Modeling and analysis of the balancing bench in field of dynamics

DYNAMICS R4

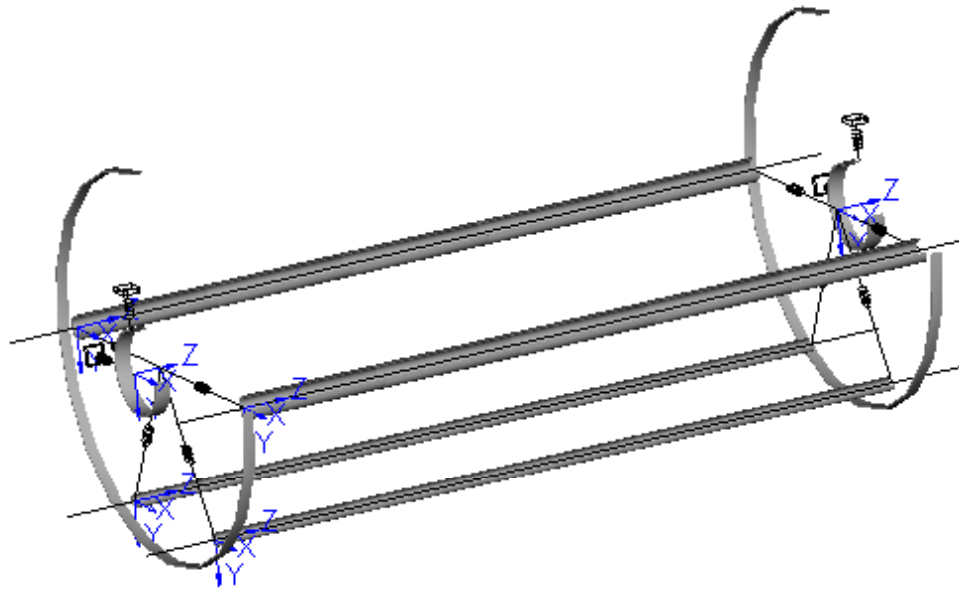Alfa-Tranzit Co., Ltd

TRANZIT

Common view of the balancing bench

In software DYNAMICS R4 was created a model of this balancing bench (which produced by the Diamech Co. and mounted in Gasturboservice Co., Ltd) to obtain estimation of the natural frequencies. This bench was modeled as spatial system. The calculations were made in two versions – without the rotor and with the rotor, set in the cradle.
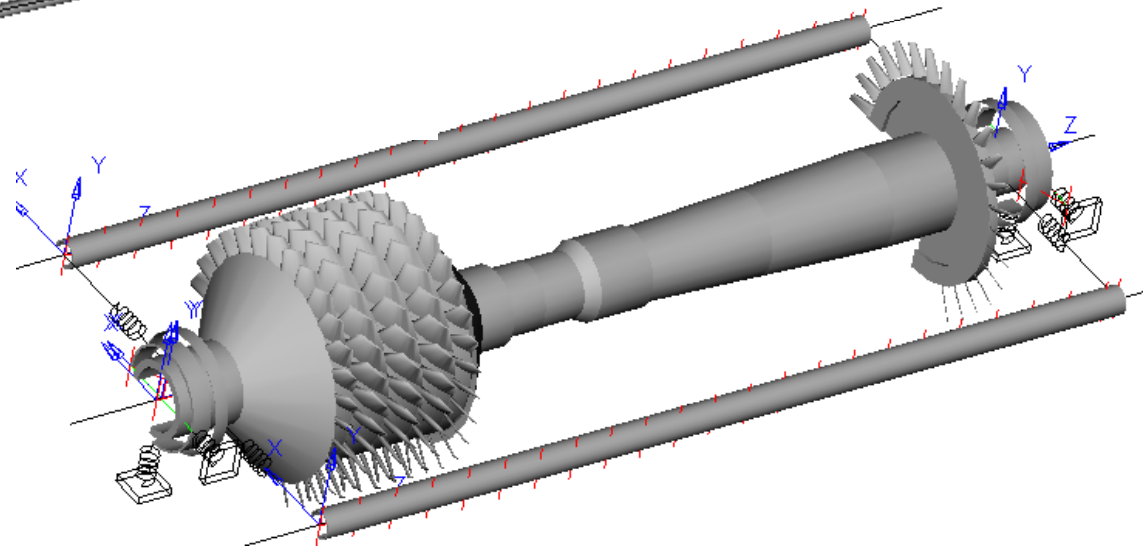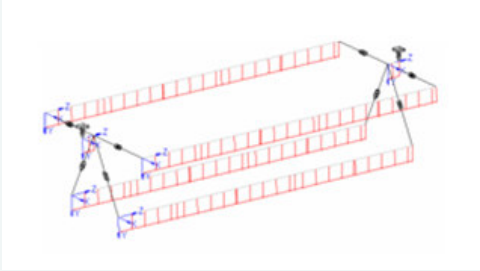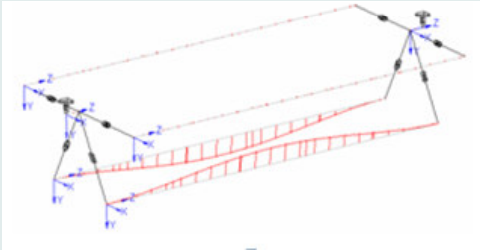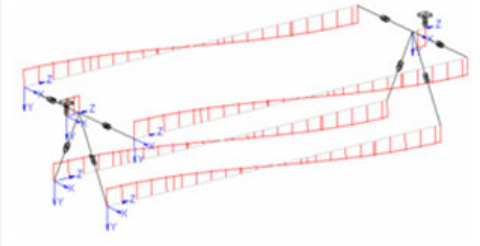
Spatial model of the balancing bench

**Model of the dynamic
system without rotor**

**Model of the dynamic
system with HP rotor of
GTE RD-59**

Natural frequencies and mode shapes of the balancing bench without the rotor

Calculation		Published data «Diamech»
Frequencies, rpm (Hz)	Mode shapes	Frequencies, Hz
60(1)		~ 1 Гц
120(2)		~ 2 Гц
2839.0(47.3)		No data

Operating frequencies for rotor balancing at this bench are in the range up to 1500 rpm. According Diameh Co., Ltd the natural frequencies of the bench are ~1 Hz and ~2 Hz. These data were used to tuning the mathematical model.

Higher frequencies are associated with the stiffness of the longitudinal beams of the bench.

DYNAMICS R4

Natural frequencies and mode shapes of the balancing bench with the rotor

Frequency , rpm (Hz)		
0.5	3786.0 (63.1)	15102.5 (251.7)
0,5	3786.1 (63.1)	23539.0 (392.3)
38.3 (0.6)	3959.4 (66.0)	23552.1 (392.5)
38.3 (0.6)	3973.3 (66.2)	29088.1 (484.8)
1599.0 (26.6)	3994.9 (66.6)	42248.8 (704.1)
1608.6 (26.8)	4013.8 (66.9)	42248.8 (704.1)
2305.2 (38.4)	6245.6 (104.1)	45662.0 (761.0)
2312.6 (38.5)	6267.3 (104.5)	45662.6 (761.0)
2759.3 (46.0)	9233.8 (153.9)	72341.3 (1205.7)
2762.1 (46.0)	12982.9 (216.4)	72341.4 (1205.7)
3171.9 (52.9)	13152.6 (219.2)	74839.2 (1247.3)
3171.9 (52.9)	14951.8 (249.2)	