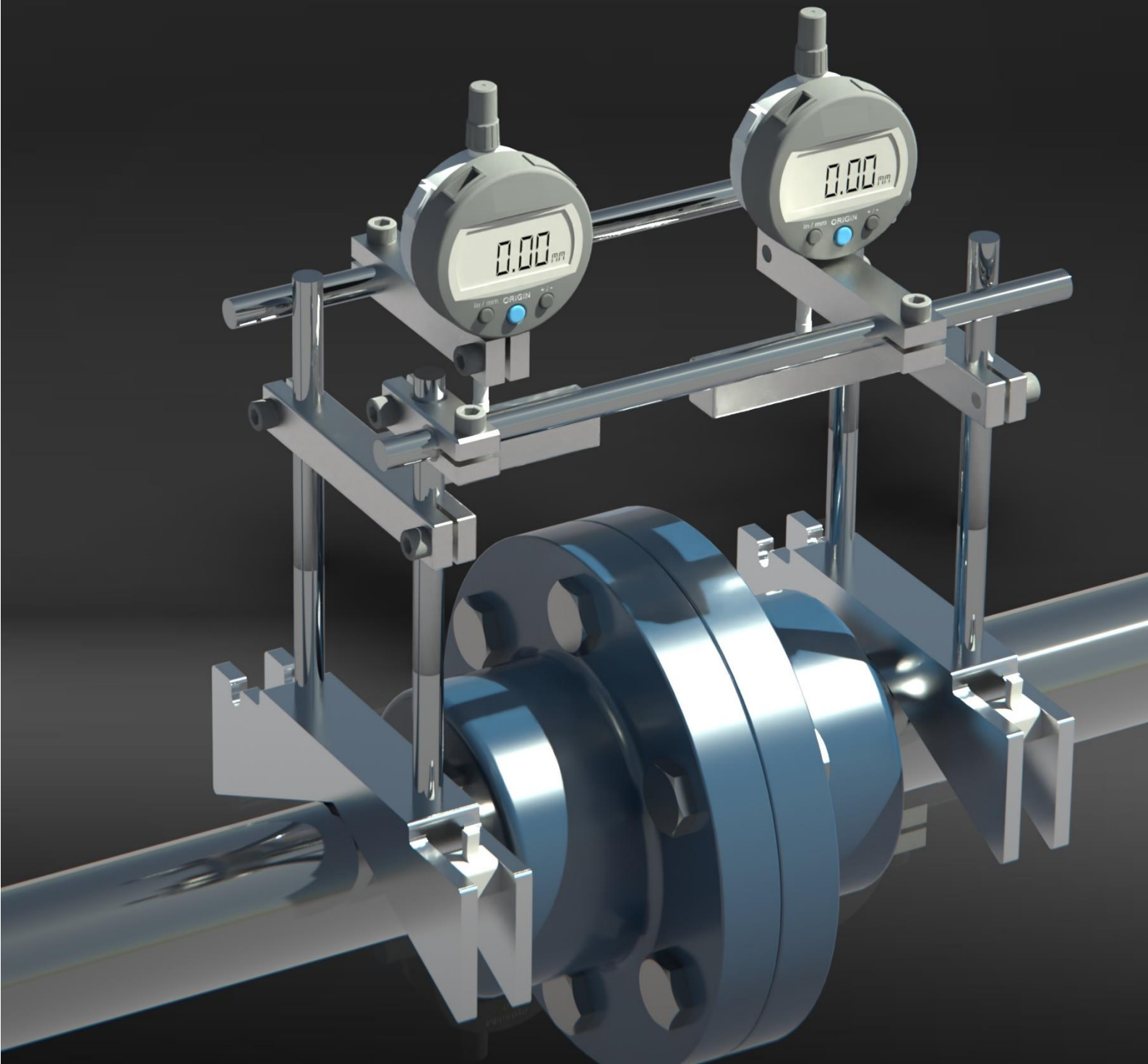


Shaft Alignment Tool

User Guide

Rev 01

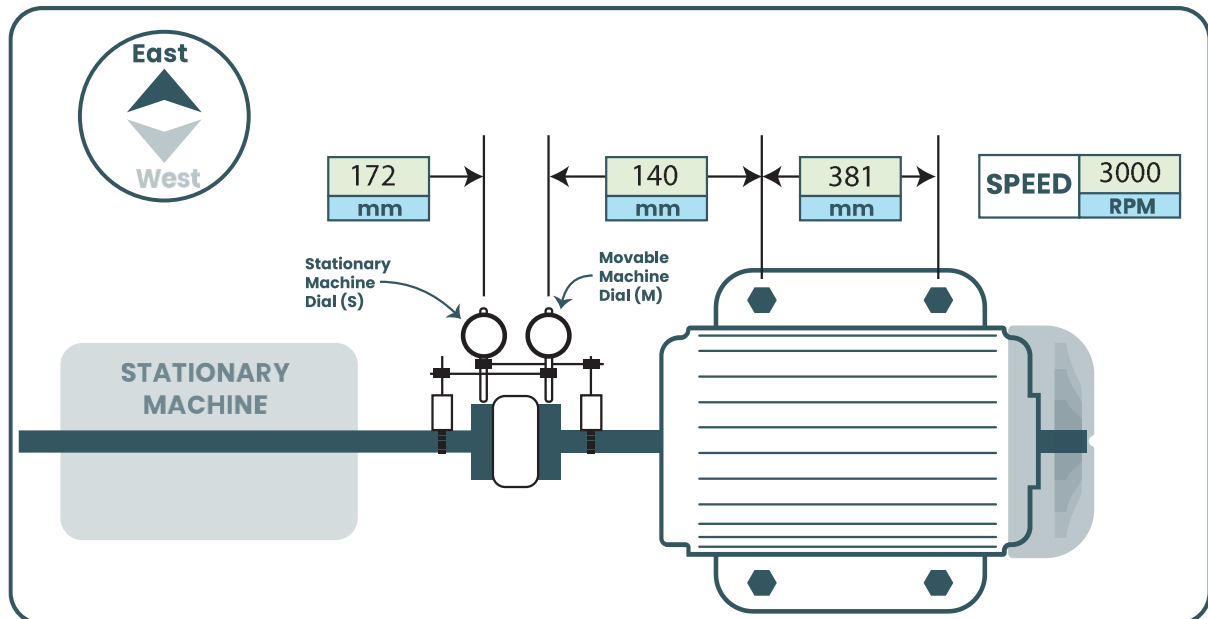


Shaft Alignment Using “The Reverse Indicator Method” or



Step#01: System Dimensions and Speed:

Measure the system dimensions as shown in the picture below. It shows the **top view** of a system. The Movable machine (to which the alignment move will apply) is a motor which is on the right side. It also shows the **East** and **West** directions. The **East** and **West** direction indicated here are **NOT** the **Geographic East** and **Geographic West**. Notice that the **East** direction is on the **front** when **motor** is to the **right**.

