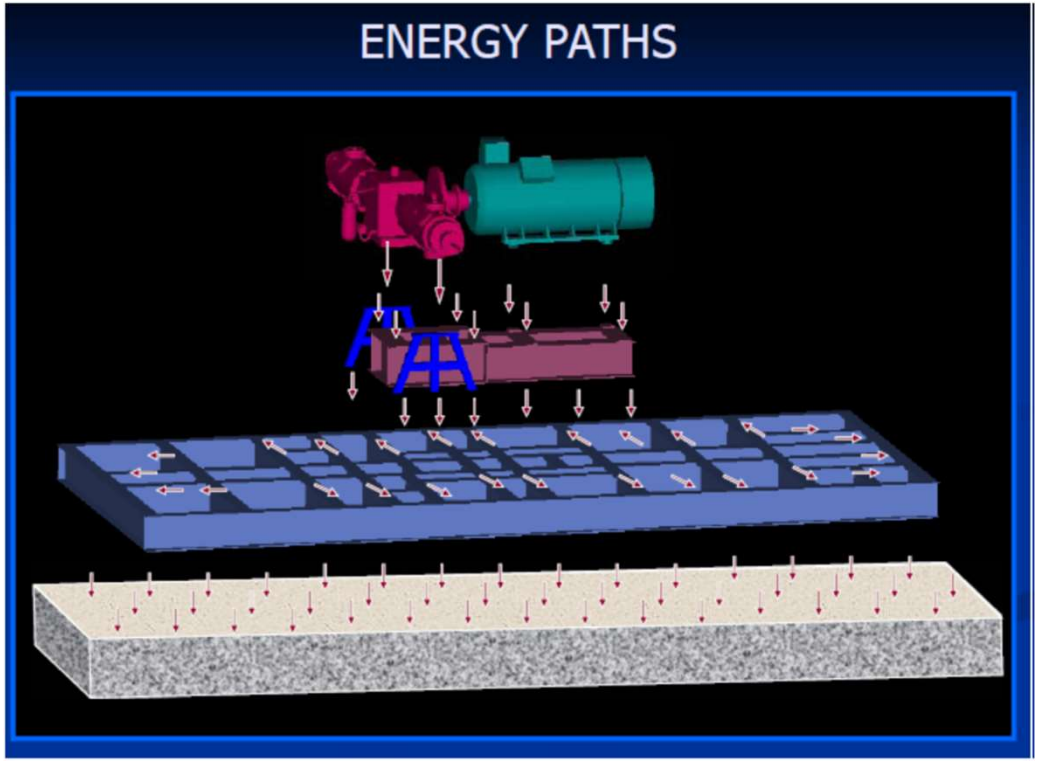
# ESSENTIALS OF MOUNTING AND ALIGNING ROTATING EQUIPMENT

WORLD STANDARD COMPRESSORS

# WHAT WE WANT TO ACHIEVE



# REFERENCES

WORLD STANDARD COMPRESSORS

- Gas Machinery Research Council- Best Practices for Specifying & Procuring a Successful Large, High-Speed Reciprocating Compressor Package
- API- Recommended Practice 686

# WHERE DOES IT START?

WORLD STANDARD COMPRESSORS

# ESSENTIAL #1 FOUNDATION

If this isn't right, nothing above it will be right

- GMRC GUIDELINE FOR HIGH-SPEED RECIPROCATING COMPRESSOR PACKAGES
  - 6.3.2 FoundationDesign
  - 6.3.2.1 Preliminary Foundation Design
  - 6.3.2.2 SoilTesting
  - 6.3.2.3 Foundation Static Design Requirements
  - 6.3.2.4 Foundation Dynamic Design Requirements
- API RP 2GEO
  - Geotechnical and Foundation Design Considerations

