



Modeling and analysis of the balancing bench in field of dynamics

DYNAMICS R4

Alfa-Tranzit Co., Ltd



Common view of the balancing bench

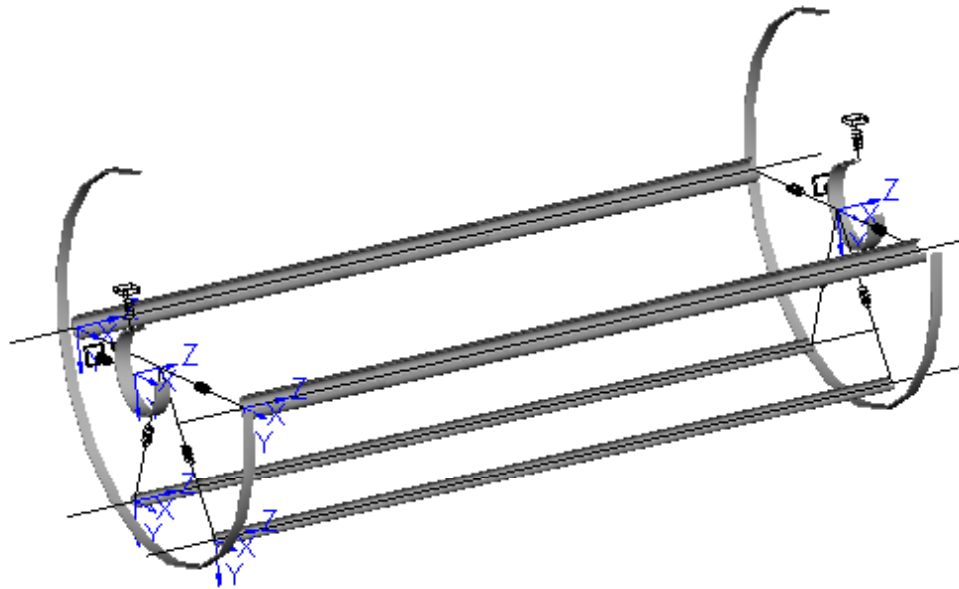


In software DYNAMICS R4 was created a model of this balancing bench (which produced by the Diamech Co. and mounted in Gasturboservice Co., Ltd) to obtain estimation of the natural frequencies. This bench was modeled as spatial system. The calculations were made in two versions – without the rotor and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

DYNAMICS R4

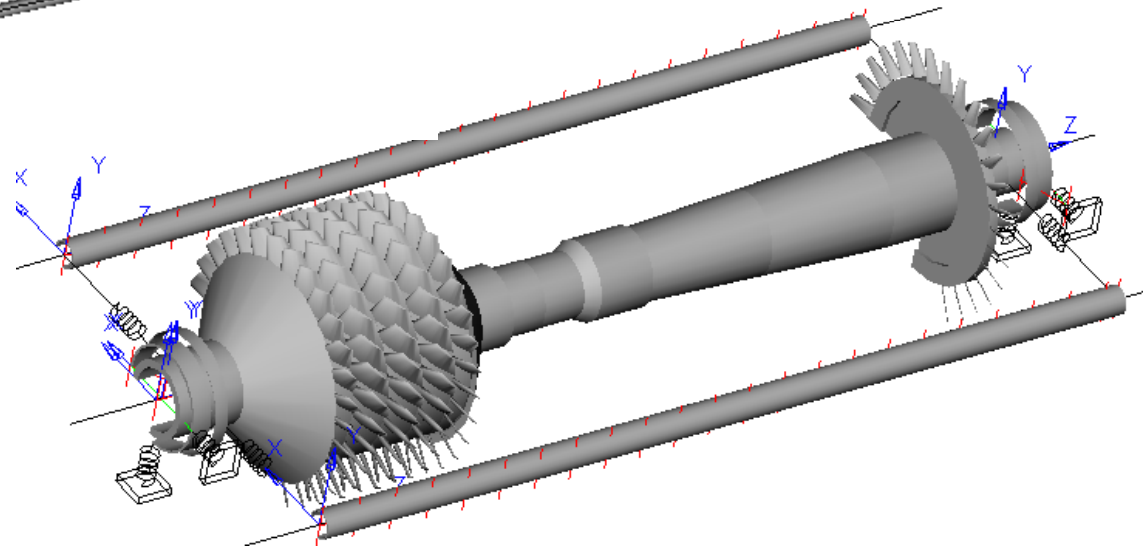
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Spatial model of the balancing bench



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)		$\sim 1 \Gamma\text{ц}$
120(2)		$\sim 2 \Gamma\text{ц}$
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.

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)	