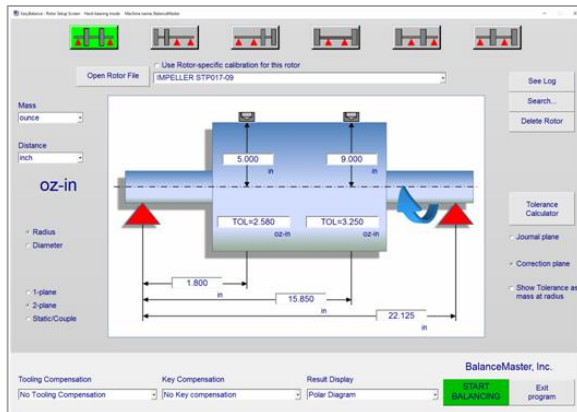


# Balancing Instrumentation Road Map

In 3 easy steps from **Setup** to **Result**

## 1. Setup rotor



Rotor Setup screen

## 2. Measure...



Live Polar screen

## 3. Show result...



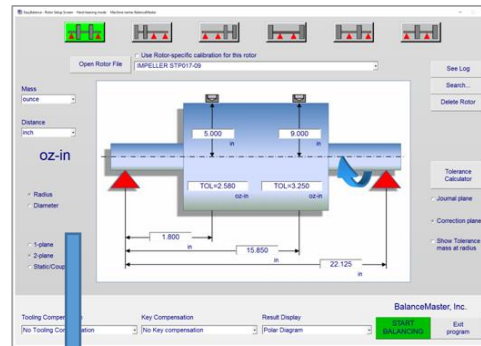
Result screen

Next Run

New Rotor

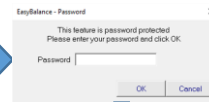
# Travel to Instrumentation City

Rotor Setup

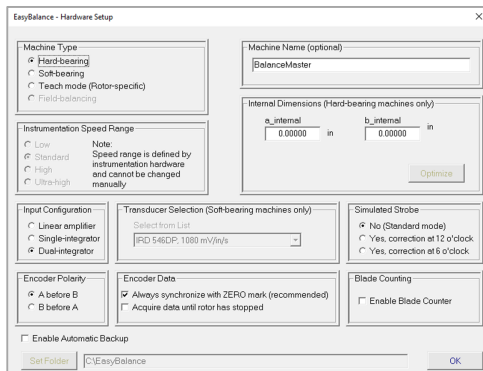
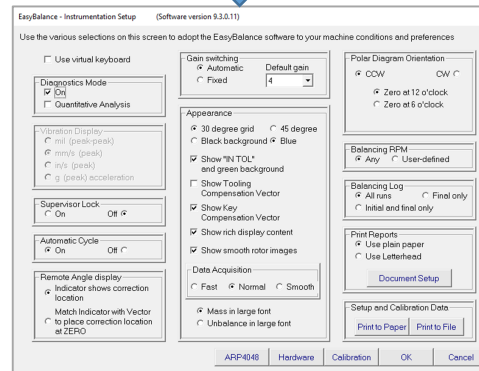


“Right-click”  
anywhere

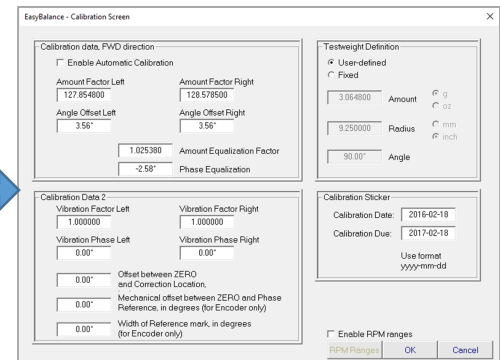
Must have  
Password



Instrumentation



Hardware



Calibration

# In the Neighborhood

## Instrumentation Setup

Diagnostics Mode  
Supervisor Lock  
Automatic Cycle  
Remote Angle Display  
Gain switching  
Appearance  
Polar Diagram Orientation  
Balancing RPM  
Balancing Log  
Print Reports  
Setup and Calibration Data

EasyBalance - Instrumentation Setup (Software version 9.3.0.11)

Use the various selections on this screen to adopt the EasyBalance software to your machine conditions and preferences

☐ Use virtual keyboard

**Diagnostics Mode**  
☒ On  
☐ Quantitative Analysis

**Vibration Display**  
☐ mil (peak-peak)  
☒ mm/s (peak)  
☐ in/s (peak)  
☐ g (peak) acceleration

**Supervisor Lock**  
☐ On ☒ Off

**Automatic Cycle**  
☒ On ☐ Off

**Remote Angle display**  
☒ Indicator shows correction location  
☐ Match Indicator with Vector to place correction location at ZERO

**Gain switching**  
☒ Automatic ☐ Fixed  
Default gain: 4

**Appearance**  
☒ 30 degree grid ☐ 45 degree  
☐ Black background ☒ Blue  
☒ Show "IN TOL" and green background  
☐ Show Tooling Compensation Vector  
☒ Show Key Compensation Vector  
☒ Show rich display content  
☒ Show smooth rotor images

**Data Acquisition**  
☐ Fast ☒ Normal ☐ Smooth  
☒ Mass in large font  
☐ Unbalance in large font

**Polar Diagram Orientation**  
☒ CCW ☐ CW  
☒ Zero at 12 o'clock  
☐ Zero at 6 o'clock

**Balancing RPM**  
☒ Any ☐ User-defined

**Balancing Log**  
☒ All runs ☐ Final only  
☐ Initial and final only

**Print Reports**  
☒ Use plain paper  
☐ Use Letterhead  
[Document Setup](#)

**Setup and Calibration Data**  
[Print to Paper](#) [Print to File](#)

ARP4048 Hardware Calibration OK Cancel

# In the neighborhood

## Hardware Setup

Machine Type  
Instrumentation Speed Range  
Input Configuration  
Encoder Polarity  
Encoder Data  
Machine Name  
Internal Dimensions  
Transducer Selection  
Simulated Strobe  
Blade Counting  
Automatic Backup

EasyBalance - Hardware Setup

**Machine Type**

- ☒ Hard-bearing
- ☐ Soft-bearing
- ☐ Teach mode (Rotor-specific)
- ☐ Field-balancing

