

## Torsional and lateral analysis

This document outlines the principles for rotor dynamic analysis of the rotor train, when different suppliers contribute with rotating parts.

One of the suppliers shall be appointed to be responsible and include in his scope of supply to perform the complete rotor dynamic analysis. The party that has the final responsibility against the client shall normally be appointed to be responsible for the complete analyses.

### Torsional analysis

Complete analysis of the whole rotating train with complete shaft models shall be done.

The experience is that a single mass/spring model can give inaccurate results.

### Lateral analysis

Complete analysis of the whole rotating train with complete shaft models shall be done. Also bearing oil film and pedestal description shall be included in the model.

The experience is that the dynamic characteristics of the flexible coupling and dynamic coupling between the gas turbine and compressor (in MD-application) should not be ignored.

Resonance due to coupling modes or coupled compressor-coupling-turbine modes could have a big influence on the working operation of the machine.

In order to assess the suitability of the coupling from a rotor dynamic point of view a coupled lateral analysis with the complete train should be performed.

In order to perform the above rotor dynamic analysis the required data are as follow:

- Complete shaft models of compressor rotor/driven equipment and the driving shaft arrangement.
- Complete shaft model of coupling between compressor/ driven equipment and the driving shaft arrangement.
- Complete shaft model of gear if existing in the rotor train.
- Oil film stiffness and damping for the rotor train bearings.
- Stiffness and damping for bearing pedestals
- Expected torsional disturbances from the compressor/driven equipment, if any.
- Expected unbalance on the compressor/driven equipment and driving shaft arrangement.
- Displacement of bearing pedestals due to temperature differences between warm and cold condition.



Gas Turbine

**SGT-600, SGT-700,  
SGT-800**

GTI number		W330016E	
Document number		1CS34891	
Revision	K	Page	2

If the result of the analysis will establish the need for design changes of the respective supplier's parts this rotor dynamic analysis is only recommending. The final decision has to be made by the party that has the final responsibility against the client. The cost absorption of the redesign shall be mutually agreed between the involved parties.

The responsible party for the rotor dynamic analysis is responsible for the alignment instruction of the assembled rotor train.

It is an obligation for the involved parties to contribute to the responsible party with accurate data in a quick manner.