

Process Industry Equipment Failure

Special points of Interest:

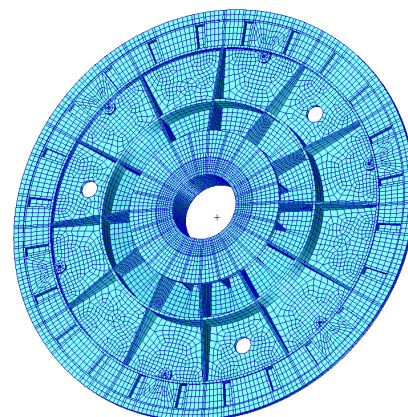
- Failure of drum head caused shut down of a paper mill.
- Finite Element Analysis used to assess the structure.
- Risk of future failures identified.
- Technical evidence and support provided to substantiate claim.

The Problem

Shortly after the start-up of a new paper mill built for our client, the head of a Through Air Dryer (TAD) drum failed, resulting in the complete shut down of the plant.

A temporary repair was undertaken in order that paper production could resume.

It was later claimed by the supplier that the repaired TAD drum head was adequate and that a replacement was not needed. Given that the period to procure a replacement drum head would be many months, a



Drum Head

further failure could have had enormous commercial implications for our client.

Eatec was asked to assess the repaired drum head in order to determine whether a further failure within the expected life of the machine was likely.

The Approach

The loads which act on a TAD drum include:

- Self weight
- Centrifugal forces
- Belt tension
- Thermal loads
- Pressure

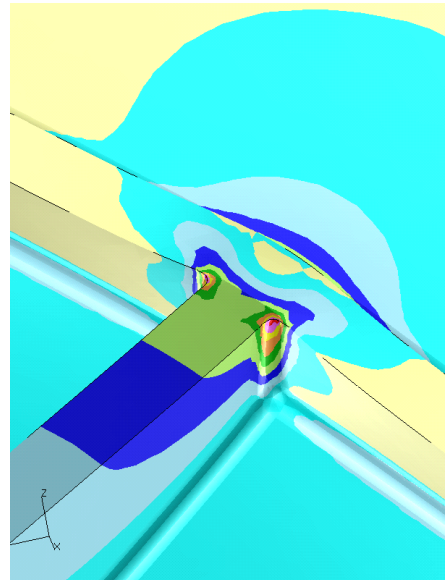
Due to the complexity of the drum head and the combination of loads, it was necessary to perform a Finite Element Analysis of the structure. In order that the analysis was accurate, half of the complete drum assembly was modelled.

The calculated stress levels were assessed against published fatigue strength values for the cast iron and mild steel used in the repaired drum head. The stresses in the welds used in the repaired section were assessed against BS 7608.

The Results

The results showed that the repaired drum head had a low factor of safety against fatigue failure, and that further cracking was highly likely to occur if the machine was run at maximum operating conditions.

On the basis of Eatec's assessment of the repaired drum head and the serious commercial consequences of a further failure, our client decided to submit a claim to the supplier for a replacement drum.



Stress Distribution

Outcome

During the negotiations, Eatec provided technical support to the client.

A new drum head was designed by the company which had supplied the original Through Air Dryer.



Given the problems with the original design, our client requested that Eatec should assess the new drum head design prior to manufacture.

The support provided by Eatec enabled the client to:

- Appreciate the likelihood of subsequent failures of the original drum head
- Minimise the commercial risks to the company by implementing an inspection plan to check for further cracking
- Justify the claim for a replacement drum

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