**Machine Name (optional)**

BalanceMaster

**Instrumentation Speed Range**

- ☐ Low
- ☒ Standard
- ☐ High
- ☐ Ultra-high

Note: Speed range is defined by instrumentation hardware and cannot be changed manually

**Internal Dimensions (Hard-bearing machines only)**

a\_internal: 0.00000 in      b\_internal: 0.00000 in

Optimize

**Input Configuration**

- ☐ Linear amplifier
- ☐ Single-integrator
- ☒ Dual-integrator

**Transducer Selection (Soft-bearing machines only)**

Select from List

IRD 546DP, 1080 mV/in/s

**Simulated Strobe**

- ☒ No (Standard mode)
- ☐ Yes, correction at 12 o'clock
- ☐ Yes, correction at 6 o'clock

**Encoder Polarity**

- ☒ A before B
- ☐ B before A

**Encoder Data**

- ☒ Always synchronize with ZERO mark (recommended)
- ☐ Acquire data until rotor has stopped

**Blade Counting**

- ☐ Enable Blade Counter

☐ Enable Automatic Backup

Set Folder: C:\EasyBalance

OK

# In the neighborhood

## Calibration Setup

Automatic Calibration  
Calibration Data  
Calibration Data 2  
Testweight definition  
Calibration Sticker  
RPM Range calibration

EasyBalance - Calibration Screen

Calibration data, FWD direction

☐ Enable Automatic Calibration

|                    |                     |
|--------------------|---------------------|
| Amount Factor Left | Amount Factor Right |
| 127.854800         | 128.578500          |
| Angle Offset Left  | Angle Offset Right  |
| 3.56°              | 3.56°               |

|          |                            |
|----------|----------------------------|
| 1.025380 | Amount Equalization Factor |
| -2.58°   | Phase Equalization         |

Testweight Definition

☒ User-defined  
☐ Fixed

|          |        |   |
|----------|--------|---|
| 3.064800 | Amount | <input checked="" type="radio"/> g<br><input type="radio"/> oz    |
| 9.250000 | Radius | <input type="radio"/> mm<br><input checked="" type="radio"/> inch |
| 90.00°   | Angle  |   |

Calibration Data 2

|                       |                        |
|-----------------------|------------------------|
| Vibration Factor Left | Vibration Factor Right |
| 1.000000              | 1.000000               |
| Vibration Phase Left  | Vibration Phase Right  |
| 0.00°                 | 0.00°                  |

0.00° Offset between ZERO and Correction Location.

0.00° Mechanical offset between ZERO and Phase Reference, in degrees (for Encoder only)

0.00° Width of Reference mark, in degrees (for Encoder only)

Calibration Sticker

Calibration Date: 2016-02-18

Calibration Due: 2017-02-18

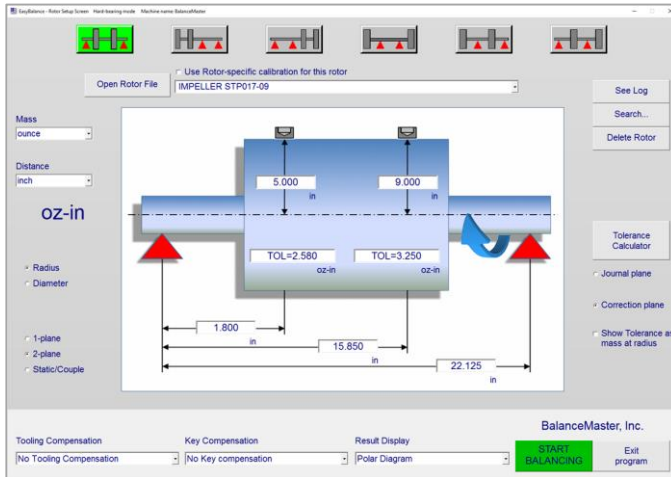
Use format  
yyyy-mm-dd

☐ Enable RPM ranges

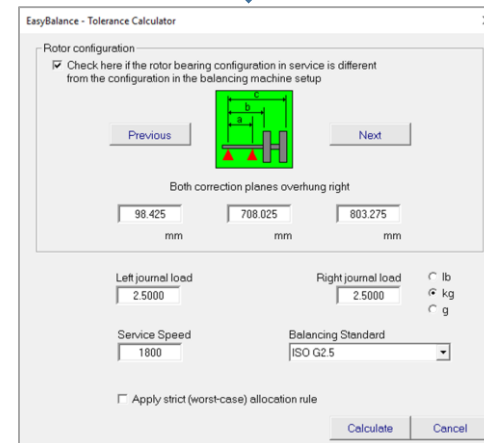
RPM Ranges OK Cancel

# What's my Tolerance?

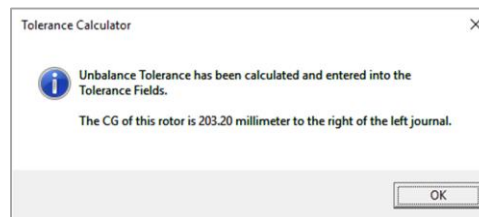
## Tolerance Calculator (ISO 21940)



Click  
Tolerance Calculator



Enter Rotor Info  
Select Balancing Standard  
Click "Calculate"



Done!

# Special Places

## ARP Test

ARP4048

ARP5323

ARP4050

Umar Test

URR Test

Compensator Test  
Couple Separation test

Internal data base for all  
machine classes

ARP Test Log

EasyBalance - ARP4048 Test Setup

**ARP Test Selection**

☒ Umar Test

☒ URR Test

☐ Compensator Test

☐ Couple Separation Test

**Machine Class Selection**

☐ 30 (Load Capacity 60 lb)

☒ 100 (Load Capacity 150 lb)

☐ 300 (Load Capacity 450 lb)

☐ 1000 (Load Capacity 1500 lb)

☐ 3000 (Load Capacity 4500 lb)

**Test Setup Information**

Test Rotor: ARP4162 Proving Rotor, 50 lb

Test Speed Range: 1000 to 1600 RPM

1 A Unit: 10.0 microinch

Required URR: 95 %

10A mass (1): 0.0379 oz

25A mass (2): 0.0947 oz

125A mass (2): 0.4737 oz

**Test Information**

Test performed by: Name

Serial Number Instrumentation: 85-03xxx

Serial Number Machine: 85-xxxx

Machine make and model: Balancemaster

Test Location: Shop

Test Rotor ID:

**ARP Test Log**

|                   |                   |
|-------------------|-------------------|
| Umar Tests        | URR Tests         |
| Compensator Tests | Couple Sep. Tests |

OK Cancel

# Special Places

## Umar Test

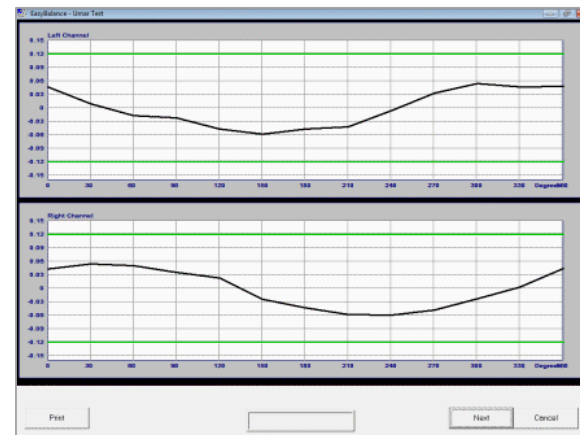
EasyBalance - Umar Test

Position 10A mass in center plane  
at 150°

| Position of<br>Test mass | Amount of<br>Unbalance | Amount of<br>Unbalance | Multiples of<br>Mean Value | Multiples of<br>Mean Value |
|--------------------------|------------------------|------------------------|----------------------------|----------------------------|
| Angle                    | Left                   | Right                  | Left                       | Right                      |
| 0°                       |                        |                        |                            |                            |
| 30°                      |                        |                        |                            |                            |
| 60°                      |                        |                        |                            |                            |
| 90°                      |                        |                        |                            |                            |
| 120°                     |                        |                        |                            |                            |
| 150°                     |                        |                        |                            |                            |
| 180°                     |                        |                        |                            |                            |
| 210°                     |                        |                        |                            |                            |
| 240°                     |                        |                        |                            |                            |
| 270°                     |                        |                        |                            |                            |
| 300°                     |                        |                        |                            |                            |
| 330°                     |                        |                        |                            |                            |
| Sum                      |                        |                        |                            |                            |
| Mean Value               |                        |                        |                            |                            |

OK Cancel

Follow screen prompts  
and get  
Umar test results





# Special Places

## URR Test

EasyBalance - URR Test

Step 1

Left Plane

Position 25A mass at 240°  
Position 125A mass at 270°

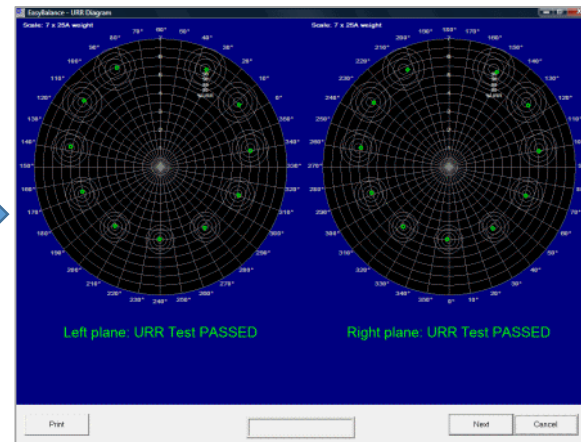
| Stationary position | Traverse position |  |
|---------------------|-------------------|--|
| 240°                | 270°              |  |
| 240°                |                   |  |
| 240°                |                   |  |
| 240°                |                   |  |
| 240°                |                   |  |
| 240°                |                   |  |
| 240°                |                   |  |
| 240°                |                   |  |
| 240°                |                   |  |
| 240°                |                   |  |
| 240°                |                   |  |
| 240°                |                   |  |

Right Plane

Position 25A mass at 330°  
Position 125A mass at 240°

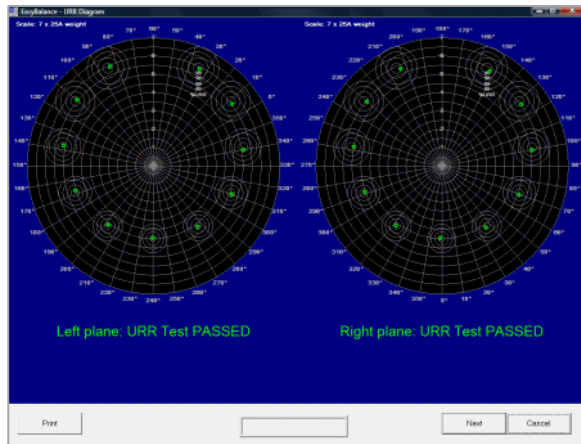
| Stationary position | Traverse position |  |
|---------------------|-------------------|--|
| 330°                | 240°              |  |
| 330°                |                   |  |
| 330°                |                   |  |
| 330°                |                   |  |
| 330°                |                   |  |
| 330°                |                   |  |
| 330°                |                   |  |
| 330°                |                   |  |
| 330°                |                   |  |
| 330°                |                   |  |
| 330°                |                   |  |
| 330°                |                   |  |

Follow screen prompts  
and get  
URR test results



# Special Places

## ARP Test Documentation



Generate ARP Test Print Reports

Use any printer connected to PC



### ARP 4048 - URR TEST CERTIFICATE

Instrumentation: EasyBalance 2.2, Date: 2007-12-14, Time: 16:54:19

BMI

Non\_authorized\_copy

Non\_authorized\_copy

Phone: Non\_authorized\_copy

Fax:

