TECH NOTE 5

Rev 0.1 Ludeca, Inc. • Miami, Florida No.5

Horizontal Moves Limitations (HO-)

Bolt Bound?

Need only a few thousands to get into alignment?

Use Optalign targets and let Optalign recalculate your moves!

You might find out that a small move in the opposite direction will get you in the ball park!

This note will help you obtain the best alignment possible when the MTBM becomes bolt-bound (BB). The alternatives to better the alignment in the horizontal plane are not as straight forward as for the vertical plane since we could be bolt-bound at *either* foot in *either direction*. For the vertical correction, it is assumed that we can always make positive corrections (add shims) where as this might not be the case in the horizontal plane. Thus, prior to deciding which way to move to correct misalignment, several factors must be considered. These factors are, the misalignment at coupling, the suggested Optalign foot corrections, which foot has the limitation and the allowable tolerances.

Considering the factors mentioned above, it is possible to calculate an intentional misalignment based on the allowable tolerances and the shaft position (Optalign's coupling results). The calculated intentional misalignment (targets) will then be entered into the Optalign, to obtain the new feet corrections. For simplicity purposes the limitations are treated in two different ways:

When Horizontal Offset is positive, denotes HO(+).

When Horizontal Offset is negative, denotes HO(-).

This note refers to HO(-) **only**.

Overview

When moving the MTBM toward alignment if it becomes bolt-bound, tighten the hold down bolts, take new alignment readings and record feet corrections and coupling results.

From the coupling results, the suggested feet correction, the known feet movement limitations and allowable tolerances, Optalign targets are calculated and entered to obtain new feet corrections.

Summary

With negative horizontal offset HO(-), we can have three cases as such:

Case 1: HO(-) and HA(-) or HA (0), or HA(+) smaller than tolerance, and:

Both front and back feet must be moved toward 3 o'clock.

Case 2: HO(-), HA(-), and:

Front foot must be moved toward 3 o'clock and back foot must be moved toward 9 o'clock.

Case 3: HO(-), HA(-), and:

Both front and back feet must be moved toward 9 o'clock.

Note

If the calculated results do not bring machine into tolerances, the base must be corrected to bring machines into alignment.

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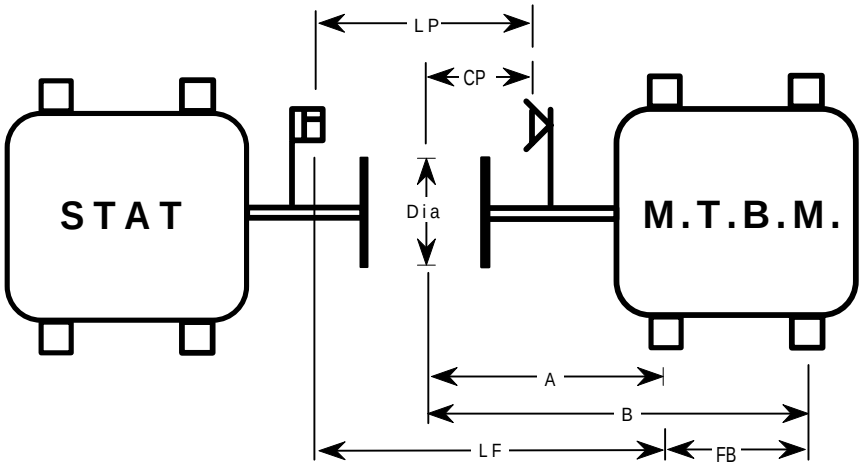
Dimensions are defined in the sketch for use in the calculations.

LP = Laser-to-prism
LF = Laser-to-front foot
FB = Front-to-back foot
CP = Coupling center-to-prism
DIA = Coupling diameter



A = Coupling-center to-front foot
A = LF - LP + CP
B = Coupling-center to-back-foot
B = A + FB

Optalign Results
HO = Horizontal Offset
HA = Horizontal Angularity
HF = Horizontal Front Move
HB = Horizontal Back Move

Optalign Targets
VOt = Vertical Offset target
HOt = Horizontal Offset target
VAt = Vertical Angularity target
HAt = Horizontal Angularity target
-HA$_{max}$ = Maximum negative allowable horizontal angularity

(BB) = Bolt bound in the direction of correcting alignment
(OK) = can be moved

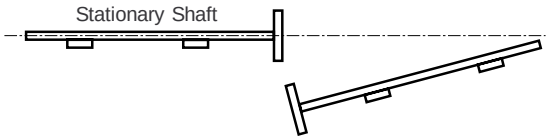
Initiate alignment check following Alignment Recording Form (01-688-02). Carry out alignment correction. If, when moving to correct horizontal misalignment, the machine becomes bolt-bound (BB) then:

Tighten hold down bolts, take new alignment readings, record feet corrections and coupling results.

