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DyRoBeS© Manual | RotorBal

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Influence coefficient method is used in the balancing calculation. The theory is based on two papers:

- 1. Tessarzik, J. M., Badgley, R. H., and Anderson, W. J., 1972, Flexible Rotor Balancing by the Exact Point-Speed Influence Coefficient Method, ASME Journal of Engineering for Industry, Feb., 1972, pp 148-158.
- Lund, J. W. and Tonnesen, J., 1972, Analysis and Experiments on Multi-Plane Balancing of a Flexible Rotor, ASME Journal of Engineering for Industry, Feb., 1972, pp 233-242.

Since the least square method is used to solve the simultaneous equations, the Number of Measured Probes times the Number of Speed Points must be greater than or equal to the Number of Balancing Planes. (NsXNm>= Nb).

To use the influence coefficient method, no prior knowledge in rotor mode is required. However, trial weights are required to obtain the influence coefficients.

All the inputs are self-explanatory. They are briefly described below:

1. Number of Balancing Planes: Nb

The balancing planes are the planes along the rotor where the trial weights and balancing corrections are applied. Note that the trial weight can be **left-in** or **removed** after the trial run.

2. Number of Measured Probes: Nm

The measurement probes are where the vibrations are taken and recorded. The purpose of the balancing is to find the optimal balancing corrections at the balancing planes such that the vibrations at the measurement probes are minimized.

3. Number of Speeds/Cases: Ns

The number of speeds or cases allows for different speeds or cases, such as idle speed, full speed, full load, unloads, etc...

4. Runout Compensation

Runout can be included or excluded in this balancing calculation.

5. Comments

Up to 3 comment lines can be used to describe the system under study.

6. Graphic Data

The following graphic data are used for the graphic purposes which do not affect the calculation results. These data can be changed in the postprocessor if necessary.

6.1. Shaft Rotation: CCW or CW

6.2. Phase: Lag or Lead

Phase Lag indicates that the phase angle increases against the shaft rotation direction, and Phase Lead indicates that the phase angle increases with the shaft rotation direction.

6.3. 0 degree: Up or Right.

0 degree position defines the reference mark where all the angles (phases) are measured from

6.4. Number of Balancing Holes

To be used if the balance weight is to be divided into two holes.

6.5 1st Hole Angle

Phase angle of the first hole from the zero degree position. Measured according to Phase Lag or Phase Lead in 6.2.

6.6 Number Direction

The hole numbering direction can be either CCW or CW.

Balancing Calculation - Additional Input D	3
Shaft Rotation]
Phase C Lag	
0 degree at	
Balancing Holes	1
No. of Holes: 12 1st Hole Angle: 0	
Numbering Direction: C CCW 🤄 CW	
Hole (Balance) Split	
Frequently, the balancing weight can only be placed at certain locations. One vector can be decomposed into 2 independent vectors.	
Correction Angle: 146.39, Measured CCW	Lancei
Specified by Hole Numbers, or Angles	
1st Hole: 8 2nd Hole: 9	

7. Weighting Factors

Weighting factor allows one to strengthen or weaken the data from the measurement probes or speeds. For example, one may use higher weighting factors for the probes where the critical components are located and/or speeds where the rotor will be operated most of the time. Weighting factor zero indicates that the specific probe data will not be included in the calculation.

