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All About Shaft Alignment

Misaligned Rotating Machinery Has Caused And Will Continue
To Cause Tremendous Financial Loss To Every Industry World Wide

- Lost production
- Prematurely damaged machinery
- Excessive energy consumption

Statistically, Within A 100 Mile Radius Of Any Location:

- 50% of all rotating machinery drives are excessively misaligned and will probably need to be shutdown and repaired within the next 16 months
- The other 50% will probably run uneventfully with little or no maintenance for the next 80 months

Objective Of Shaft Alignment Is To Increase
The Operating Lifespan Of Rotating Machinery

The most common components likely to fail due to misalignment are:
Bearings Seals Couplings Shafts

What Do I Need To Know To Correctly Align Rotating Machinery?

- Where is the machine at off-line?
- What position will the machinery move to when operating?
- What are appropriate off-line alignment specifications to maintain correct alignment tolerances during operating conditions?

Only one out of every five alignment technicians realizes that machinery moves from off-line to operating conditions

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Benifits Of Accurate Alignment

- Reduce forces on the bearings to insure longer bearing life
- Minimize wear in the coupling components
- Minimize the amount of shaft bending
- Eliminate the possibility of shaft failure from cyclic fatigue
- Reduce power consumption (documented 2 to 17 %)
- Maintain proper internal rotor clearances
- Lower vibration levels in machine casings, bearing housings and rotors

Economics Of Accurate Alignment

To calculate the energy savings of a 100 hp extruder drive that runs continuously for one year

KW/hr = horse power rating / efficiency rating x .746
KW/hr = 100 / .92 x .746 = 81.1

$ savings / yr = KW/hr x operation hrs x electrical rate x percent improvement
$ savings / yr = 81.1 x 8400 x .05 x .05
$ savings / yr = $1,703.10

Even at a low percentage of return (5%) the energy savings alone will repay the cost of the average alignment in less than 3 months

To calculate the energy savings of a 20 hp driven pump that runs continuously for one year

KW/hr = horse power rating / efficiency rating x .746
KW/hr = 20 / .85 x .746 = 17.6

$ savings / yr = KW/hr x operation hrs x electrical rate x percent improvement
$ savings / yr = 17.6 x 8400 x .05 x .05
$ savings / yr = $369.60

Even for a small hp motor the yearly energy savings at a low percentage of return (5%) will repay the cost of the average alignment in less than 1 year.

Bibliography John Piotrowski, SHAFT ALIGNMENT HANDBOOK Marcel Dekker Inc.

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Shaft Misalignment

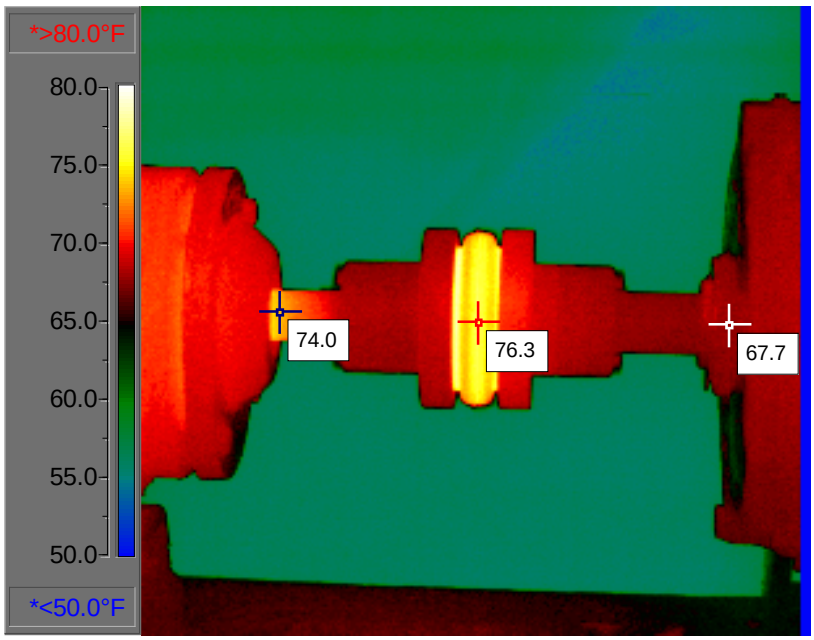
Measured Shaft Alignment Data, Pump (mils)

horz	offset	78.5	right
	angle	5.5/1”	left
vert	offset	4.0	high
	angle	3.1/1”	down

Suggested Shaft Alignment Tolerances (mils)

horz	offset	2.0
	angle	.3/1”
vert	offset	2.0
	angle	.3/1”

ThermaGram of pump and motor minutes after start-up, lost energy via heat generated at the coupling because of shaft misalignment, misalignment verified by vibration analysis and measurement



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