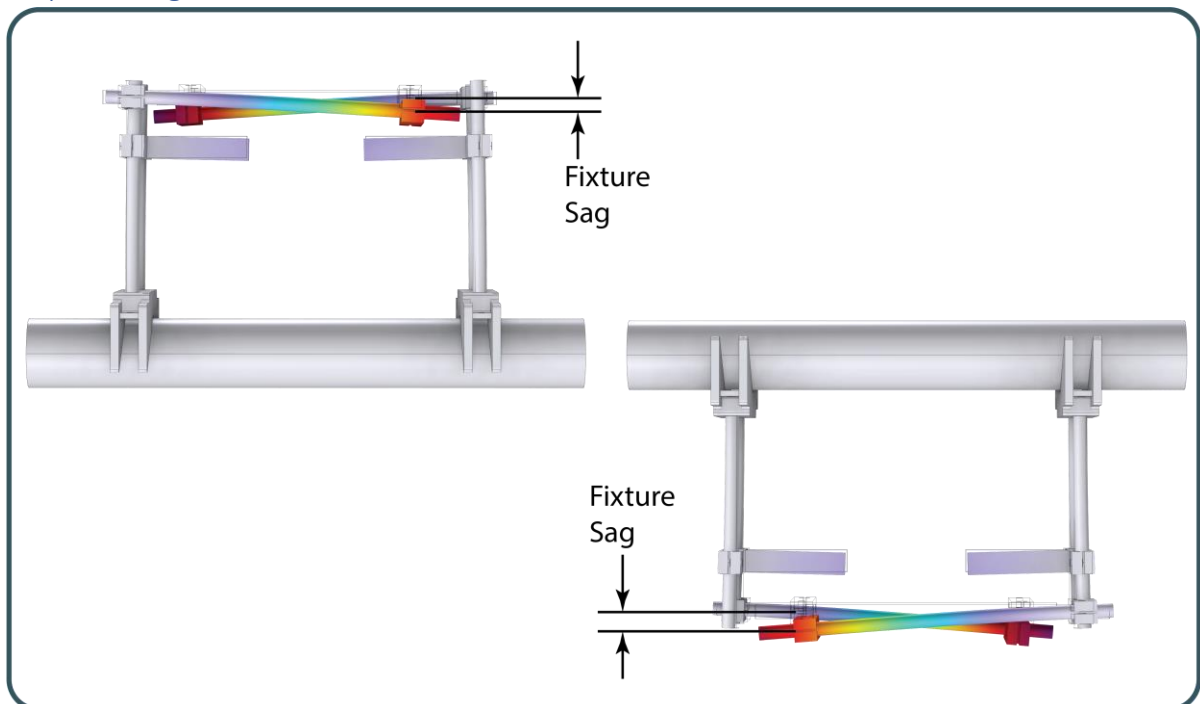


There are **three (03)** required dimensions

1. Distance between the Stationary Machine Dial (S) and the Movable Machine Dial (M).
2. Distance between the Movable Machine Dial (M) and the Movable Machine's **Inbound feet**.
3. Distance between the Movable Machine's **Inbound feet** and **Outbound feet**.

The **speed of rotation** (RPM) is also required for the alignment to be assessed against the standard.

Step#02: Sag Measurement



Sag Measurement is the most crucial step in accurately measuring the amount of misalignment. The fixture sag is induced due to earth's gravitational pull and must be accounted for, for the correct calculation of misalignment from the dial readings. The fixture sag value can be somewhere between 0 and 1mm depending upon the mounting lengths of the fixture.