🛃 DyRo	BeS-RotorBal: C:	\1620\	Ch_9_Example_2_	TwoP laneBalanci	ingWithRunou	it.BAL				×
Numbe Numbe	Number of Balancing Planes: 2 Number of Speeds/Cases: 1 Shaft Rotation Number of Measured Probes: 2 Runout Compensation: Yes • CCW C Number					w Pł	ase Lag C Lead	0 degree -	at C X - Right	
Comme Comme	nt: Handbook of Ro nt: Handbook of Ro	otordynami otordynami	ics, Example 3.11, pp3.9 ics, Example 3.11, pp3.9		No. of Holes: 36 1st Hole Angle: 0 Numbering Direction: C CCW C CW					
Lomme	nt: Handbook of Ro	otoraynam	ics, Example 3.11, pp3.3 r	10	_	_	Weighti	ng (Scale) Facto	rs for probes ar	nd speeds
	Condition	Speed	Description	Amplitude	Phase (deg)		Probe	Factor	Speed	Factor
1	Runout		Probe: 1	0.5	272		1	1	1	1
2	Runout		Probe: 2	0.4	123		2	1	2	
3	Initial Readings	1	Probe: 1	1.8	148		3		3	
4	Initial Readings	1	Probe: 2	3.6	115		4		4	
5	Trial Run < 1 >		Remove Afterward 💌	4.9	120		5		5	
6	Response	1	Probe: 1	1.1	178		6		6	
7	Response	1	Probe: 2	2	98		7		7	
8	Trial Run < 2 >		Left-In Afterward 📃 💌	4.9	220		8		8	
9	Response	1	Probe: 1	2.1	98		9		9	
10	Response	1	Probe: 2	3.7	102		10		10	
11							11			
12							12		Nam	0
13							13		New	Upen
14							14			
15							15			
16							16		<u>S</u> ave	Save <u>A</u> s
17							17			
18							18		······	
19							19		<u>R</u> un	<u>C</u> lose
20						-	20		ši	







8. PostProcessor Graphic Data

The following graphic data are used for the graphic purposes which do not affect the calculation results. These data can be changed in the postprocessor if necessary.

8.1. Shaft Rotation: CCW or CW

8.2. Phase: Lag or Lead

Phase Lag indicates that the phase angle increases against the shaft rotation direction, and Phase Lead indicates that the phase angle increases with the shaft rotation direction.

8.3. 0 degree: Up or Right.

0 degree position defines the reference mark where all the angles (phases) are measured from

8.4. Number of Balancing Holes

To be used if the balance weight is to be divided into two holes. Any vector can be decomposed into two independent vectors.

8.5 1st Hole Angle

Phase angle of the first hole from the zero degree position. Measured according to Phase Lag or Phase Lead in 6.2.

8.6 Number Direction

The hole numbering direction can be either CCW or CW.

Balancing Calculation - Additional Input D 🔀
Shaft Rotation
Phase C Lag © Lead
Odegree at
Balancing Holes No. of Holes: 12 1st Hole Angle: 0
Numbering Direction: C CCW C CW



Example 1:

🛃 DyRo	BeS_RotorBal - I	nput Da	ıta								
Number of Balancing Planes: 2 Number of Speeds/Cases: 1 Number of Measured Probes: 2 Runout Compensation: Yes				S	Shaft Rotation Phase CLag CL						
Comment: Handbook of Rotordynamics, Example 3.11, pp3.90 Comment: Runout compensation is included							_		degree at	C X - Righ	t
Comme	nt: The first trial wei	ght is rem	oved afterward, 2nd	trial w	eight is left-in			Weighti	ng (Scale) Fact	tors for probes	and speeds
	Condition	Speed	Description		Amplitude	Phase (deg)		Probe	Factor	Speed	Factor
1	Runout		Probe: 1	_	0.5	272		1	1		1
2	Runout		Probe: 2		0.4	123		2	1	2	1 1
3	Initial Readings	1	Probe: 1		1.8	148		3		3	1
4	Initial Readings	1	Probe: 2		3.6	115		4		4	1
5	Trial Run < 1 >		Remove Afterward	-	4.9	120		5		5	1
6	Response	1	Probe: 1		1.1	178		6		6	1
7	Response	1	Probe: 2		2	98		7		7	
8	Trial Run < 2 >		Left-In Afterward	-	4.9	220		8		8	
9	Response	1	Probe: 1		2.1	98		9		9	
10	Response	1	Probe: 2		3.7	102		10		10	
11								11			
12								12		Nou	Open
13								13		<u>N</u> ew	Open
14								14			
15								15			Cause de l
16								16		<u>ave</u>	Jave As
17								17			
18								18			
19								19		<u>R</u> un	
20							•	20			







Handbook of Rotordynamics Example 3.11, pp 3.90 Runout Compensation is included The first trial weight is removed afterward, 2nd trial weight is left-in

```
***** Number of Speeds or Cases
                               1
                           :
****
     Number of Balancing Planes :
                               2
***** Number of Measurement Probes:
                               2
***** Runout (slow-roll vectors) *****
         Amplitude Phase Angle
  Probe
           0.50000
                        272.00
   1
   2
           0.40000
                        123.00
====== Initial Response (Without Trails) ======
  Speed Probe
                            Phase Angle
              Amplitude
   1
        1
                 1.8000
                             148.00
                  3.6000
                              115.00
   1
          2
Plane
          Amplitude Phase Angle Afterward
                      120.00
            4.9000
   1
                                 Remove
----- Response to Trial Unbalance ------
  Speed
        Probe Amplitude Phase Angle
                 1.1000
   1
          1
                             178.00
   1
          2
                   2.0000
                               98.000
```

