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healthcare for production machinery
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Alignment Training Planning

For planning purposes, the following guidelines should be used.

Course length (days)	Basic plus ____ from list A.
1	1
2	2
3	4
4	6
5	8

The basic modules include Objectives 1 thru 4 on the next page plus one of rim & face, reverse dial or laser methods. Prerequisites for the basic module include basic industrial math including solving formulas, ratio problems and graphing. A module covering these can be included. To cover the math will take an added _ day.

List A

	Module	Prerequisites
1	Rim & Face including graphing	Basic
2	Reverse dial including graphing	Basic
3	Laser including graphing (Instrument provided by client)	Basic
4	Vertical machines	1, 2 or 3
5	Spacer shaft	1, 2 or 3
6	Machine trains	1, 2 or 3
7	Right angle drives	1, 2 or 3
8	Thermal growth	1, 2 or 3

Alignment Objectives

At the completion of this course, the student who actively participates will:

1. **Understand the importance of correct shaft alignment, including the answers to the following questions:**
   - **1.1. What is misalignment?**
   - **1.2. How is misalignment measured?**
   - **1.3. What are the effects of misalignment?**
2. **Discussed the proper installation of machinery, including the following questions:**
   - **2.1. How should a machine be mounted for best performance?**
   - **2.2. What are the major coupling types?**
   - **2.3. What is the effect of magnetic center on of a motor?**
3. **Have performed the necessary preliminary checks and answered the following questions:**
   - **3.1. What is coupling runout and what is its effect on alignment?**
   - **3.2. How is coupling runout measured?**
   - **3.3. What is soft foot and what is its effect on alignment?**
   - **3.4. How can soft foot be detected?**
   - **3.5. What is the effect of piping stress on alignment?**
   - **3.6. How can piping stress be detected?**
4. **Have performed a basic straight edge, feeler gage alignment, including answering the following:**
   - **4.1. How can we measure misalignment with a straight edge and feeler gage?**
   - **4.2. How do we determine what the proper corrections are?**
   - **4.3. How do we move the machine?**
   - **4.4. What is the proper method for shimming the machine?**
5. **Have performed a dial indicator or laser alignment, including answering the following:**
   - **5.1. What is the rim and face method?**
   - **5.2. What is the reverse indicator method?**
   - **5.3. How does laser alignment differ from other methods?**
   - **5.4. What is bar sag?**

5.5. What is the validity rule?

5.6. How do we use graphing to solve the alignment problem?

5.7. How do we use the graph to solve bolt-bound problems?

6. Have discussed thermal growth, including answers to the following questions:

6.1. What is thermal growth and how does it effect alignment?

6.2. How can we estimate thermal growth?

7. Optional modules requiring extra time:

7.1. How do we align multiple machine trains?

7.2. How do we align machines with jack or spacer shafts?

7.3. How do we align vertical machines?

7.4. How do we align c-face machines?