TURBINE ROTOR BORE STRESS ANALYSIS DATA PACKAGE

UTILITY _____ PLANT _____

UNIT _____ ROTOR SECTION (HP, IP, HP/IP, LP) _____

START DATA

In order to analyze a turbine rotor bore , the stresses at the bore of the rotor due to thermal transients for a cold start and a warm start must be determined. This is done by inputting the input and output temperatures and pressures at each section of the rotor as shown in Figure 1 into a finite element model. This data should be recorded for any steam path that is continuous in the same direction on the rotor to be analyzed. In the case of a compound rotor such as a high pressure/intermediate pressure rotor the steam conditions into and out of each section should be recorded

GEOMETRY DATA

The geometric dimensions needed are the width and inside radius and outside radius of each section , the bore diameter and any bottle bore information, the weights of the blades and the seal dimensions.Typical geometric dimensions needed are shown in Attachment B. If possible a drawing of the rotor should be provided. If this is not possible, measurements can be made during an outage.

OPERATIONAL DATA

Attachment C lists operational data that is needed.

MATERIAL DATA

Typical material data needed is the Charpy impact data, the yield strength at the upper and lower shelf and the chemical composition of the rotor material. See Attachment D for a table to be filled out.

NDE DATA

NDE data should be recorded on a 3 1/2 inch floppy disk or CD-ROM in ASCII format. The recorded data should consist of the cylindircal coordinates of any "hits" found in the rotor. This would be the axial position, the angular position and the radial position.

Other test performed should be a visual examination and a magnetic particle examination. Pictures or video tapes should be made to compare to future inspections.

ATTACHMENT A

START DATE _____ BY _____
START TYPE (Cold, Warm, Hot) _____
ROTOR _____

TIME	STEAM CONDITIONS IN		STEAM CONDITIONS OUT		RPM
	TEMPERATURE	PRESSURE	TEMPERATURE	PRESSURE	

For a cold start record data every 15 minutes.
For a warm or hot start record data every 5 minutes.
Include warmup period before roll off.

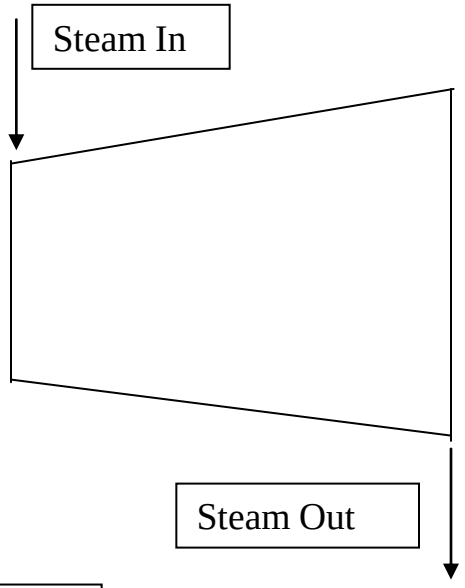
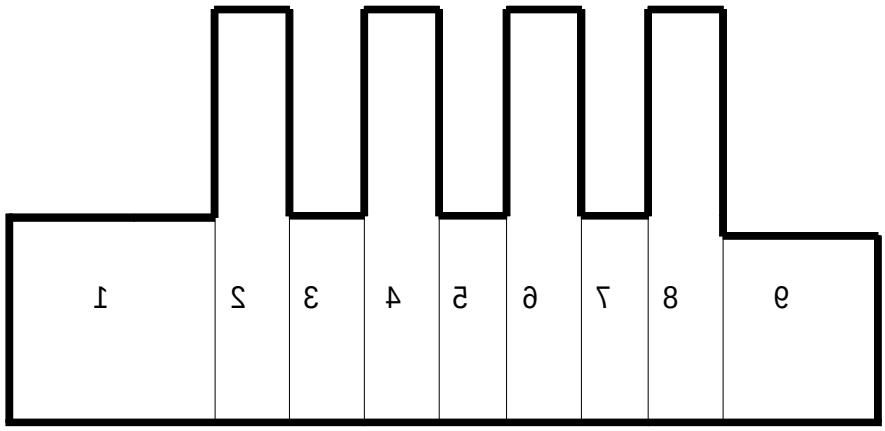


Figure 1

ATTACHMENT B

Section	Descrip.	Bore Radius	Outside Radius	Width	Blade Weight	Blade Length	No. of Seals
1	Outboard Seal				N/A	N/A	
2	Blade/Wheel						N/A
3	Interstage Seal				N/A	N/A	
4	Blade/Wheel						N/A
5	Interstage Seal				N/A	N/A	
6	Blade/Wheel						N/A
7	Interstage Seal				N/A	N/A	
8	Blade/Wheel						N/A
9	Inboard Seal				N/A	N/A	



ATTACHMENT C

Operational Data

Date of commercial operation _____

Number of starts since commercial operation _____

Mean time between starts _____

Projected number of starts per year in future _____

Average operations factor _____

Steam seal temperatures _____

Megawatt rating _____

Number of stages _____

ATTACHMENT D

Material Properties

Rotor material _____

Yield strength at room temperature _____

Yield strength at upper shelf _____

FATT _____

Charpy impact data:

Temperature	Energy (ft-lbs)	Percent Shear	Lateral Expansion (mils)

CHECK-OFF SHEET FOR TURBINE ROTOR INFORMATION

Rotor geometry:

- Bore diameter
- Bottle information
- Radius and length of each component,i.e.,blade wheel, inlet seals, interstage seals,outlet seals
- Number of teeth in each seal
- Seal clearances
- Length and weight of blades

Start information:

- A profile of temperature vs time for turbine inlet steam, turbine outlet steam, seal inlet steam, seal outlet steam, revolutions per minute for a cold start and a warm start
- Operating history, i.e., date of commercial operation, any unusual events, typical length of time running per year, number of starts per year

Rotor material property information:

- Fracture toughness versus temperature
- Yield strength
- ASTM specification for material or composition

NDE data

- Size and location of suspected cracks
- Video tape of magnetic particle test and visual inspection
- Measured bore diameters along length of rotor