Test performed by

Machine Make and Model : HMC

Machine Serial Number : 85-02567

Instrumentation Serial Number : 85-02568

Required URR : 95%

Test Rotor

Balancemaster HB-3500

125A mass

Test Speed

Test Location

Test Rotor ID

1 A unit : 10.0 microinch

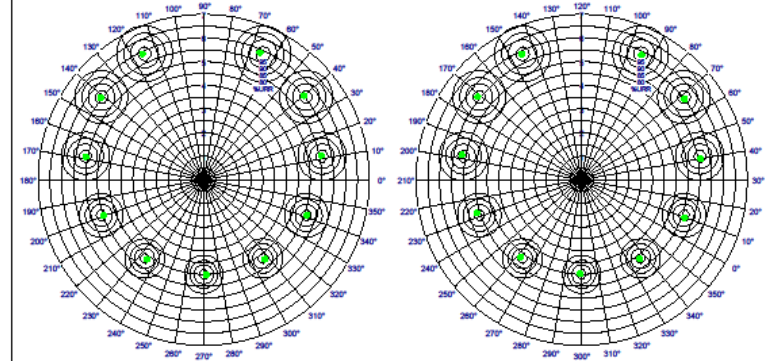
25A mass : 2.8860 g

125A mass : 13.4301 g

904 RPM

Shop

ARP4162 PROVING ROTOR, 50 LB



Machine has PASSED ARP4048 URR test

Test Log Data

| Run | Test Mass Position |            |            |            | Unbalance Readout (g) |         |           |         |         |           |
|-----|--------------------|------------|------------|------------|-----------------------|---------|-----------|---------|---------|-----------|
|     | Left               |            | Right      |            | Left                  |         |           | Right   |         |           |
|     | stationary         | travelling | stationary | travelling | Amount                | Phase   | Multiples | Amount  | Phase   | Multiples |
| 1   | 90°                | 270°       | 120°       | 210°       | 10.7691               | 271.44° | 4.009     | 13.9082 | 198.22° | 5.178     |
| 2   | 90°                | 300°       | 120°       | 180°       | 11.3920               | 307.65° | 4.241     | 15.1108 | 171.33° | 5.626     |
| 3   | 90°                | 330°       | 120°       | 150°       | 12.3782               | 341.07° | 4.609     | 15.8383 | 145.37° | 5.897     |
| 4   | 90°                | 0°         | 120°       | 90°        | 13.6223               | 11.85°  | 5.072     | 15.7453 | 94.41°  | 5.952     |
| 5   | 90°                | 30°        | 120°       | 60°        | 14.8853               | 40.08°  | 5.534     | 14.8701 | 68.19°  | 5.536     |
| 6   | 90°                | 60°        | 120°       | 30°        | 15.8122               | 66.20°  | 5.887     | 13.7215 | 40.04°  | 5.100     |
| 7   | 90°                | 120°       | 120°       | 0°         | 15.9175               | 115.96° | 5.926     | 12.4724 | 9.89°   | 4.643     |
| 8   | 90°                | 150°       | 120°       | 330°       | 14.9752               | 141.42° | 5.575     | 11.1441 | 336.39° | 4.149     |
| 9   | 90°                | 180°       | 120°       | 300°       | 13.6643               | 168.86° | 5.087     | 10.6738 | 298.90° | 3.974     |
| 10  | 90°                | 210°       | 120°       | 270°       | 12.1199               | 199.64° | 4.512     | 11.1435 | 261.69° | 4.149     |
| 11  | 90°                | 240°       | 120°       | 240°       | 11.1016               | 234.42° | 4.133     | 12.4984 | 227.61° | 4.653     |