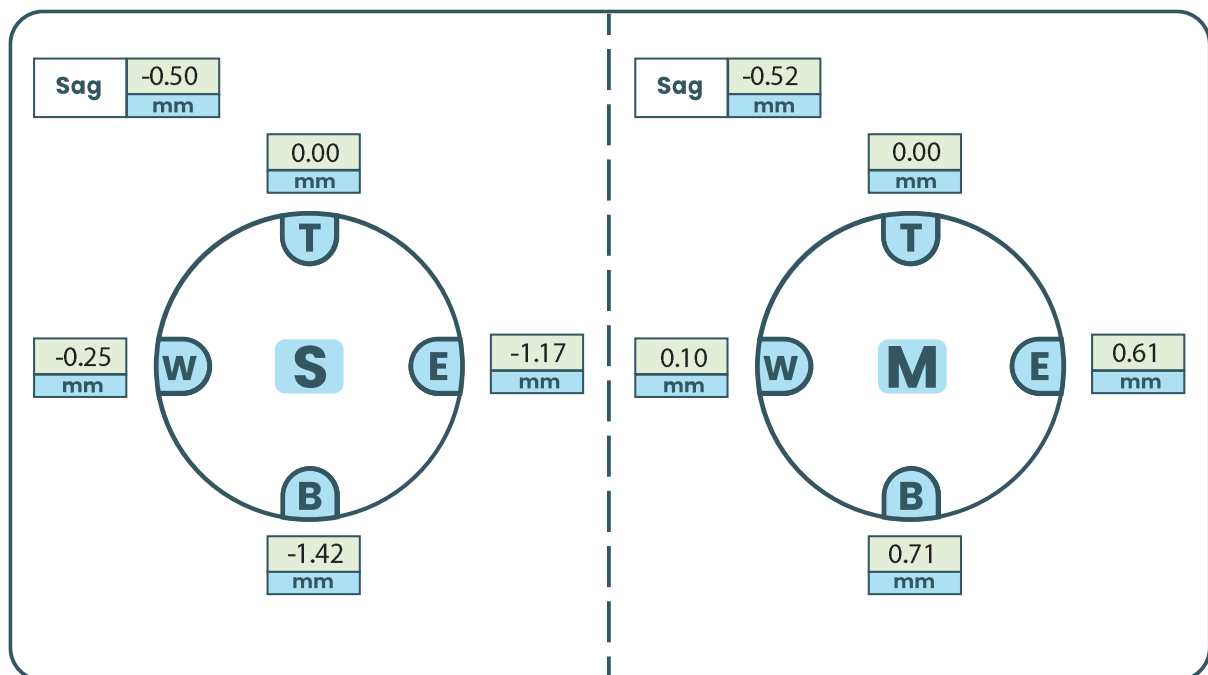
To measure the fixture sag, unmount the fixture from the system and mount it on a steel pipe without changing the fixture length as shown below.



Turn the fixture upside down and note the total indicated negative readings on both dials.

