

## TechNote #34 ROTALIGN®

### ROTALIGN®ment of cardan shafts using Cardan Bracket ALI 2.893SET

#### Introduction

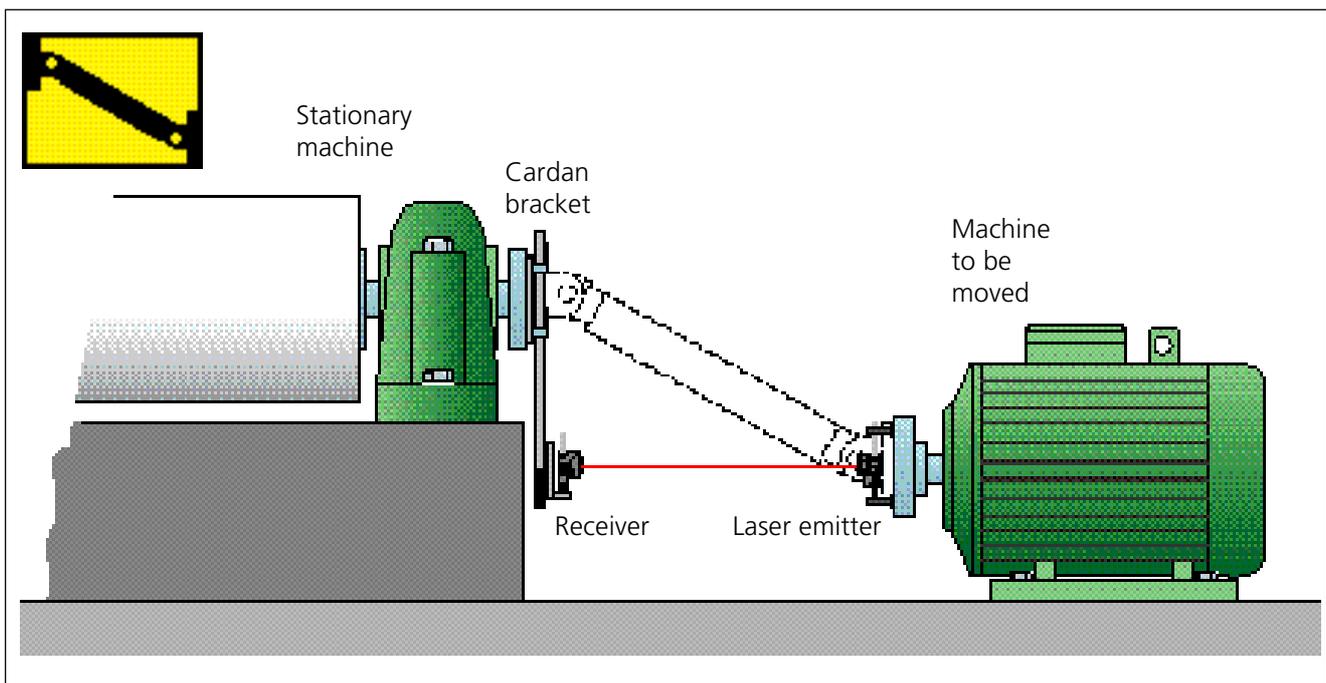
This technical note describes the alignment of two machines joined via a cardan spacer shaft. No matter by conventional methods, accurate cardan shaft alignment is made easy by the ROTALIGN laser-optical alignment system in conjunction with the Cardan Bracket ALI 2.893SET.

Cardan shafts are normally installed with the spacer shaft set at a considerable angle (usually  $4^\circ$  to  $6^\circ$ ) in order to ensure sufficient lubricant circulation, which in turn prevents the universal joints from seizing. Excessive misalignment of such a configuration leads to rapid fluctuation of the driven shaft RPM during operation, which holds particularly grave consequences for electronically-controlled synchronous and asynchronous AC drive motors.

Precise alignment reduces the rotational irregularities of the cardan shaft to a minimum, so that the uneven bearing loading during cardan shaft rotation is also minimized, the service life of the components is extended and the chance of unexpected machine failure is reduced.