# ESSENTIAL #2 SKID/BASEPLATE TO FOUNDATION INTERFACE

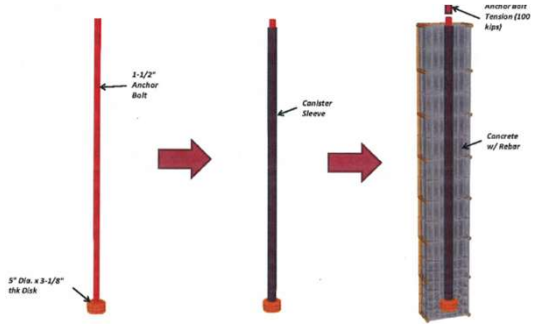
WORLD STANDARD COMPRESSORS

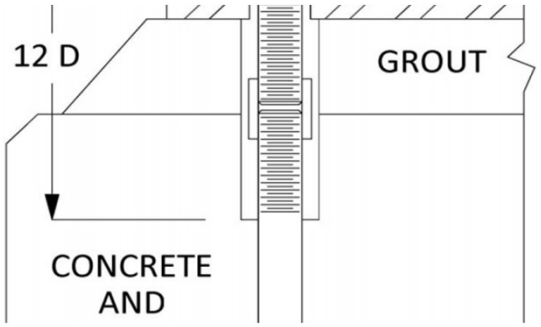
## GMRC GUIDELINE

- 6.4.2.3 Anchor Bolts
- 6.4.4.2 Skid Grout to Foundation

## API Recommended Practice 686

- Section 2.10 Anchor Bolts and Sleeves




# ESSENTIAL #2 SKID/BASEPLATE TO FOUNDATION INTERFACE

WORLD STANDARD COMPRESSORS

# ESSENTIAL #2 SKID/BASEPLATE TO FOUNDATION INTERFACE

- Gas Machinery Research Council, Research Guideline: Mounting Separable Reciprocating Compressors in Pipeline Service (2006).
- Gas Machinery Research Council, Reciprocating Compressor Foundations: Loading, Design Analysis, Monitoring & Repair, December l-993.
- Gas Machinery Research Council, Parameter Studies for Enhancing Integrity of Reciprocating Compressors, September 1994.
- Geotechnical Considerations for Design and Construction of Foundations, Oct L999, Gas Machinery Conference, Larry Lanz, P.E., El Paso Energy
- API Recommended Practice 686 Chapter 5

# ESSENTIAL #3 MAIN BEARING BORE ALIGNMENT

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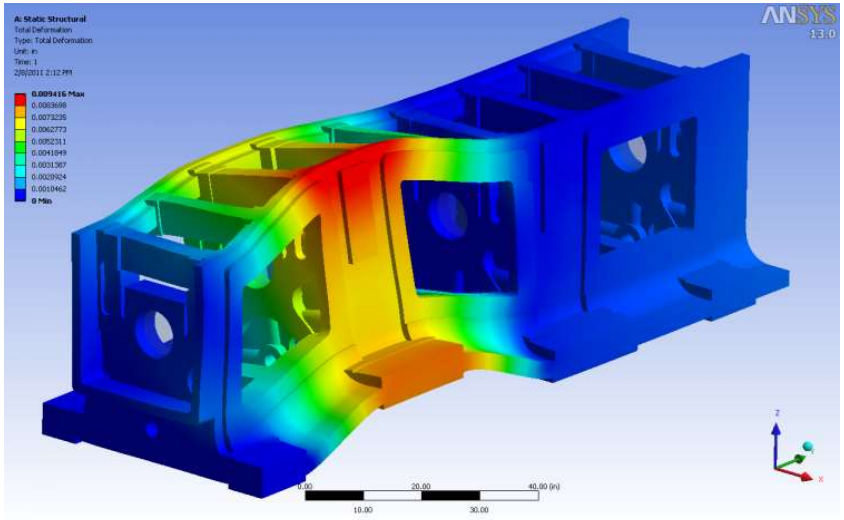
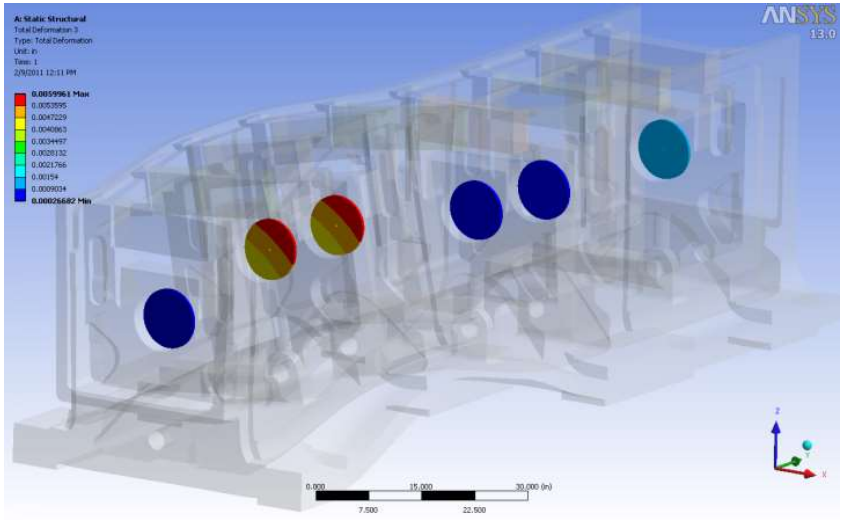


