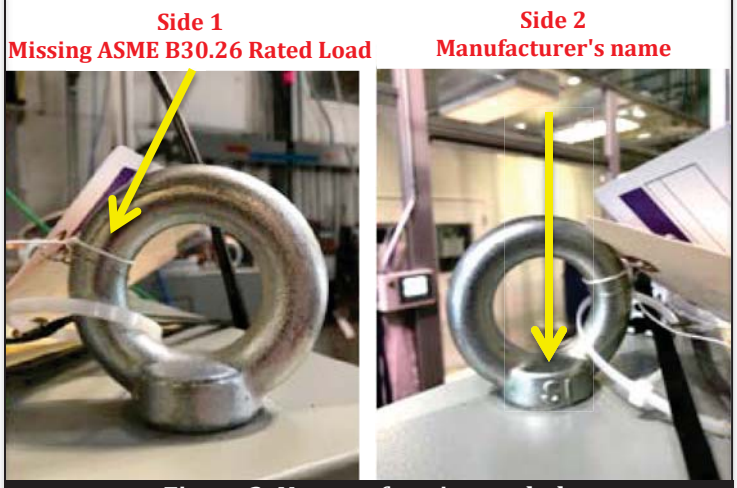

Figure 2: Non-conforming eyebolt

Investigation by the SLAC LCLS-II project team and the supplier determined that the eyebolts were manufactured in Japan, bore the manufacturer's marking on the base of the bolts, and well exceeded the mechanical design requirements of ASME B30.26 as verified by third-party test data. Based on this information, it was determined that the eyebolts are capable of performing their intended function and are not considered "counterfeit" or "suspect." However, some of the eyebolts were not marked with the rated load as required by ASME B30.26. Although the lack of rated load marking on the bolts does not affect the ability of the bolts to perform their intended function, it represents a nonconformance to project design requirements, as the LCLS-II Engineering Specification Document used to procure the SSA units requires the eyebolts to meet ASME B30.26. SLAC owns the overall responsibility for ensuring that receipt inspection occurs and working with the other Laboratories involved in the project (JLab, Fermilab) to ensure that effective inspections are performed. The failure to identify the nonconformance of the eyebolts to ASME B30.26 upon receipt inspection was categorized as an ORPS reportable "Management Concern."

Recommendations/ Actions:

Immediate Action:

The SSA supplier, R&K Company, Ltd., has taken responsibility to provide new eyebolts fully compliant with ASME B30.26 and directly equivalent to the existing M22 bolts found on the fifteen prototype SSA units at

JLab, Fermilab, and SLAC (15 SSAs x 4 eyebolts each = 60 eyebolts). SLAC will ensure all of the eyebolts for the affected SSA units will be replaced in a timely manner.

Lessons Learned:

1. Procurement technical specifications need to take into account potential ramifications of specifying specific industry standard designations when foreign suppliers may be involved. A statement of "equivalency" may be prudent to allow use of compatible standards.

2. Attention to detail is extremely important in all aspects of supply chain management including procurement technical specifications development, supplier oversight and communication, and receiving inspection activities.

3. Acceptance criteria documentation needs to clarify the acceptance/rejection criteria for "key" hardware. It is also important to consider that when deliveries are made to other sites, the sites should be contacted to assure the same verifications were successfully performed at their facilities.

Questions and comments, please contact Lessons Learned at SLAC National Accelerator Laboratory.