Case 1: HO(-) and HA(-), or HA(0), or HA (+) smaller than tolerance

Both feet must be moved **toward 3 o'clock.**

Bolt-bound *both* front and back feet.



a) Decide from tolerance maximum allowable gap (positive) for 10" DIA (HA_{max}).

b) Calculate HOt

$HOt = ((HA_{max} \times A) \div 10) - (HF))$

1) [⊏⊐], ENT, ENT

2) Enter VOt = 0 0, ENT

3) Enter HOt = value calculated in "b", ENT

4) Enter VAt = 0 0, ENT

5) Enter HAt = (HA_{max}), ENT

6) RUN

7) Record new feet corrections

HF = 0 HB = optimum

8) Make move, recheck alignment.

Example 1:

LP = 6 inch LF = 15 inch
FB = 16 inch CP = 3
Dia = 10"

Optalign Results:
HO = -8 HF = 5
HA = -2.5 HB = 1

If 1800 RPM:
A = 15 - 6 + 3 = 12

Max. positive gap allowed = 3.0

$HOt = (3.0 \times 12 \div 10) - 5$
$= 3.6 - 5 = -1.4 \approx -1.5$ mils

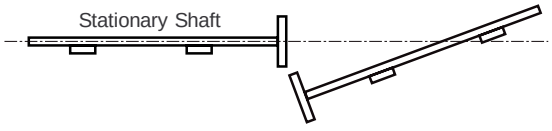
Optalign Targets:
VOt = 0 HOt = -1.5
VAt = 0 HAt = 3.0

New corrections read from Optalign
HF = 0 HB = -9

Case 2: HO(-) & HA(-)

Front foot must be moved **toward 3 o'clock** (Optalign correction positive).

Back foot must be moved **toward 9 o'clock** (Optalign correction negative).



Three conditions:

a) FF(BB) BF(BB) Can't improve
b) FF(BB) BF(OK) Similar to case1
c) FF(OK) BF(BB)

Example Case 2b:

Same dimensions as example 1

Optalign results:

HO = -10 HF = 5
HA = -4.5 HB = -2
FF (BB) BF (OK)

If 1800 RPM

HAmax = 3.0

HOt = (3.0 × 12 ÷ 10) - 5
= 3.6 - 5 = -1.4 ≈ -1.5 mils

Optalign Targets:

VOt = 0 HOt = -1.5
VAt = 0 HAt = 3.0

New Feet Corretions:

HF = 0 HB = -12

(BB) = Bolt bound in the direction of correcting alignment.

(OK) = Can be moved

Case 2c

1) Enter VOt = 0 0, ENT
2) Enter HOt = Max (+) allowable offset. ENT
3) Enter VAt = 0 0, ENT
4) Enter HAt = 10 × (HB + HOt) ÷ B (remember HB is *negative*.), ENT
5) RUN

Be careful to observe proper sign usage.

Example Case 2c:

Same dimensions as example 1

Optalign Results:

HO = -8 HF = 2
HA = -5 HB = -6

If 1800 RPM

B = 12 + 16 = 28

HOt = 2.0

HAt = 10 × (-6 + 2) ÷ 28 = -1.5

Optalign Targets:

VOt = 0 HOt = 2.0
VAt = 0 HAt = -1.5

New Feet Corrections:

HF = 6 HB = 0

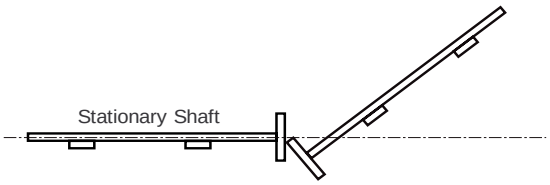
6) Record new feet corrections

HF = optimum HB = 0

7) Make move, recheck alignment

Case 3: HO(-) & HA(-)

Both front and **back feet** must be moved **toward 9 o'clock** (Optalign correction negative).



a) FF(OK) BF(BB) Similar to case 2c
b) FF(BB) BF(BB) Similar to case 2c
c) FF(BB) BF(OK) then,

1) Enter VOt = 0 0, ENT
2) Enter HOt = Max (+) allowable offset. ENT
3) Enter VAt = 0 0, ENT
4) Enter HAt = (10 × (HF + HOt)) ÷ A (remember HF is *negative*), ENT
5) RUN
6) Record new feet corrections

HF = 0 HB = optimum

7) Make move, recheck alignment

Example Case 3c:

Same dimensions as example 1

HO = -3 HF = -5
HA = -7 HB = -16

If 1800 RPM

A = 15 -6 + 3 = 12

HOt = 2.0

HAt =10 × (-5 + 2) ÷ 12 = -2.5

Optalign Targets:

Dia = 12

VOt = 0 HOt = 2.0
VAt = 0 HAt = -2.5

New Feet corrections:

HF = 0 HB = -7