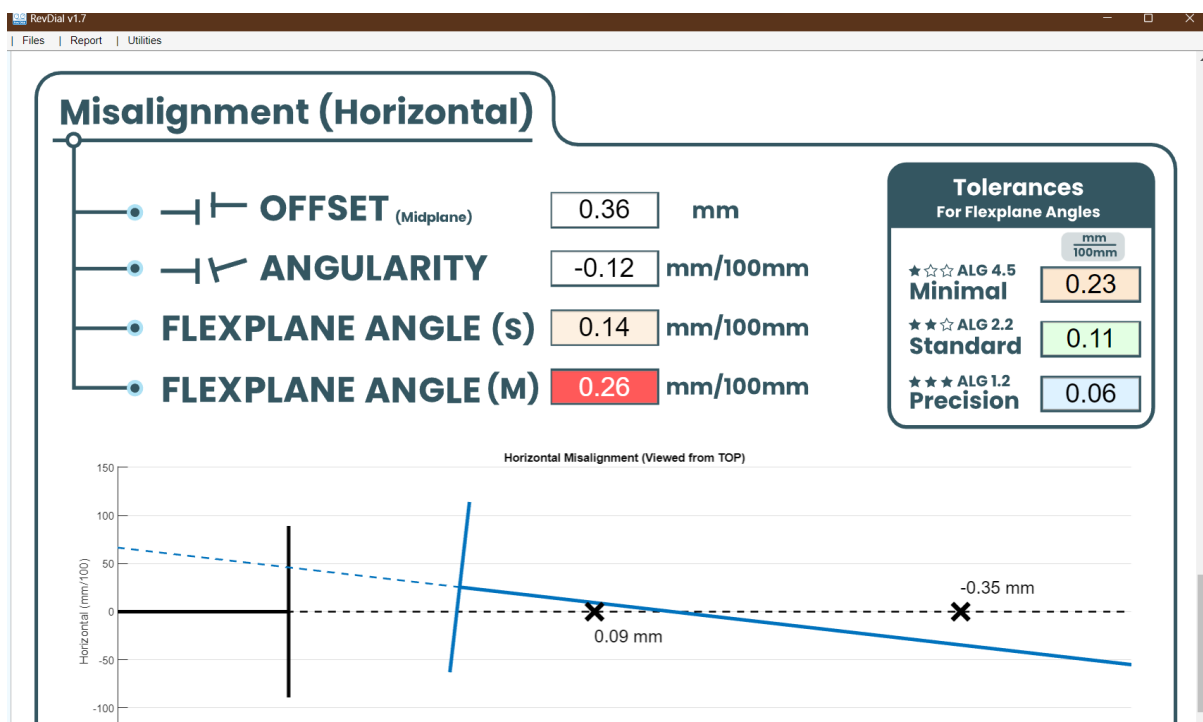
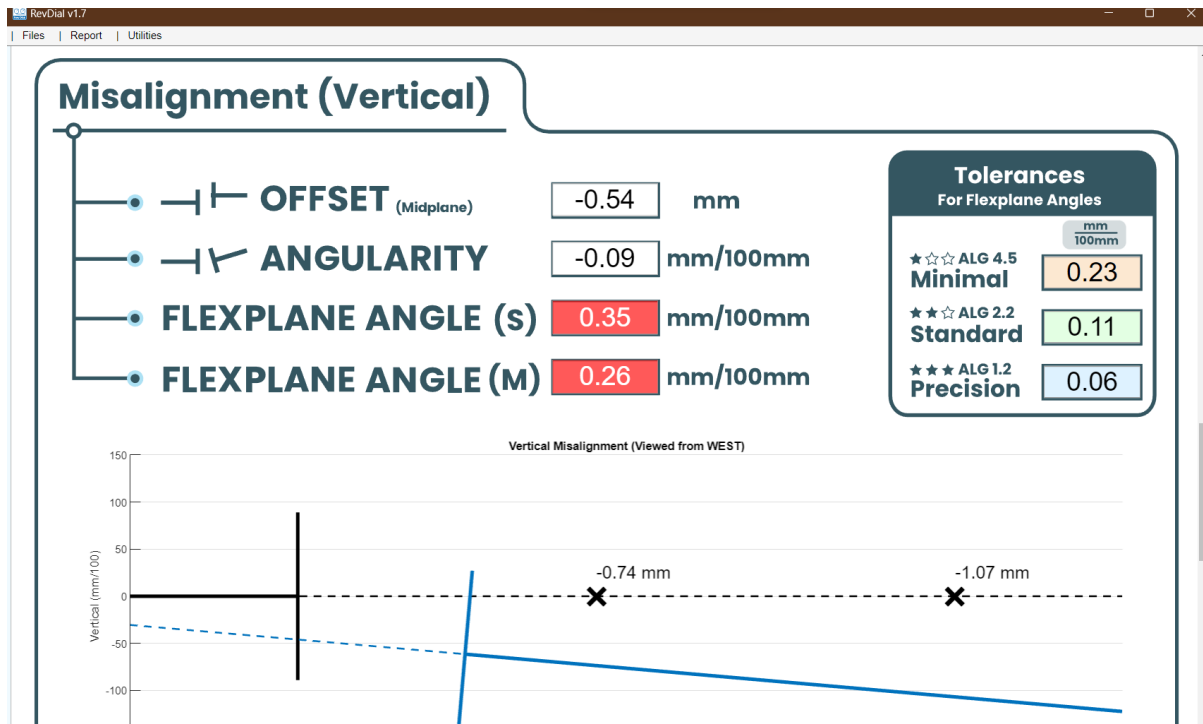
Step#03: Take Indicator Readings

1. Attach the alignment brackets firmly to shafts
2. Zero the indicators at the TOP position.
3. Slowly rotate the shaft and bracket arrangement through 90-degree intervals stopping at the EAST, BOTTOM, and WEST positions. Record each reading (plus or minus). The bottom readings can be skipped and can be obtained as $B = E + W - T$
4. Return to the TOP position to see if the indicators re-zero.
5. In case the zero is lost, re-tighten the fixture and repeat the measurement process.



