DETAILS OF INTERESTING CLAIM

No: DOIC 43

Type of Insurance:

LP (M)

Description of damaged item:

Steam turbine in paper mill

Cause of Loss:

(2) Faulty material or workmanship

Claim Cost:

1 € Mio

Description of Incident and Loss Prevention Measures initiated:

A welded heat protection shield in a steam turbine (approx. 100 MW) at a P&P factory was found broken and had injured the Curtis wheel and both stator and rotor blades. The breaking of the shield was caused by fatigue of the fillet weld.

Both fillet welds of one of the two steam heat protection plates (protecting the inlet spot from overheating that part of the casing) had failed obviously from fatigue cracking resulting from turbulence of he incoming steam. The plate having dimensions of some 15 cm x 15 cm x 1 cm got loose and flew through the machine, causing considerable distortions to the first rows of blades but no direct blade breakages during the event.

Directly after commissioning of this steam turbine both the efficiency went slightly down and the vibration level went up, but not enough to trip the machine. The machine was run for eight years and after request by the operator given permission by the insurance company for two more years till opening beyond the normal time of eight years. The permission was given because the efficiency trend had made no change for years neither had the vibration level changed for years and was still at a rather low level. Finally the insurance company asked for an oil-analysis and since also the oil showed no signs of abnormal debris, the permission was granted.

The damage and also the cause of the internal impacts on the components were directly seen at the dismantling.

A in-service program including endoscope at the intermediate overhauls have been implemented. A more sensitive vibration monitoring system has been installed and the vibration level set as a protection parameter and not only as a warning parameter.

Outline the interesting or unusual aspects of this claim or problems experienced during settlement:

The failure was found during a major overhaul of the machine. The failure must have occurred in the very early use of the machine, because for years the vibration level, efficiency and oil analyses had been good. Now a complete damage was very close.

It was amazing that this big a steel part could be crashed and fly through the machine unnoticed. The reason was the fact that the measurement system averaged vibration levels and failed to register very short deflections. The machine is equipped with several endoscope holes but endoscopies has not been performed during the scheduled production stops during the years due to the fact that the machine is so well thermally isolated that the cooling in order to permit endoscope requires several days.

The fact that several blades now were cracked at the base and had risen up somewhat but not broken apart spared the machine from a catastrophic damage.