The amount of offset measured between the two sensors can be included as alignment target values so that the standard ROTALIGN displays corrections based purely upon angularity misalignment, which is the only concern with cardan shafts. ROTALIGN PRO features a special cardan shaft alignment function which does not require this alignment target entry.

The measurement procedure described in this note allows precise measurement even when a large amount of offset is present between the two machines – even over great measurement distance (up to 10 m / 33 ft.).



Cardan shaft ROTALIGNment: the laser receiver is mounted on the non-rotatable coupling using the ALI 2.893SET bracket.

**Procedure**

1) Mount the faceplate on the coupling using the bolts supplied. The bracket is usually mounted on the coupling face of the non-rotatable shaft, for example, the roll in a paper mill.

Two different mounting arrangements are available:

1a) If the shaft end or coupling face has a threaded hole in its center, the easiest and most rigid mounting method is to use the large center bolt as shown at right. A thread adapter may be used as shown to fit the center bolt to larger bores.

1b) The coupling bolt holes may be used for three-point mounting using the square-headed M10 bolts as shown at right. If the coupling face has a raised rim, the precision machined spacers are used as shown in order to separate the bracket faceplate from the coupling face. (Without the spacers, there would be no direct contact between the faceplate and the coupling surface surrounding the bolt holes – exactly the location where the faceplate and coupling are being joined.)

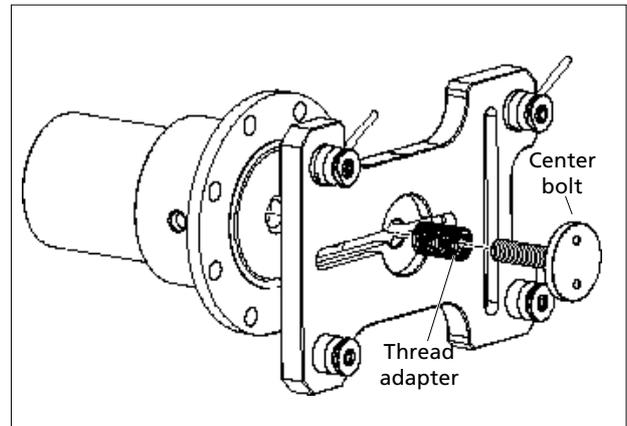
The washers prevent the nuts from marking the coupling surface when tightened.

See the parts list for exact sizes supplied with the bracket kit.

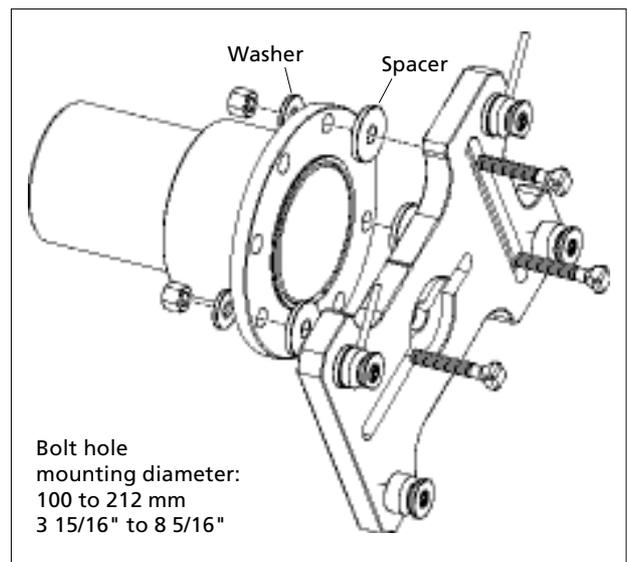
Before tightening down the bolts, use an inclinometer or spirit level to position the face plate at the same angle as the cardan shaft when installed (usually horizontal or vertical; see page 1). A design drawing from the machine manufacturer can be helpful in determining the intended horizontal and/or vertical offset between the machine coupling halves. The inclination can be calculated from these horizontal and vertical distances as follows:

$$\text{inclination} = \arctan \frac{\text{vertical offset}}{\text{horizontal offset}}$$