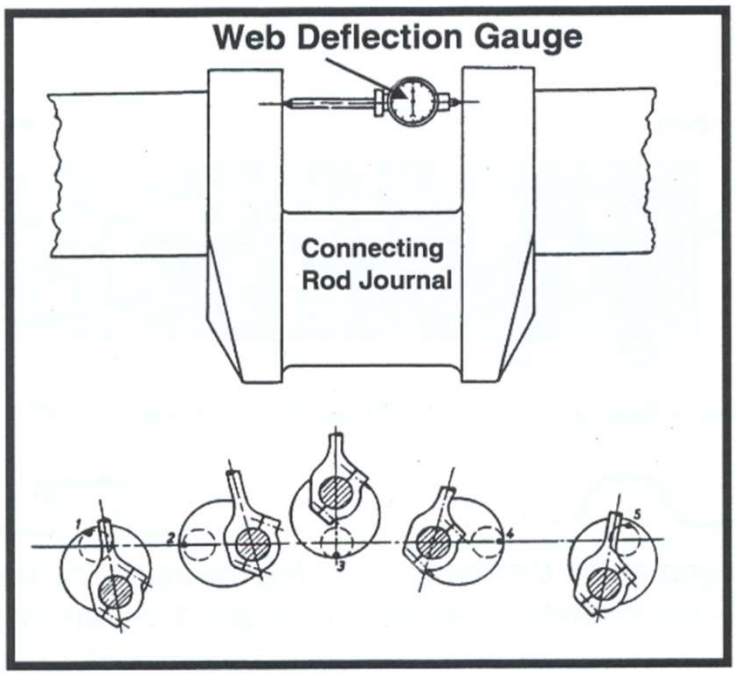
# ESSENTIAL #3 MAIN BEARING BORE ALIGNMENT

WORLD STANDARD COMPRESSORS

# ESSENTIAL #3 MAIN BEARING BORE ALIGNMENT

WORLD STANDARD COMPRESSORS

- Use the manufacturer's specified method for ensuring main bearing bore alignment.
- Special tools can be required
- Trained personnel should be used
- Take the time necessary to get it right