Operator Signature

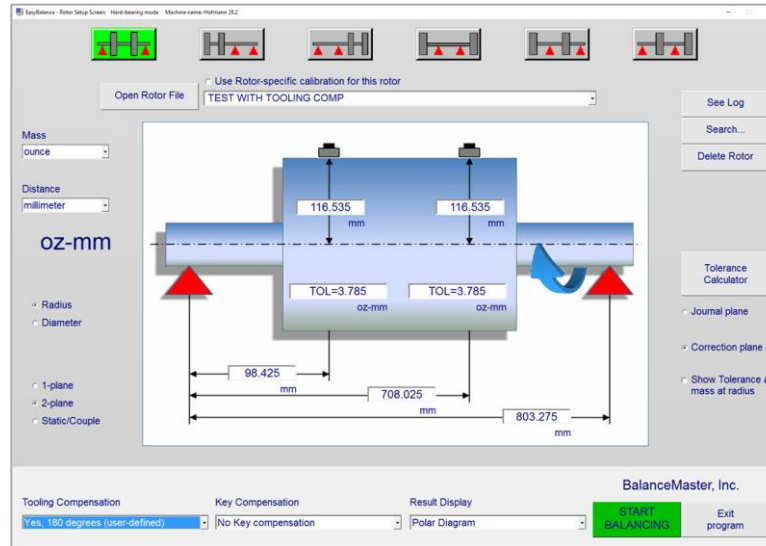
Verified By

Approved By

6.50.3.1

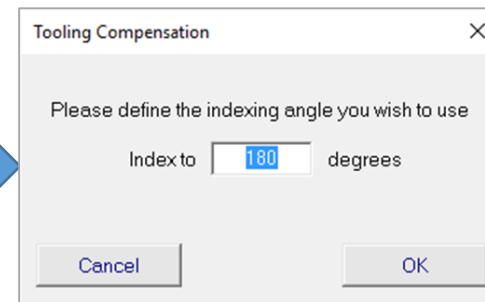
# Must Have Items

## Tooling Compensation



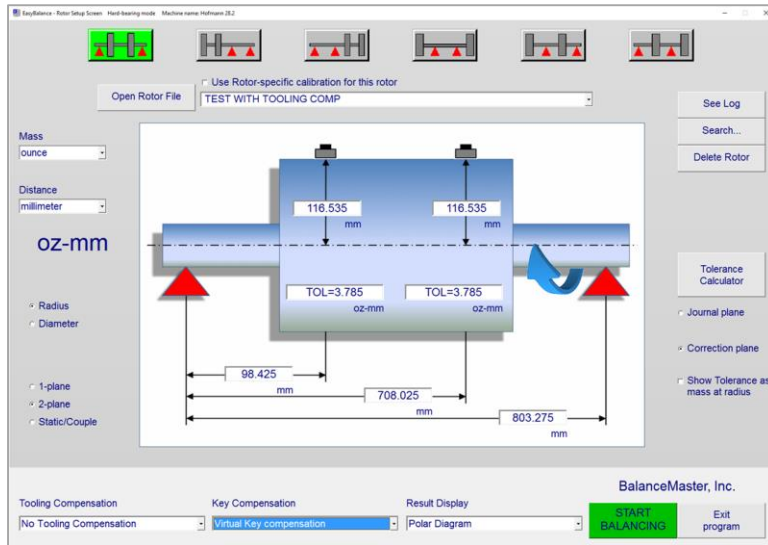
Select Tooling Compensation

Define Indexing Angle



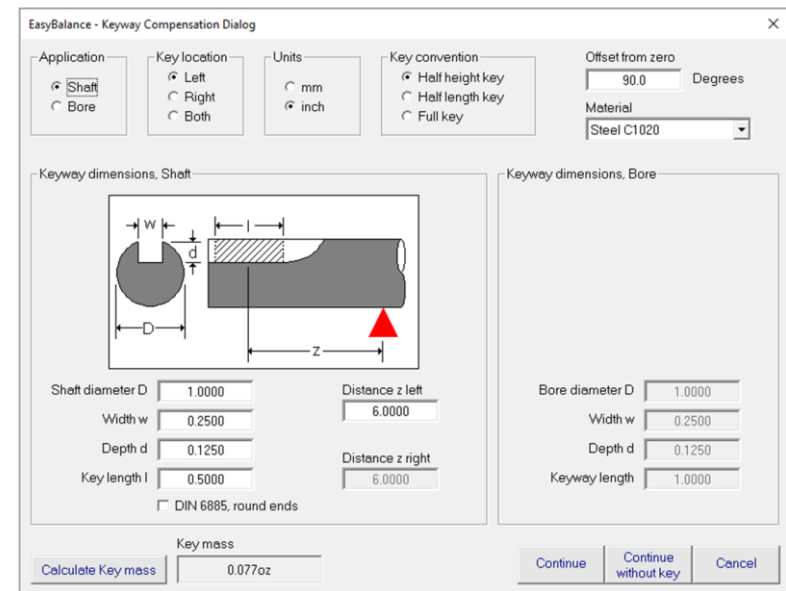
# Must Have Items

## Key Compensation



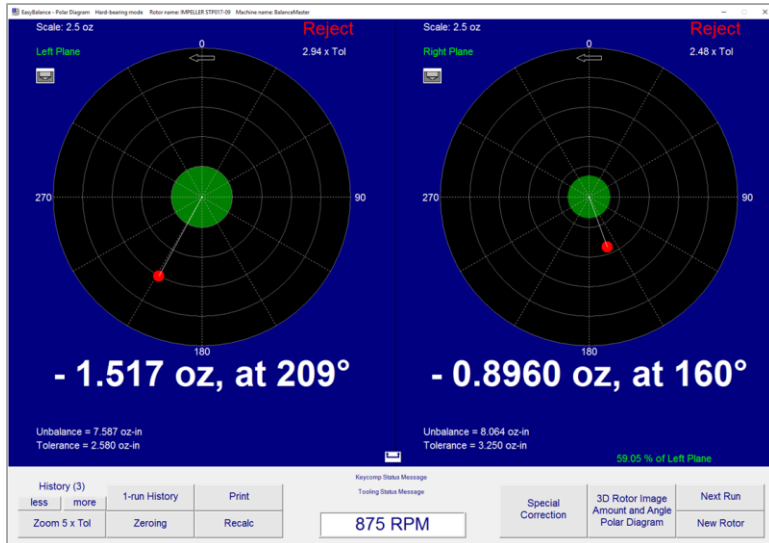
Select Key  
Compensation

Define Key  
Shaft or Bore  
Key Location  
Key Convention



# Special Places

Drilling, Milling, Clips, Welding, Spreading... How do I get there?



Click  
Special Correction

And take  
your pick...

EasyBalance - Special Correction Options

Correction Method

- ☒ Standard Correction
- ☐ Drill Correction
- ☐ Mill Correction
- ☐ Clip bin
- ☐ Mass Bin
- ☐ Bar Stock
- ☐ Wire-feed welder
- ☐ Stick welder
- ☐ Tape Correction
- ☐ Mass Spreading
- ☐ 4-position setscrews
- ☐ Always show gram

Drill Correction

☒ Radial ☐ Axial

☐ Through hole ☒ Full holes, fractional depth

Drill diameter  Max drill depth  ☐ mm ☒ inch

Drill point  Material

Wall thickness  millimeter

Rotor Segments

Left Plane   Static Plane   Right Plane

Offset (Degrees) between Segment 1 and ZERO  Offset (Degrees)  Offset (Degrees)

Exclusion areas

Combine Weights Reset OK Cancel

# Special Places

## Drilling, Milling, Clips, Welding, Spreading...

EasyBalance - Special Correction Options

Correction Method

- ☒ Standard Correction
- ☐ Drill Correction
- ☐ Mill Correction
- ☐ Clip bin
- ☐ Mass Bin
- ☐ Bar Stock
- ☐ Wire-feed welder
- ☐ Stick welder
- ☐ Tape Correction
- ☐ Mass Spreading
- ☐ 4-position setscrews
- ☐ Always show gram

Drill Correction

☒ Radial ☐ Axial

☐ Through hole ☒ Full holes, fractional depth

Drill diameter: 0.500 Max. drill depth: 1.000 ☐ mm ☒ inch

Drill point: 118° Material: Steel

Wall thickness: 1.500 millimeter

Rotor Segments

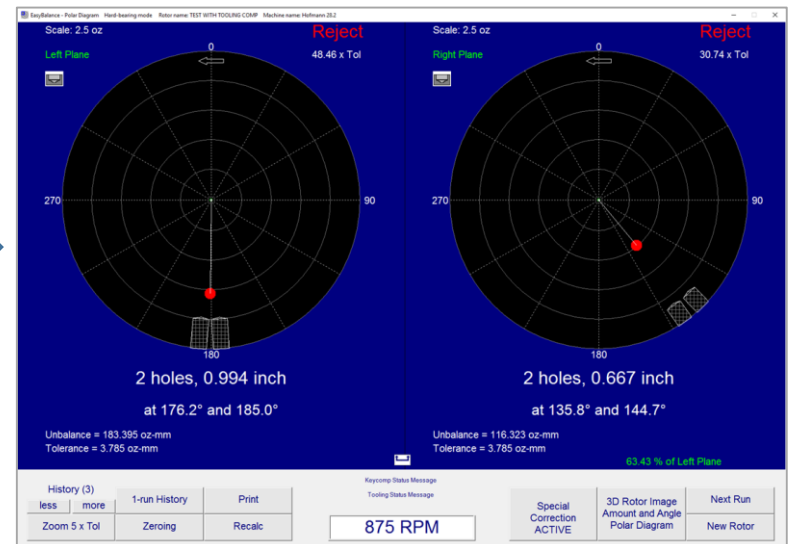
Left Plane: 6 Solid Static Plane: Solid Right Plane: 6 Solid