			Lance Run.	2					
Plane	e	Amplitude	Phase Ar	ngle	Afterw	ard			
2		4.9000	220.0	00	Left-	In			
	Res	ponse to Tri	al Unbalar	nce		-			
Speed	d Pro	be Ampl	itude	Phas	e Angle				
1	1	2.	1000	9	8.000				
1	2	3.	7000	1	02.00				
*** WP	iahtina	Factors for	probes ar	nd sn	eeds ***				
Pro	obe	Weighting F	actor	ia op	eeub				
	1	1.0000)						
	2	1.0000)						
Spe	eed	Weighting F	'actor						
-	1	1.0000)						
-====== ///////	======= <		rroation						
Corro	< IOLA	I Balance CC	priection Palance the	>>>>>	~ <i>>>>></i>				
Dland	OLION R	Amplitude	Datalice the	a ROL	01				
1 1	e no.	7 4873	84 0	Angı 257	C				
1		1.4075	04.3	557					
2		5 3209	179	73					
2		5.3209	179.	.73					
2		5.3209	179.	.73					
2	<< Tri	5.3209 m Balance Co	179. prrection	.73	>>>>>				
2 <<<<<<< Corre	<< Tri ction R	5.3209 m Balance Co equired if T	179. prrection 'rial Weigh	.73 >>>> nt Le	>>>>> ft-in				
2 <<<<<<< Correc Trim B	<< Tri ction R Balance	5.3209 m Balance Cc equired if T = Total Bal	179. prrection Crial Weigh ance - Tri	.73 >>>> nt Le ial W	>>>>> ft-in eight				
2 <<<<<<< Correc Trim H Plane	<< Tri ction R Balance e No.	5.3209 m Balance Cc equired if T = Total Bal Amplitude	179. prrection Crial Weigh ance - Tri Phase	.73 >>>> nt Le ial W Angl	>>>>> ft-in eight e				
2 <<<<<< Corree Trim H Plane 2	<< Tri ction R Balance e No.	5.3209 m Balance Cc equired if T = Total Bal Amplitude 3.5402	179. Prrection Prial Weigh ance - Tri Phase 116.	.73 >>>> nt Le ial W Angl .28	>>>>> ft-in eight e				
2 Correc Trim H Planc 2	<< Tri ction R Balance e No.	5.3209 m Balance Co equired if T = Total Bal Amplitude 3.5402	179. Prrection Prial Weigh ance - Tri Phase 116.	.73 >>>> nt Le ial W Angl .28	>>>>> ft-in leight e				
2 Correc Trim I Plane 2	<< Tri ction R Balance e No.	5.3209 m Balance Co equired if T = Total Bal Amplitude 3.5402	179. Prrection Prial Weigh ance - Tri Phase 116.	.73 >>>> it Le ial W Angl .28	>>>>> ft-in leight e				
2 Correc Trim H Plane 2	<< Tri ction R Balance e No. =======	5.3209 m Balance Co equired if T = Total Bal Amplitude 3.5402	179. Prrection Prial Weigh ance - Tri Phase 116.	.73 >>>> nt Le ial W Angl .28 =====	>>>>> ft-in leight e				
2 Correc Trim I Plane 2	<< Tri ction R Balance e No. ======= *** Th	5.3209 m Balance Cc equired if T = Total Bal Amplitude 3.5402 	179. Prial Weigh ance - Tri Phase 116. Coefficier	.73 >>>> ht Le ial W Angl .28 =====	>>>>> ft-in /eight e 	***			
2 <<<<<<< Correc Trim I Plane 2 ********	<< Tri ction R Balance e No. ======= *** Th	5.3209 m Balance Cc equired if T = Total Bal Amplitude 3.5402 ====================================	179. Prial Weigh ance - Tri Phase 116. Coefficier Influe	.73 >>>> it Le ial W Angl .28 .28	>>>>> ft-in eight e ******** Coef.	***			
2 Correc Trim I Plane 2 ******* Trial	<< Tri ction R Balance e No. ======= *** Th -Run S	5.3209 m Balance Co equired if T = Total Bal Amplitude 3.5402 ====================================	179. prrection rial Weigh ance - Tri Phase 116. Coefficier Influe Amplituc	.73 >>>> it Le ial W Angl .28 ===== nts ence de	>>>>> ft-in leight e ******** Coef. Phase	***			
2 Correc Trim I Plane 2 	<< Tri ction R Balance e No. *** Th -Run S	5.3209 m Balance Co equired if T = Total Bal Amplitude 3.5402 ====================================	179. prrection rial Weigh ance - Tri Phase 116. Coefficier Influe Amplituc 0.20617	.73 >>>> ht Le ial W Angl .28 ===== hts ence de 7	>>>>> ft-in e e ******** Coef. Phase 175.	***			
