

Portable Balancing Machine

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To balance heavy machines with vibrational parts, we need to know the magnitude and phase difference of vibrating signals, representing unbalancing situation. This signals will be measured by tracking filter circuits, either analog or digital systems. Unfortunately, this Tracking filter circuit is at present very expensive.

This research aims at designing and building inexpensive balancing machines which are easy to operate by just using offline programming. This program employs function fitting that allows us to use lower cost circuits.

The fundamental idea of this research is to determine the linear independent function fitting and unbalancing signals, leading to function fitting. During this signal process, data are completely recorded in one rotating period.

A mathematical function used in this research either sine or square depends on speed and precision of a processor unit. Therefore, this research inevitably introduces a Fast Fitting Algorithm that can be used in either low speed processor or microprocessor.

The precision of equipment can be observed by sampling rate, quantization or bit length and signal to noise ratio.

We develop a user-friendly graphic interface by proposing both sequence and random access for the users.

The success in balancing occasionally depend on user experience and expert systems which are used to help a decision making process.

Our expert system is a crucially importance that helps us to distinguish the difference between misalignment and beating. Additionally, ill conditions in finding the influence coefficient matrix in two plane is the fundamental results of trial and error in balancing machines.

The general specification of our portable balancing machine are:

- instant correcting mass calculation
- one run balancing
- 100 machine status recording
- sequence and random operation
- nth harmonics detecting
- number of averaging setting
- simple vibration inspection: Φ & Amp
- more than 10 cm distance Φ detecting
- infrared phase detecting
- adjustable signal amplifier gain
- dark or light Φ detection
- AI machine condition diagnostic (under development)