Offset (Degrees) between Segment 1 and ZERO: 0 Offset (Degrees): 0 Offset (Degrees): 0

Exclusion areas Combine Weights Reset OK Cancel

Select Correction  
Method

See result



# Forbidden Places

## Rotor Segments

☐ 4-position setscrews  
☐ Always show gram

Rotor Segments

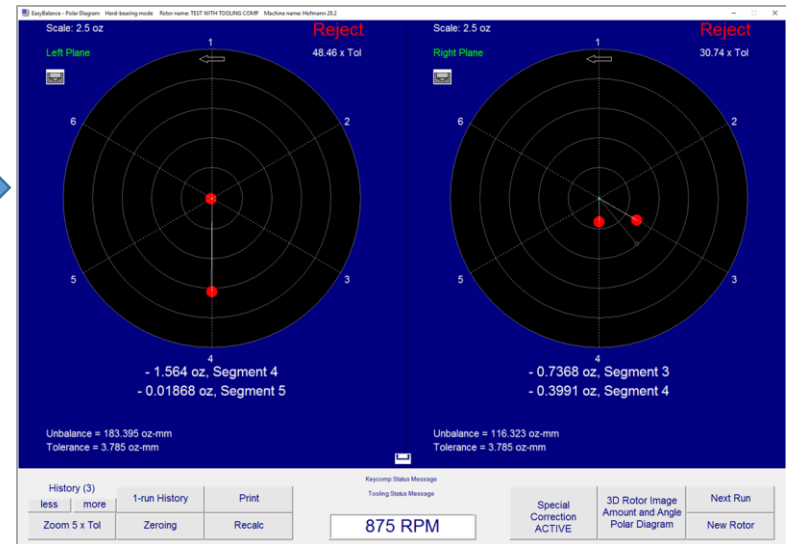
Left Plane:  Solid  
Static Plane:  Solid  
Right Plane:  Solid

Offset (Degrees) between Segment 1 and ZERO:   
Offset (Degrees):   
Offset (Degrees):

Exclusion areas Combine Weights Reset OK Cancel

Select Rotor  
Segments

Show Vector  
Split results



# Forbidden Places

## Exclusion Zones

EasyBalance - Exclusion Zones

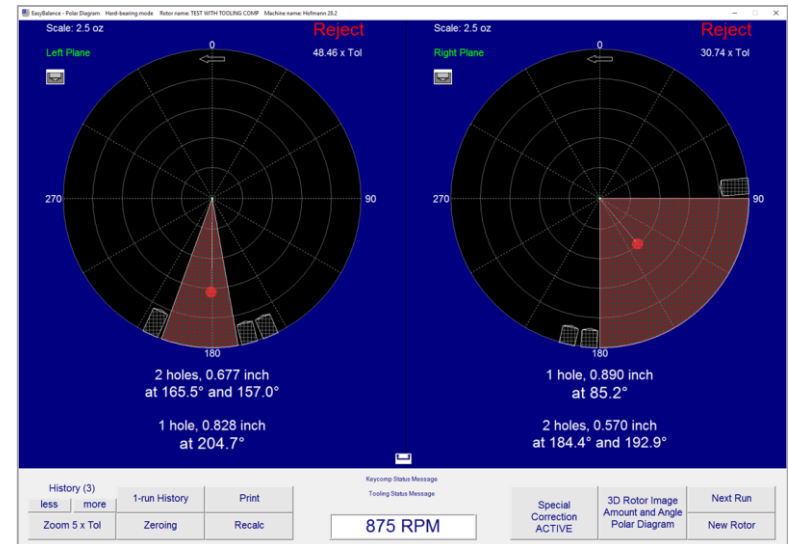
Define exclusion zones by beginning and ending angle

| Zone | Left Plane |      | Right Plane |      |
|------|------------|------|-------------|------|
|      | Begin      | End  | Begin       | End  |
| 1    | 0.0°       | 0.0° | 0.0°        | 0.0° |
| 2    | 170        | 200  | 90          | 180  |
| 3    | 0.0°       | 0.0° | 0.0°        | 0.0° |
| 4    | 0.0°       | 0.0° | 0.0°        | 0.0° |
| 5    | 0.0°       | 0.0° | 0.0°        | 0.0° |
| 6    | 0.0°       | 0.0° | 0.0°        | 0.0° |
| 7    | 0.0°       | 0.0° | 0.0°        | 0.0° |
| 8    | 0.0°       | 0.0° | 0.0°        | 0.0° |
| 9    | 0.0°       | 0.0° | 0.0°        | 0.0° |
| 10   | 0.0°       | 0.0° | 0.0°        | 0.0° |
| 11   | 0.0°       | 0.0° | 0.0°        | 0.0° |
| 12   | 0.0°       | 0.0° | 0.0°        | 0.0° |