2 Correc Trim I Plane 2 	<< Tri ction R Balance e No. *** Th -Run S	5.3209 m Balance Co equired if T = Total Bal Amplitude 3.5402 ====================================	179. prrection rial Weigh ance - Tri Phase 116. Coefficier Influe Amplituc 0.20617 0.36446 0.24007	.73 >>>> nt Le ial W Angl .28 ===== nts ence de 7 5	>>>>> ft-in e e ******** Coef. Phase 175. 194.	***			
2 Correc Trim I Plane 2 Trial- Trial- 1 2 2	<< Tri ction R Balance e No. ======= *** Th -Run S	5.3209 m Balance Co equired if T = Total Bal Amplitude 3.5402 =	179. prrection Prial Weigh ance - Tri Phase 116. Coefficier Influe Amplituc 0.20617 0.36446 0.34092 0.16007	.73 >>>> ht Le ial W Angl .28 ===== hts ence de 7 5	>>>>> ft-in deight e ********* Coef. Phase 175. 194. 182.	***			
2 Correc Trim I Plane 2 Trial- Trial- 1 1 2 2	<< Tri ction R Balance e No. ======= *** Th -Run S	5.3209 m Balance Co equired if T = Total Bal Amplitude 3.5402 =	179. prrection Prial Weigh ance - Tri Phase 116. Coefficier Influe Amplituc 0.20617 0.36446 0.34092 0.16986	.73 >>>> ht Le ial W Angl .28 ===== hts ence de 7 5 5	>>>>> ft-in deight e ********* Coef. Phase 175. 194. 182. 165.	***			
2 Correc Trim I Plane 2 Trial- Trial- 1 1 2 2	<< Tri ction R Balance e No. *** Th -Run S	5.3209 m Balance Co equired if T = Total Bal Amplitude 3.5402 ====================================	179. prrection Prial Weigh ance - Tri Phase 116. Coefficier Influe Amplituc 0.20617 0.36446 0.34092 0.16986	.73 >>>> ht Le ial W Angl .28 ence de 7 5 2 5	>>>>> ft-in deight e ********* Coef. Phase 175. 194. 182. 165.	***			
2 Correc Trim I Plane 2 Trial Trial 1 1 2 2	<< Tri ction R Balance e No. *** Th -Run S	5.3209 m Balance Co equired if T = Total Bal Amplitude 3.5402 ====================================	179. prrection Prial Weigh ance - Tri Phase 116. Coefficier Influe Amplituc 0.20617 0.36446 0.34092 0.16986 edicted Res	.73 >>>> ht Le ial W Angl _28 mts ence de 7 5 2 5 5 5 5 5	>>>>> ft-in deight e ********* Coef. Phase 175. 194. 182. 165.	***			
2 Correc Trim I Plane 2 Trial- 1 1 2 2	<< Tri ction R Balance e No. *** Th -Run S	5.3209 m Balance Co equired if T = Total Bal Amplitude 3.5402 ====================================	179. prrection Prial Weigh ance - Tri Phase 116. Coefficier Influe Amplituc 0.20617 0.36446 0.34092 0.16986 edicted Res WithOUT Ru	.73 >>>> ht Le ial W Angl .28 	>>>>> ft-in feight e ********* Coef. Phase 175. 194. 182. 165.	*** ***		Runout -	
2 Correc Trim I Plane 2 Trial Trial 1 1 2 2 Speed	<< Tri ction R Balance e No. *** Th -Run S	5.3209 m Balance Co equired if T = Total Bal Amplitude 3.5402 = e Influence peed Probe 1 1 1 2 1 1 1 2 = Amplit	179. prrection Prial Weigh ance - Tri Phase 116. Coefficier Influe Amplituc 0.20617 0.36446 0.34092 0.16986 edicted Res WithOUT Ru	.73 >>>> ht Le ial W Angl .28 ence de 7 5 2 5 5 5 5 5 5 5 5 5 5 5 5 5	>>>>> ft-in deight e ********* Coef. Phase 175. 194. 182. 165. l Respon Angle	 Ampli		Runout - Phase	Angle
2 Correc Trim I Plane 2 Trial- 1 1 2 2 Speed 1	<< Tri ction R Balance e No. 	5.3209 m Balance Co equired if T = Total Bal Amplitude 3.5402 = e Influence peed Probe 1 1 1 2 1 1 1 2 = Amplit 0.000	179. prrection Prial Weigh ance - Tri Phase 116. Coefficier Influe Amplituc 0.20617 0.36446 0.34092 0.16986 edicted Res WithOUT Ru uude H	.73 >>>> ht Le ial W Angl .28 ence de 7 5 5 5 5 5 5 5 5 5 6 6 6 7 5 6 6 7 5 6 6 7 6 6 7 7 5 6 6 7 7 6 6 7 7 7 7 7 7 7 7 7 7 7 7 7	>>>>> ft-in feight e ********* Coef. Phase 175. 194. 182. 165. l Respon Angle 000	==== **** use ==== Ampli 0.50	With tude	Runout - Phase 272	Angle .00

