

# STEAM TURBINE DOVETAIL STYLE SHROUD INDICATIONS

By Scott MacFarlane

Crack-like indications are often discovered during the NDT inspection process of dovetail style shrouds. These indications generally take one of two forms: a crack in the rolled-in band starting between adjacent blades or a crack in the parent blade metal in the area of the dovetail groove.

The indications in the rolled-in bands occur at the edges between adjacent blades. A photo of such an indication is shown in Figure 1. The inception of these

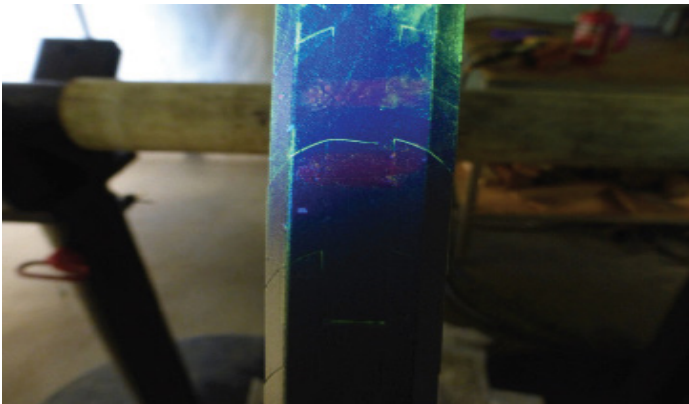


Figure 1

indications is due to relative displacement between blades resulting in high stress and cracking in the band (Figure 2). It is known that the initiation site may be formed during the installation of the blades when the shrouds are machined after installing the bands. Tool pressure during machining has been observed



Figure 2

to deflect the integral shroud blade tips which are cantilevered from the airfoil tip (Figure 3). The problem is more significant on later stages where longer blade lengths reduce structural stiffness.

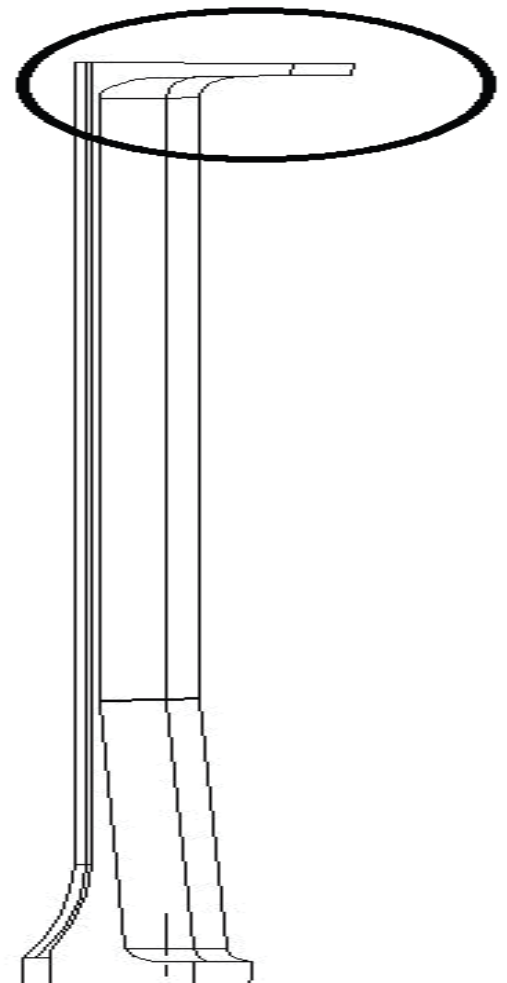


Figure 3

The most effective means of preventing these cracks is to stabilize the blade tips during the assembly and machining process which leads to a superior wheel assembly without the introduction of pre-cracks in the bands. There are different means of accomplishing this task which, RMS has developed its own proprietary process.

The other type of crack-like indication shows up in the blade parent material at the edge of the dovetail slot next to the adjacent blade. Figure 4 shows the raised edges where the material has cracked and Figure 5 shows areas where that metal has broken away leaving a void.

RMS has determined through structural analysis that these indications in themselves are not an immediate danger to the rotor blade operation. Depending on the

extent, there may exist sufficient parent material in the remaining dovetail to adequately prevent individual blade movement. Many of these indications have been observed but there has been no documented failure as a result.

Regardless, any observed cracking in the dovetail style shroud configurations should be addressed to reduce the chance of further damage or machine failure.

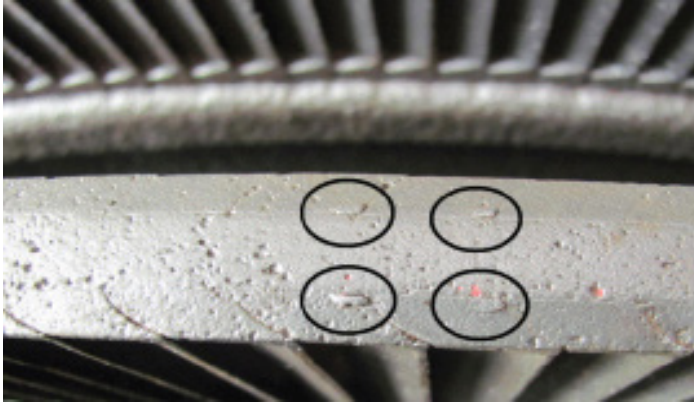


Figure 4

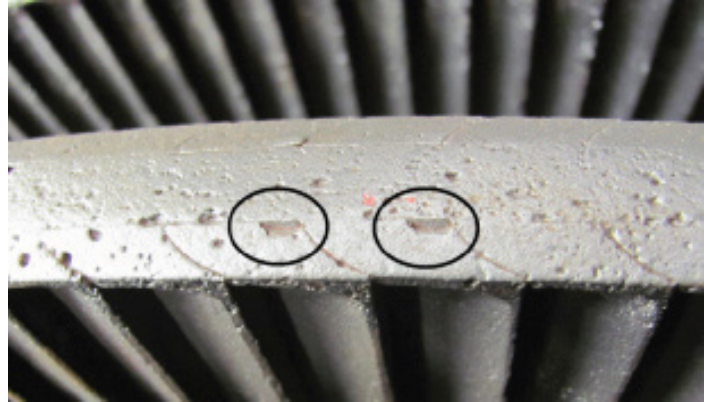


Figure 5

*For more information:*

Email: [RMS@rotatingmachinery.com](mailto:RMS@rotatingmachinery.com)

Tel: 484-821-0702

**Headquarters**

2760 Baglyos Cir.  
Bethlehem, PA 18020

**Houston Office**

16676 Northchase Dr., Ste 400  
Houston, TX 77060



[rotatingmachinery.com](http://rotatingmachinery.com)

Tel: 484-821-0702

Parts: [rms@rotatingmachinery.com](mailto:rms@rotatingmachinery.com)

Rotating Machinery Services, Inc. | 2760 Baglyos Circle, Bethlehem, PA 18020 | Tel: 484-821-0702