Reset all OK Cancel

Define Exclusion  
Zones

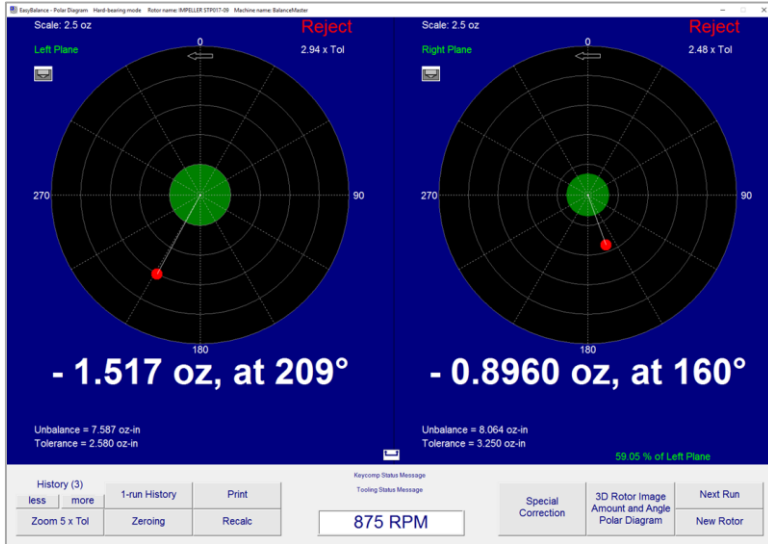
Show  
Correction  
Locations





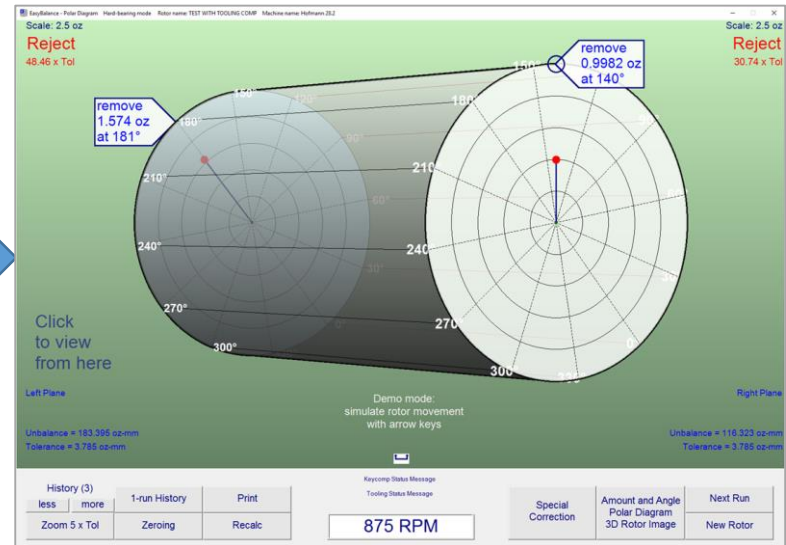
# I like it different

## 3D Rotor Image



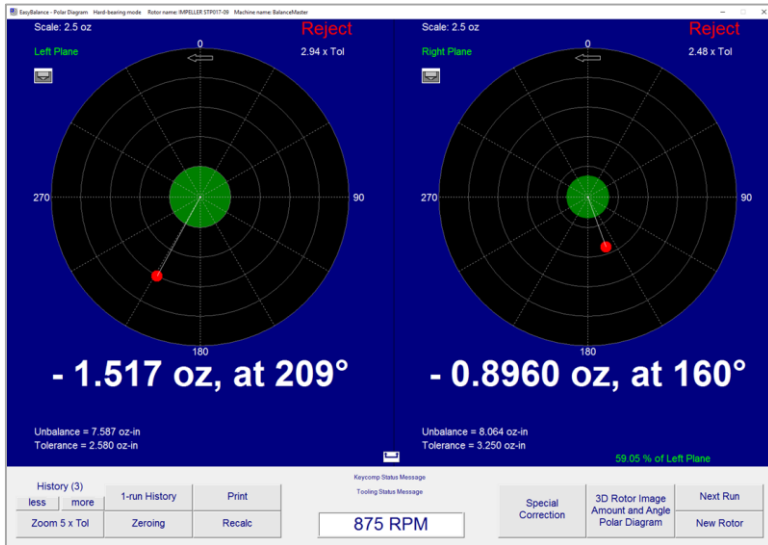
Click  
3D Rotor Image

Results are shown in a  
3D Rotor Image  
(Yes, it moves if  
you have an Encoder)



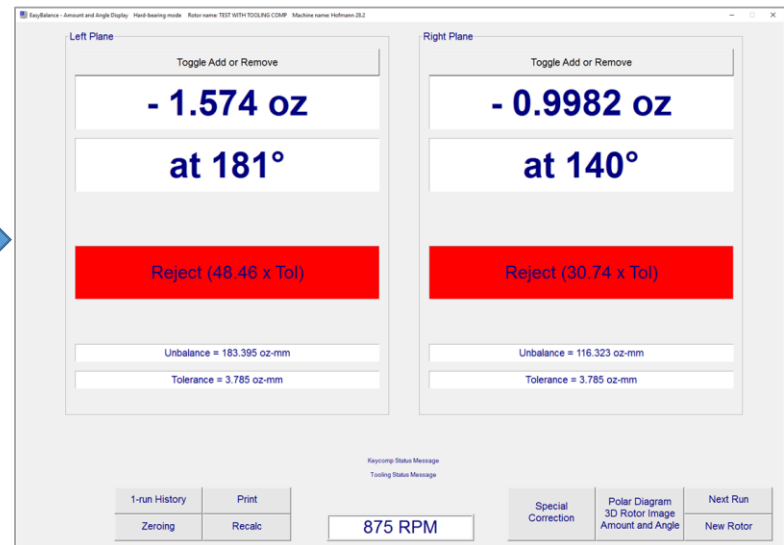
# I like it different

## Amount and Angle



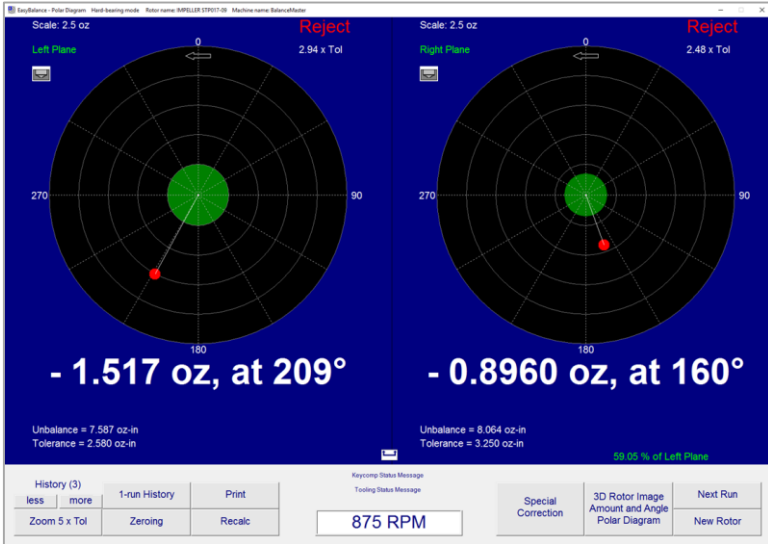
Click  
Amount and Angle

Results are shown in  
Large Numbers  
Amounts and Angles



I like it different

Multiple Run Averaging



Click  
Run History

Multi Run Averaging  
Include / Exclude individual runs  
Show Standard Deviation  
Continue with Result Average