Example 2:

5 DyRo	BeS_RotorBal - I	nput Da	ta							×
Numbe Numbe	r of Balancing Planes r of Measured Probes	: 2 : 2	Number of Speed	s/Cases: 6 ensation: No	-	ſ	Shaft Rotatio	on C CW	Phase C Lag	C Lead
Comme	nt: Example from RI	DTORBAL	. Example 5.3.2 - 70 MW (Gas Turbine	_		_0	degree at]
Comme	nt: Example from RI	DTORBAL	. Example 5.3.2 - 70 MW (Gas Turbine				Y · Up	🔘 X - Right	
Comme	nt: Example from RI	DTORBAL	. Example 5.3.2 - 70 MW (Gas Turbine			Weighti	ing (Scale) Fact	ors for probes an	d speeds
	Condition	Speed	Description	Amplitude	Phase (deg)		Probe	Factor	Speed	Factor
1	Initial Readings	1	Probe: 1	1.7	339		1	1		1
2	Initial Readings	1	Probe: 2	4.6	54		2	1	2	1
3	Initial Readings	2	Probe: 1	2.8	226		3		3	1
4	Initial Readings	2	Probe: 2	6.7	10		4		4	1
5	Initial Readings	3	Probe: 1	3.9	145		5		5	1
6	Initial Readings	3	Probe: 2	3.7	333		6		6	1
7	Initial Readings	4	Probe: 1	4.5	103		7		7	
8	Initial Readings	4	Probe: 2	4.7	302		8		8	
9	Initial Readings	5	Probe: 1	5.4	74		9		9	
10	Initial Readings	5	Probe: 2	6.5	113		10		10	
11	Initial Readings	6	Probe: 1	1.98	98		11			
12	Initial Readings	6	Probe: 2	5.7	114		12		Nau	0
13	Trial Run < 1 >		Left-In Afterward 👘 💌	20	359		13		New	Open
14	Response	1	Probe: 1	2.6	313		14			
15	Response	1	Probe: 2	5.9	7		15			
16	Response	2	Probe: 1	3.9	232		16		<u>S</u> ave	Save <u>A</u> s
17	Response	2	Probe: 2	4.4	4		17			
18	Response	3	Probe: 1	4.2	160		18		[
19	Response	3	Probe: 2	2.8	340		19		<u>R</u> un	<u>C</u> lose
20	Response	4	Probe: 1	3.5	120	-	20		<u></u>	