Step#04: Calculate the Misalignment and Alignment Move

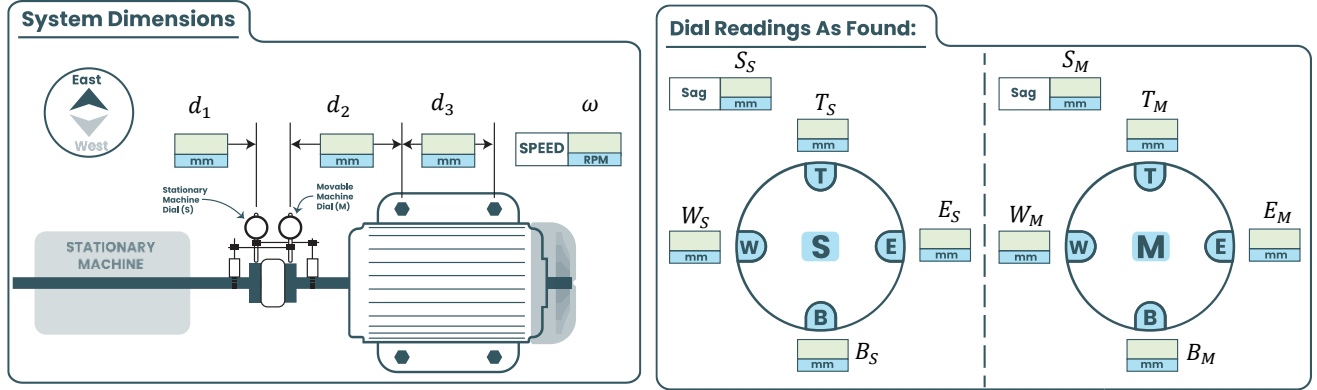
The misalignment can be calculated using the RevDial software or manually using the formulae given in appendix-A. Following are some snapshots of RevDial software showing the amount of misalignment and the corrective alignment move.



Appendix A

Formulae for Reverse Dial Method:

Required Values:



Calculated Values:

Misalignment (Vertical)

	OFFSET (Midplane)	O_V	$\frac{B_S - T_S - S_S}{2} + \frac{A_V \times d_1}{200}$	mm
	ANGULARITY	A_V	$\left(\frac{-B_S + T_S - B_M + T_M + S_S + S_M}{2d_1} \right) \times 100$	mm/100mm
	FLEXPLANE ANGLE (S)	$FPA_{V,S}$	$\left \frac{B_S - T_S - S_S}{2 \times d_1} + \frac{A_V}{100} \right \times 100$	mm/100mm
	FLEXPLANE ANGLE (M)	$FPA_{V,M}$	$\left \frac{B_S - T_S - S_S}{2 \times d_1} \right \times 100$	mm/100mm

Position of Movable Machine at Inbound feet:

$$\frac{A_V}{100} \times \left(\frac{d_1}{2} + d_2 \right) + O_V$$

Position of Movable Machine at Outbound feet:

$$\frac{A_V}{100} \times \left(\frac{d_1}{2} + d_2 + d_3 \right) + O_V$$

Misalignment (Horizontal)

•  OFFSET (Midplane)	O_H	$\frac{W_S - E_S - S_S}{2} + \frac{A_V \times d_1}{200}$	mm
•  ANGULARITY	A_H	$\left(\frac{-W_S + E_S - W_M + E_M + S_S + S_M}{2d_1} \right) \times 100$	mm/100mm
• FLEXPLANE ANGLE (S)	$FPA_{H,S}$	$\left \frac{W_S - E_S - S_S}{2 \times d_1} + \frac{A_V}{100} \right \times 100$	mm/100mm
• FLEXPLANE ANGLE (M)	$FPA_{H,M}$	$\left \frac{W_S - E_S - S_S}{2 \times d_1} \right \times 100$	mm/100mm

Position of Movable Machine at Inbound feet:

$$\frac{A_H}{100} \times \left(\frac{d_1}{2} + d_2 \right) + O_H$$

Position of Movable Machine at Outbound feet:

$$\frac{A_H}{100} \times \left(\frac{d_1}{2} + d_2 + d_3 \right) + O_H$$