Run History

Average calculated from 3 runs:

|                      | Left Plane         | Right Plane        |         |   |
|----------------------|--------------------|--------------------|---------|---|
|                      | + 0.40356 oz, 355° | + 0.08629 oz, 314° |         |   |
|                      |                    |                    | RPM     |   |
| Result 1 (youngest): | 0.2737 oz 352°     | 0.0152 oz 198°     | 875     | <input checked="" type="checkbox"/> Include |
| Result 2:            | 0.6646 oz 355°     | 0.0929 oz 310°     | 875     | <input checked="" type="checkbox"/> Include |
| Result 3:            | 0.2741 oz 1°       | 0.1739 oz 320°     | 875     | <input checked="" type="checkbox"/> Include |
| Result 4:            |                    |                    |         | <input type="checkbox"/> Include            |
| Result 5:            |                    |                    |         | <input type="checkbox"/> Include            |
| Result 6:            |                    |                    |         | <input type="checkbox"/> Include            |
| Result 7:            |                    |                    |         | <input type="checkbox"/> Include            |
| Result 8:            |                    |                    |         | <input type="checkbox"/> Include            |
| Result 9:            |                    |                    |         | <input type="checkbox"/> Include            |
| Result 10:           |                    |                    |         | <input type="checkbox"/> Include            |
| Result 11:           |                    |                    |         | <input type="checkbox"/> Include            |
| Result 12 (oldest):  |                    |                    |         | <input type="checkbox"/> Include            |
| max value:           | 0.6646 oz 354.8°   | 0.1739 oz 320.3°   | 875 RPM |   |
| min value:           | 0.2737 oz 0.6°     | 0.0152 oz 197.9°   | 875 RPM |   |
| Standard Deviation:  | 0.1842 oz 204.84°  | 0.0653 oz 67.10°   | 0.0 RPM |   |
| Standard Deviation:  | 21.4609 oz-mm      | 7.6505 oz-mm       |         |   |

[Delete all non-selected runs](#)
[Discard last run](#)
[Print to Paper](#)
[Print to File](#)
[Use Average](#)
[Continue](#)

# I'm a Neat Freak

## Clean up a Rotor

Combine weights

Left Plane

- 1.409 oz 159.9°

Left Plane

Same radii ☒

|             | Mass in oz | Angle | Radius in mm |
|-------------|------------|-------|--------------|
| Location 1  | 0.5        | 270   |              |
| Location 2  | 0.25       | 180   |              |
| Location 3  |            |       |              |
| Location 4  |            |       |              |
| Location 5  |            |       |              |
| Location 6  |            |       |              |
| Location 7  |            |       |              |
| Location 8  |            |       |              |
| Location 9  |            |       |              |
| Location 10 |            |       |              |
| Location 11 |            |       |              |
| Location 12 |            |       |              |

Right Plane

- 0.767 oz 207.5°

Right Plane

Same radii ☒

|  | Mass in oz | Angle | Radius in mm |
|--|------------|-------|--------------|
|  | 0.5        | 90    |              |
|  | 0.5        | 100   |              |
|  |            |       |              |
|  |            |       |              |
|  |            |       |              |
|  |            |       |              |
|  |            |       |              |
|  |            |       |              |
|  |            |       |              |
|  |            |       |              |
|  |            |       |              |

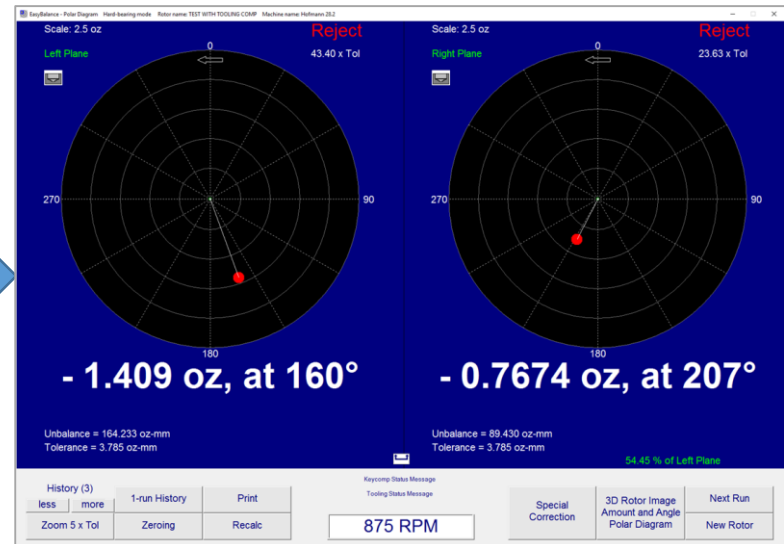
Combine

Accept

Cancel

Enter existing  
unbalance  
corrections...

and combine old and new  
corrections into one

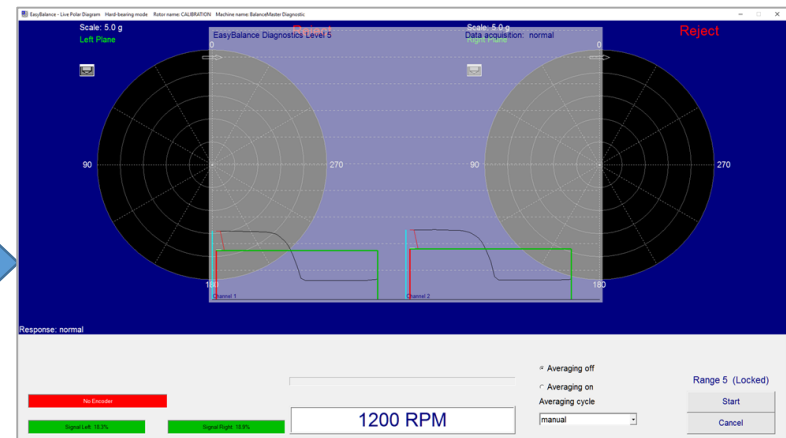


# The Doctor will see you now...

## Built-in Diagnostics



Directly look at Sensor signal strength  
Easily identify bad cables,  
bad sensors



Built-in multi-channel Oscilloscope:  
Raw signals and various filter stages  
Super-imposed over Live Results