Example from ROTORBAL Example 5.3.2 - 70 MW Gas Turbine 2 probes at 6 speeds No runout

**** ***** ****	Number of Number of Number of	Speeds or Cases Balancing Planes Measurement Probe	: 6 : 2 es: 2
****	NO Runout	Compensation	
	Initial 1	Response (Without	Trails) =====
Spee	ed Probe	Amplitude	Phase Angle
1	1	1.7000	339.00
1	2	4.6000	54.000
2	1	2.8000	226.00
2	2	6.7000	10.000
3	1	3.9000	145.00

3 4 5 5 6 6	2 1 2 1 2 1 2	3.700 4.500 4.700 5.400 6.500 1.980 5.700	0 3: 0 10 0 30 0 70 0 11 0 99 0 11	33.00 03.00 02.00 4.000 13.00 3.000 14.00
********* Plane 1	**** Tri Ampli 20.	al Unbalan tude P 000	ce Run: 1 hase Angle 359.00	************* Afterward Left-In
Speed 1 2 2 3 4 4 5 5 6 6	Response Probe 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 2	to Trial Amplitu 2.600 5.900 4.400 4.200 2.800 3.500 5.400 4.100 3.700 1.500 3.100	Unbalance Phase de Phase 0 3: 0 7 0 2: 0 4 0 1: 0 3: 0 1: 0 3: 0 1: 0 3: 0 1: 0 3: 0 1: 0 3: 0 1: 0 9: 0 1: 0 9:	e Angle 13.00 .0000 32.00 .0000 60.00 20.00 20.00 25.00 3.000 7.000 41.00 9.000
********* Plane 2	**** Tri Ampli 10.	al Unbalan tude P 000	ce Run: 2 hase Angle 270.00	************** Afterward Left-In
Speed 1 2 2 3 3 4 4 5 5 6 6	Response Probe 1 2 1 2 1 2 1 2 1 2 1 2 1 2 2 1 2 2	to Trial Amplitu 1.800 4.300 3.100 3.400 3.200 1.900 2.400 4.400 2.400 3.500 1.020 3.110	Unbalance Phase de Phase 0 3: 0 1: 0 2: 0 9 0 1: 0 3: 0 1: 0 3: 0 1: 0 3: 0 1: 0 1: 0 1: 0 1: 0 1: 0 1:	e Angle 19.00 5.000 44.00 .0000 07.00 29.00 22.00 30.00 1.000 01.00 70.00 04.00
*** Weigh Probe 1 2 Speed 1 2 3 4 5	ting Fact Weig Weig	ors for pr hting Fact 1.0000 hting Fact 1.0000 1.0000 1.0000 1.0000 1.0000	obes and spe or or	eeds ***
6 Correcti Plane N 1 2	Total Bal on Requir o. Amp 26 20	1.0000 ance Corre red to Bala blitude 5.867 5.639	ction >>>> nce the Roto Phase Angle 347.83 267.30	 >>>> or e
<ccccccccccccccccccccccccccccccccccccc< td=""><td>Trim Bal on Requir ance = Tc o. Amp 8. 10</td><td>ance Corre red if Tria tal Balanc blitude 2159 </td><td>ction >>>> l Weight Le: e - Trial We Phase Angle 319.71 264.77</td><td>>>>>>> ft-in eight e</td></ccccccccccccccccccccccccccccccccccccc<>	Trim Bal on Requir ance = Tc o. Amp 8. 10	ance Corre red if Tria tal Balanc blitude 2159 	ction >>>> l Weight Le: e - Trial We Phase Angle 319.71 264.77	>>>>>> ft-in eight e