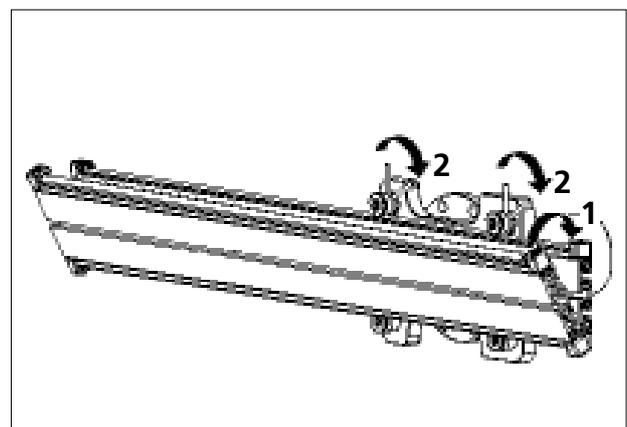
2) Place the slide in the faceplate as shown, then use the two levers (top) to tighten the slide into place.



Faceplate mounting using the center bolt



Bolt hole mounting diameter: 100 to 212 mm 3 15/16" to 8 5/16"



Mount the slide (1), then lock the faceplate levers (2).

# PRÜFTECHNIK AG - Shaft alignment

## ROTALIGN® TechNote - page 3

3) Make sure that the spacer clips are mounted at the bottom of the receiver holder support posts. Slide the receiver all the way onto the posts. (Do not tighten its yellow locking knobs until the laser beam has been adjusted in Step 6 below.)

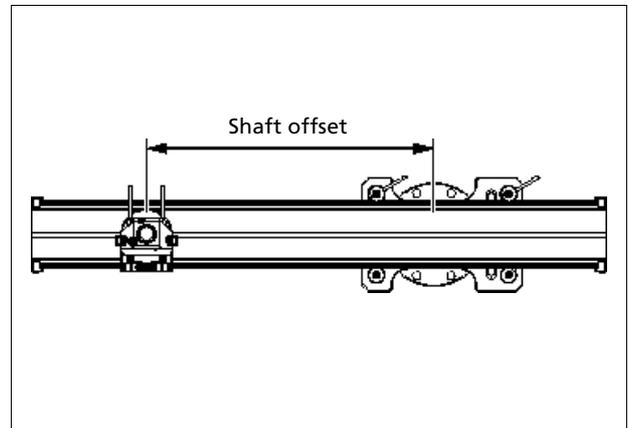
4) Position the receiver holder on the slide so that it is located directly across from the coupling center of the other machine: as in Step 1, consult the machine manufacturer's specification to determine the correct shaft offset distance indicated in the drawing at right.

5) Use a magnetic bracket (such as the ALI 2.106 bolt hole bracket) to attach the laser emitter facing outward from the face of the other coupling (see illustration on page 1).

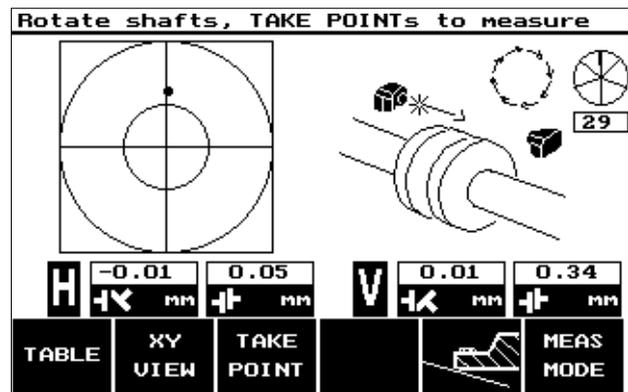
6) Switch on the laser and use its thumbwheels to adjust the beam onto the target of the receiver dust-cap (rough machine alignment may be necessary). When correctly adjusted, the beam spot should remain stationary on the target when the laser shaft is rotated. Tighten down the receiver holder thumbwheel to lock it onto the slide, then tighten down the receiver locking knobs.

7) Take alignment readings using the Multipoint mode with the standard ROTALIGN. (ROTALIGN PRO users please refer to the corresponding Tech Note for different instructions regarding that version).

