

# Balancing

Engineered for SignalCalc Dynamic Analyzers

■ ACE  
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## Balancing

When the center of mass of a rotating element does not coincide with its axis of rotation a condition of unbalance exists. The force generated by this unbalance is proportional to the square of the rotational frequency. If the amount of unbalance exceeds permissible levels, even small increases in operating speeds of the rotor can lead to significant increases in vibration levels. This condition can only be corrected by accurately measuring the vibration response of the rotor at its fundamental frequency and following a series of steps designed to determine the amount of unbalance and adding (or subtracting) an appropriate amount of compensating mass at the necessary locations.

SignalCalc Balancing offers an elegant, easy to use solution for the balancing of rotors of any rotating machine. The application is offered in a choice of single plane, dual plane or multiplane options and is available to run on the highly portable and rugged Quattro platform or the powerful Abacus platform. SignalCalc Balancing is a complete standalone application that puts to use Data Physics SignalCalc digital signal processing techniques and comes complete with an elegant and intuitive Graphical User Interface for instrumentation setup, rotor geometry definition and a complete measurement wizard for the balancing measurements and correction mass calculations.

### A Solution for all Balancing Applications

SignalCalc Balancing is available in one of three options:

- Single Plane Balancing
- Dual Plane Balancing
- Multiplane Balancing

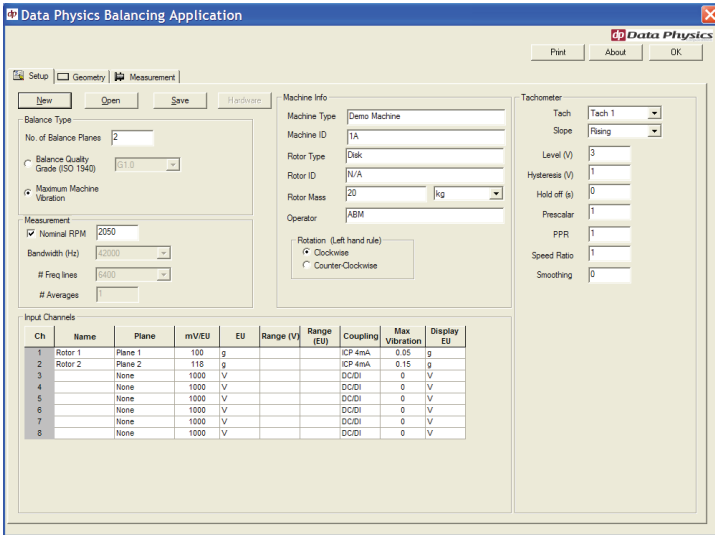
This permits users to employ the most cost effective solution that meets their application needs and ensures an optimum user interface.

The application is divided into three simple and intuitive steps. The first allows for definition of the number of balance planes, the maximum allowable vibration at each balance plane and the setup of vibration channels and tachometer input which is used to provide a measure of the rotor speed during balancing and also a phase reference.

Input channels may be defined in units of acceleration, velocity or displacement and the maximum allowable vibration limits for each balance plane may also be defined in any of these units.

The tachometer set up ensures jitter free triggering for the synchronous averaging of vibration required for accurate balancing runs and offers a variety of conditioning tools for any type of tachometer.

The second step is designed to give users an interactive drawing board for the rotor geometry. Components making up the rotor being balanced can be defined as supports (usually bearing locations) and rotors where the addition of correction masses occurs. Users simply need to provide the position of each component along the axis of rotation, a radius for each rotor and optionally, the number of pre-drilled holes available on the rotor

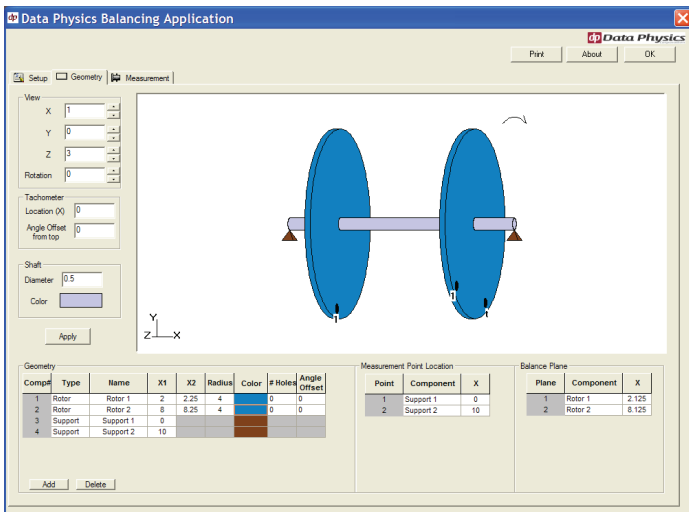


for the addition of trial and correction masses which are used by the system for "weight splitting."

The final step is dedicated to the balancing measurements, and features a balancing wizard that leads the user through the required balancing steps. Vibration measurements for all balancing planes may be viewed in either the time or frequency domain and the addition of trial masses are shown clearly in the "rotor" view. Measurement results and calculated final correction masses are neatly arranged in a tabular format.

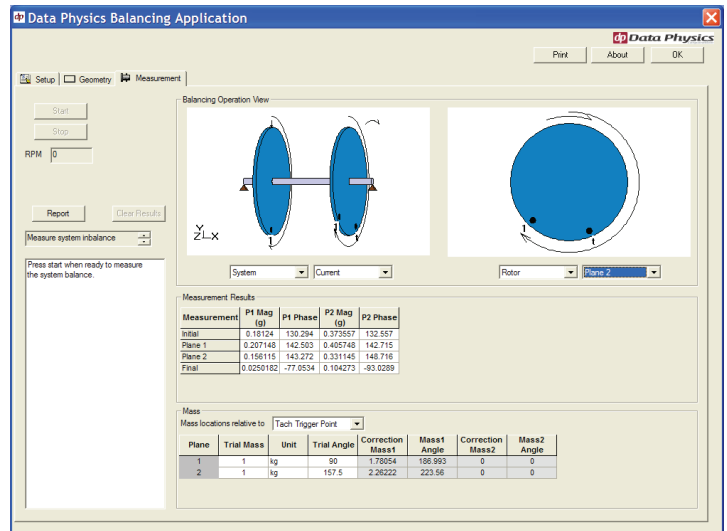
### Preset Balancing Templates

Default channel setup and rotor geometry is available for single plane, dual plane and overhang rotor configurations. Once the user selects any of these templates, default rotor geometry is set up for the user and only the input channel set up needs to be completed before the balancing runs may commence.



### Easy to Follow Balancing Wizard

The Balancing operation is carried out by calculating the change in the phase and amplitude of vibration at each measurement plane following the addition of trial masses. The system guides the user through each measurement step via an easy to follow balancing wizard that displays instructions for the user in a text box. An initial run measures the "as is" vibration condition of the rotor. Then, the rotor is stopped and a trial mass is added to the first rotor plane to be balanced. The rotor is then run up again and the change in vibration condition resulting from the addition of the first trial mass is measured. This process is repeated for each plane to be balanced (note: trial masses on any plane must be removed before the trial mass for the next plane is added). Once trial runs for all planes have been completed, the mass table displays the amount and angular location of final correction masses.



Fine trim balancing is possible by recalling previous balancing measurement results and repeating runs on any or all measurement planes and the system also supports a manual mode, where users may directly enter vibration amplitude and phase values from an external instrument.