

Fig. No. 217
Consequential damage to
rotor blades



Amount of loss

CHF 1 500 000

Cause

Failure of turbine blade.

Description

The unit comprised a 15-year-old gas turbine driving an 15 MW electrical generator. It was in cyclical use and had been in operation for a total of approximately 30 000 hours and started around 4 500 times. Three months prior to the failure, an overhaul of the unit had led to various stages of blading and nozzle guide vanes being replaced.

During the start-up in question, there was a loud bang and high vibration levels, which tripped the unit. Simultaneously, a fire ignited around the unit's rear bearing, flaring up the outside of the unit and causing severe damage to the casing. On removing the casing, severe damage to the hot gas section of the turbine was discovered.

Fig. No. 218
Damage to
static components



Comment

The failure was caused by a turbine blade moving upstream in its fixing, breaking the restraint device, and eventually coming into contact with static components located upstream. These then snapped off and passed through the turbine, breaking off some of the rotating blades. The ensuing vibration of the unit fractured a lube oilpipe to the rear bearing. This oil then caught fire.

Conclusions

The blade and blade row which caused the failure were not fully inspected or replaced during the previous overhaul. This underlines the need for a full and thorough overhaul procedure to ensure that all necessary actions are taken.