Rotate the receiver holder into measurement position first, then turn the laser-side shaft and observe the detector view in the measurement screen (right): at the moment when the laser dot crosses the Y axis, press the TAKE POINT softkey to register the reading.



Set the receiver holder to equal the offset between shafts.



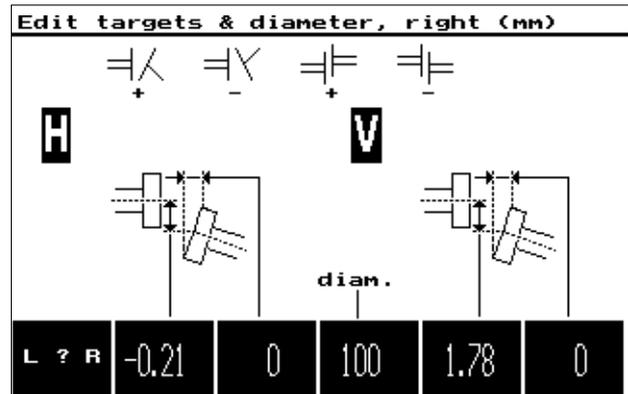
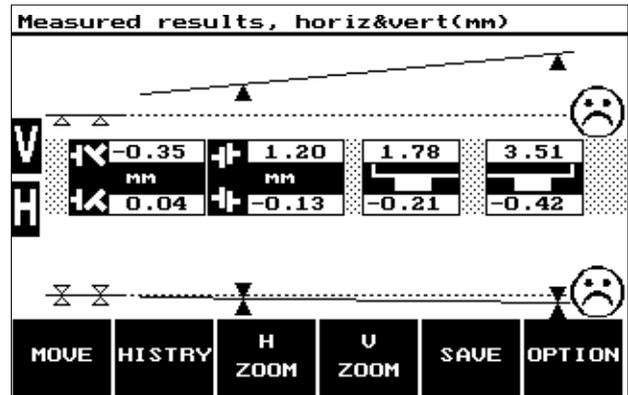
**Results**

Shaft offset is not a consideration for cardan shaft alignment, and so only angularity corrections are needed. With the standard ROTALIGN, the front foot correction values must be copied from the results screen and entered as desired alignment targets; the results screen will then show only the corrections needed to correct angular misalignment between the two machines.

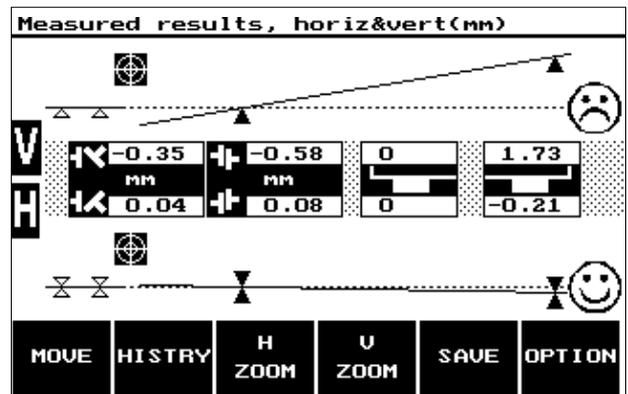
For example, if the standard ROTALIGN displays the results shown at right:

Note the values 1.78 and -0.21 for coupling offset in the vertical and horizontal, respectively.