4	*******	The Inf	luence	Coefficients	******	****	
				Influence	Coef.		
	Trial-Run	Speed	Probe	Amplitude	Phase		
	1	1	1	0.65281E-0	1 279.		
	1	1	2	0.21766	317.		
	1	2	1	0.57655E-0	1 248.		
	1	2	2	0.11846	202.		
	1	3	1	0.54915E-0	1 228.		
	1	3	2	0.49103E-0	1 134.		
	1	4	1	0.77078E-0	1 242.		
	1	4	2	0.10636	26.		
	1	5	1	0.65130E-0	1 258.		
	1	5	2	0.15575	313.		
	1	6	1	0.67568E-0	1 230.		
	1	6	2	0.14110	312.		
	2	1	1	0.83143E-0	1 210.		
	2	1	2	0.17475	257.		
	2	2	1	0.10809	105.		
	2	2	2	0.10554	258.		
	2	3	1	0.34210	118.		
	2	3	2	0.10027	271.		
	2	4	1	0.11046	26.		
	2	4	2	0.10867	214.		
	2	5	1	0.18221	359.		
	2	5	2	0.32108E-0	1 318.		
	2	6	1	0.78362E-0	1 12.		
	2	6	2	0.27106E-0	1 279.		
_							
===			== Pre	edicted Residu	al Respo	nse ======	
				WithOUT Runou	t	V	With Runout
	Speed Pro	obe	Amplit	ude Phas	e Angle	Amplitud	de Phase Angle
	1	1	1.09	968 31	0.43	1.0968	3 310.43
	1 :	2	2.60)67 35	8.29	2.606	358.29
	2	1	2.87	744 25	7.03	2.8744	1 257.03
	2 :	2	1.79	963 40	.778	1.7963	40.778
	3	1	4.85	509 66	.019	4.8509	66.019
	3 :	2	0.735	525 31	7.09	0.73525	5 317.09
	4	1	1.60)51 15	4.41	1.6051	154.41
	4	2	4.32	282 34	1.01	4.3282	341.01
	5	1	0.550)31 34	3.11	0.55031	343.11
	5 2	2	2.10)98 11	4.00	2.1098	3 114.00
	6	1	1.63	347 20	7.09	1.6347	207.09
	6	2	2.09	997 11	8.93	2.0997	118.93
===							

Example 3:

🛃 DyRo	BeS_RotorBal - I	nput Da	ıta							X
Numbe Numbe	r of Balancing Planes r of Measured Probes	: 2 : 4	Number of Spe Runout Con	eds/Cases: 2	- -	[Shaft Rotati © CCW	on / CCW	Phase © La	g 🔿 Lead
Comme	nt: W501 Gas Turb	ine 108 M	W					I degree at		_
Comme	nt: 2 Speeds, 3070	DO RPM	-		Y · Up	C X - Right				
Comme	nt: 4 Probes and 21	Balancing	Planes			-	Weigh	ting (Scale) Fac	tors for probes a	nd speeds
	Condition	Speed	Description	Amplitude	Phase (deg)		Probe	Factor	Speed	Factor
1	Initial Readings	1	Probe: 1	1.1	143		1	1		1
2	Initial Readings	1	Probe: 2	3.7	268		2	1.2	2	1.2
3	Initial Readings	1	Probe: 3	1.7	287		3	1.1	3	
4	Initial Readings	1	Probe: 4	0.8	156		4	1	4	
5	Initial Readings	2	Probe: 1	3.7	98		5		5	
6	Initial Readings	2	Probe: 2	7.5	41		6		6	
7	Initial Readings	2	Probe: 3	3.9	1		7		7	
8	Initial Readings	2	Probe: 4	4.2	209		8		8	
9	Trial Run < 1 >		Left-In Afterward 📃 🗖	19.5	185		9		9	
10	Response	1	Probe: 1	2.5	70		10		10	
11	Response	1	Probe: 2	1.9	216		11			
12	Response	1	Probe: 3	2.9	23		12		New	0
13	Response	1	Probe: 4	1.9	216		13		<u>N</u> ew	<u>Upen</u>
14	Response	2	Probe: 1	2.5	2		14			
15	Response	2	Probe: 2	6.8	350		15			
16	Response	2	Probe: 3	9.4	359		16		<u>S</u> ave	Save <u>A</u> s
17	Response	2	Probe: 4	6.3	202		17			
18	Trial Run < 2 >		Left-In Afterward 📃	7.4	70		18		[1
19	Response	1	Probe: 1	2.3	301		19		<u>R</u> un	<u>C</u> lose
20	Response	1	Probe: 2	4.4	216	-	20		ن	



W501 Gas Turbine 108 MW 2 Speeds, 3070 RPM, 3600 RPM 4 Probes and 2 Balancing Planes

