

SAMPLE QUESTION – MECH 321

For the following scenario, explain how and why the component failed. If necessary suggest how failure could have been prevented.

- a) A heat exchanger comprising a bank of tubes welded between endplates as shown in the figure below, has cold water flowing through the tubes and steam (containing chlorine) flowing around the outside of the tubes. The tubes and endplates are made from 304 stainless steel. After several months of operation, several of the tubes have failed in the vicinity of the welds. The fractures show a brittle-type of failure with no or little plastic deformation and when the microstructure near the weld failures is examined it looks like the figure shown below.