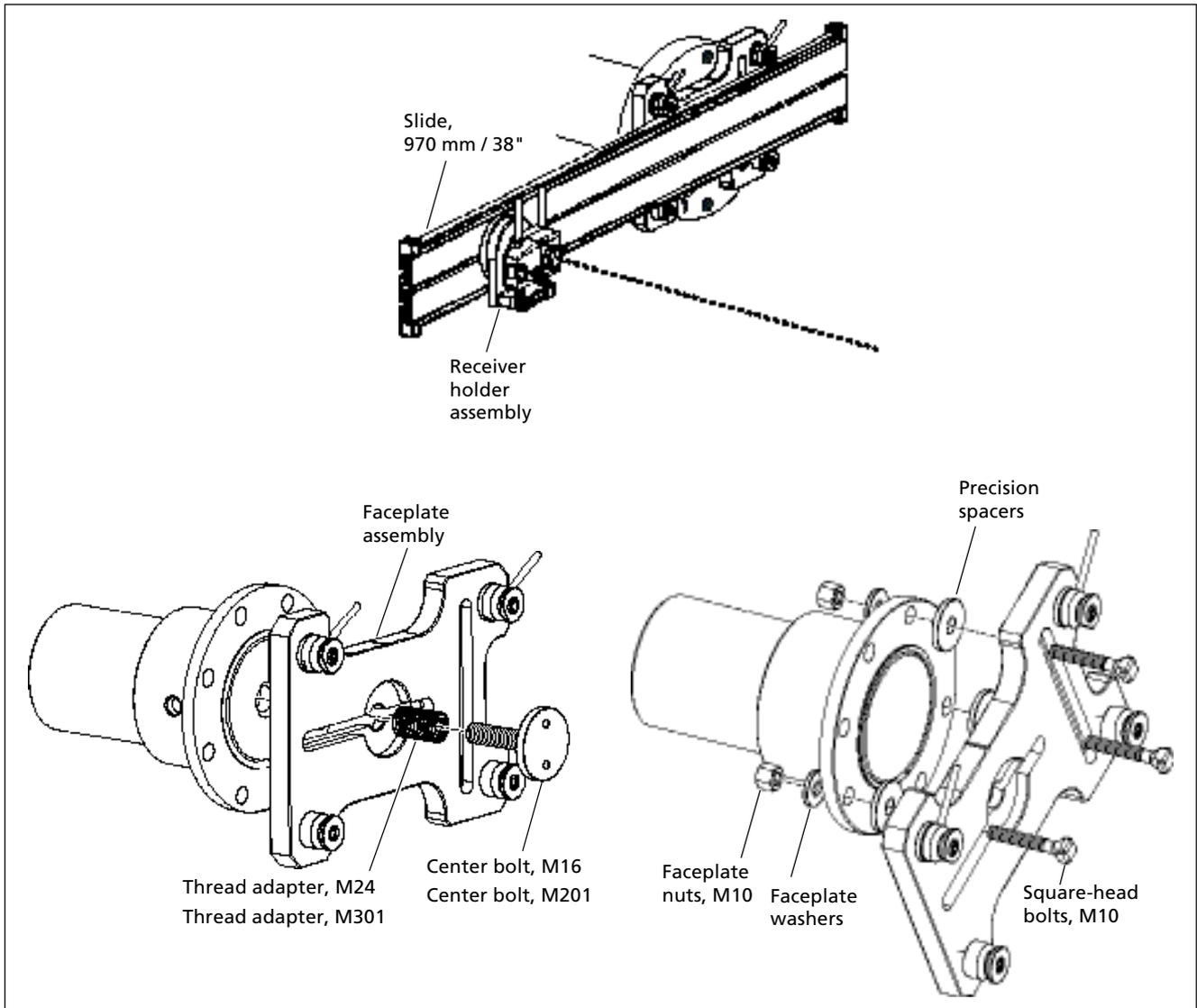
Press the  key and select 'Coupling targets', then 'Targets'. Enter the amounts 1.78 and -0.21 for vertical and horizontal coupling offset as shown in the screen at right :



Return to the results display with  . The screen then shows the proper corrections for cardan shaft alignment, i.e. only for angularity correction:



**Parts included with Cardan Bracket ALI 2.893SET**



Also included (not shown):  
 Hex key, SW5, angled  
 Hex key, SW4, angled  
 Hex key, SW1.5, angled  
 Center bolt wrench  
 Heavy-duty flight case w/ contoured foam insert

Case dimensions approx. 1350 x 420 x 55 mm  
 approx. 53" x 16 1/2" x 6"  
 Weight, with all bracket parts: approx. 21 kg / 46 lb.

Consult the OPTALIGN/ROALIGN Product Catalog (ALI 9.300, available free of charge) for complete details on other brackets and system accessories!