****	Number	of Spee	eds or	Cases	:	2	
****	Number	of Bala	ancing	Planes	:	2	
****	Number	of Meas	sureme	nt Probe	es:	4	
****	NO Runo	ut Comp	pensat	ion			
	Initia	l Respo	onse (N	Without	Trai	ls)	
Spee	ed Pro	be	Ampl	itude	Pha	ase	Angle
1	1		1.	1000		143	3.00
1	2		з.	7000		268	3.00
1	3		1.	7000		287	1.00
1	4		0.8	0000		156	5.00
2	1		3.	7000		98.	000

2 2 2	2 3 4	7.5 3.9 4.2	5000 9000 2000	41 1. 20	L.000 .0000)9.00	
********** Plane 1	**** Tri Ampli 19.	al Unbal tude 500	ance Ru Phase 185	un: 1 Angle 5.00	Afterwa Left-I	***** rd n
Speed 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2	Response Probe 1 2 3 4 1 2 3 4 4 **** Tri Ampli	to Tria Ampli 2.5 1.9 2.9 1.9 2.5 6.8 9.4 6.3 al Unbal tude	al Unba: tude 5000 9000 9000 9000 5000 8000 8000 8000	lance - Phase 70 21 23 21 2. 35 20 20 21 2. 35 20 20 21 2. 35 20 20 21 2. 35 20 20 21 2. 35 20 20 21 2. 35 20 21 2. 35 20 20 21 2. 20 21 2. 20 20 20 20 20 20 20 20 20 20 20 20 20	Angle 0.000 6.00 6.00 0000 50.00 59.00 02.00	***** rd
2 Speed	7.4 Response Probe	000 to Tria Ampli	70 al Unbal tude	.000 lance - Phase	Left-I Angle	n
1 1 1 2 2 2 2 2	1 2 3 4 1 2 3 4	2.3 4.4 2.5 0.80 1.7 5.6 5.3 3.8	3000 5000 7000 5000 7000 5000 8000	30 21 29 13 12 35 34 18	01.00 16.00 94.00 89.00 2.000 55.00 14.00 81.00	
*** Weight Probe 1 2 3 4	ting Fact Weig	ors for hting Fa 1.0000 1.2000 1.1000 1.0000	probes actor	and spe	eeds ***	
Speed 1 2	Weig	hting Fa 1.0000 1.2000	actor			
Correction Plane No 2	Fotal Bal on Requir o. Amp 21 9.	ance Cor ed to Ba litude .356 3609	rrection alance f Phas 13	n >>>>> the Roto se Angle 34.01 3.616	>>>> or e	==
<<<<< Correction Trim Bala Plane No 1 2	Trim Bal on Requir ance = To o. Amp 17 8.	ance Cor ed if Tr tal Bala litude .665 1048	rrection rial We ance - 1 Phas 74 32	n >>>>> ight Lef Irial We se Angle 4.947 24.12	>>>>> Et-in eight e	==
******** Before	The Inf e applica	luence (tion of	Coeffic: Weight: Inf	ients '	******** Cors	**
Trial-Run 1 1 1 1 1 1 1 1 2 2	n Speed 1 1 1 2 2 2 2 1 1	Probe 1 2 3 4 1 2 3 4 1 2 2	Amplii 0.124 0.150 0.180 0.239 0.231 0.282 0.112 0.585 0.337	tude 406 077 008 732E-01 984 737 226 241 558 784	Phase 219. 294. 227. 56. 125. 95. 173. 3. 204. 146.	

	2	1	3	0.51293	174.		
	2	1	4	0.25519	350.		
	2	2	1	0.11851	92.		
	2	2	2	0.17773	78.		
	2	2	3	0.60743	127.		
:	2	2	4	0.41498	338.		
			=== Predict	ed Residu	al Respon	se ========	
			With	NOUT Runou	t	With	Runout
Speed	Probe		Amplitude	Phas	e Angle	Amplitude	Phase Angle
1	1		3.9669		.648	3.9669	49.648
1	2		1.9065	34	8.46	1.9065	348.46
1	3		2.2628	79	.442	2.2628	79.442
1	4		0.22558	30	5.47	0.22558	305.47
2	1		1.8109	9.	5156	1.8109	9.5156
2	2		1.8740	1.8740 232		1.8740	232.93
2	3		3.3169) 159.79		3.3169	159.79
2	4		1.8632	30.989		1.8632	30.989
		====					