# ESSENTIAL #4 EQUIPMENT MOUNTING TO BASEPLATE

GMRC GUIDELINE FOR HIGH-SPEED RECIPROCATING COMPRESSOR PACKAGES

- Section 6.4.4

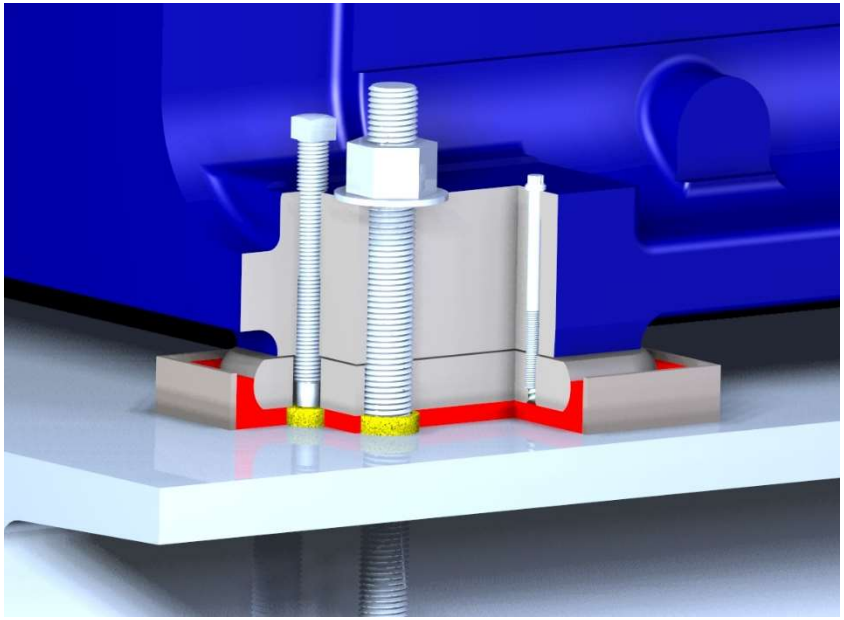
API Recommended Practice 686

- Chapter 5

Equipment Manufacturer's Requirements

- Compressor Packager's Standards
- Engine Application and Installation Guides

# ESSENTIAL #4 EQUIPMENT MOUNTING TO BASEPLATE



# ESSENTIAL #4 EQUIPMENT MOUNTING TO BASEPLATE

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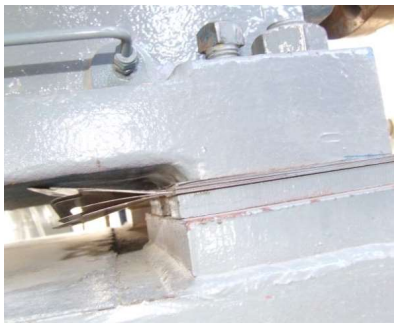
Shimming can be challenging

- Use only Stainless Steel shims
- Use as few shims as possible
- Clean and inspect shims thoroughly if being reused
- Ensure shims cover the entire machine foot
- Angular foot misalignment is very difficult to shim and will likely prove to be problematic



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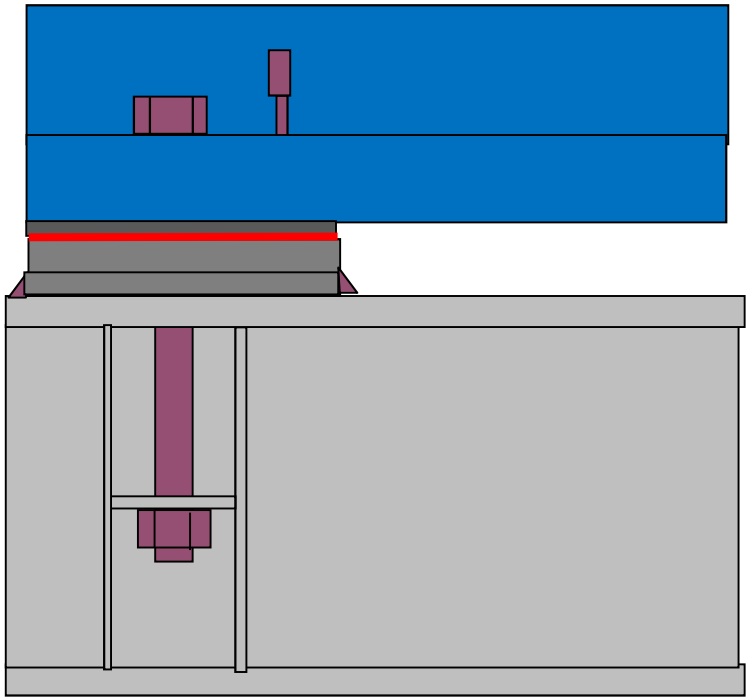
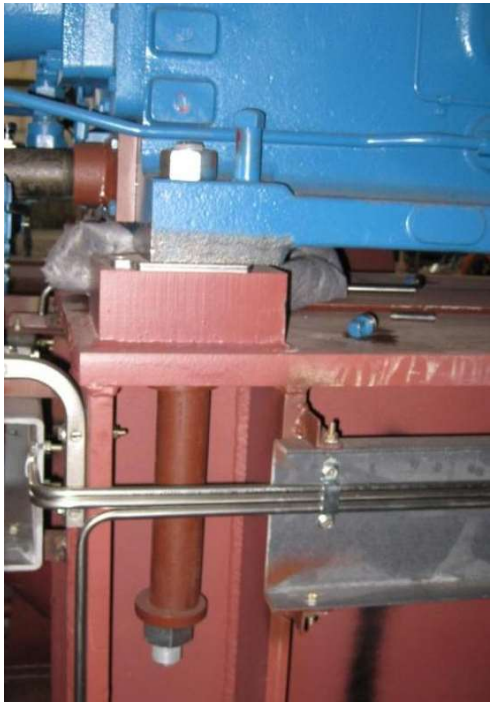




# ESSENTIAL #4 EQUIPMENT MOUNTING TO BASEPLATE

WORLD STANDARD COMPRESSORS


# ESSENTIAL #4 EQUIPMENT MOUNTING TO BASEPLATE

# ESSENTIAL #5 SHAFT ALIGNMENT

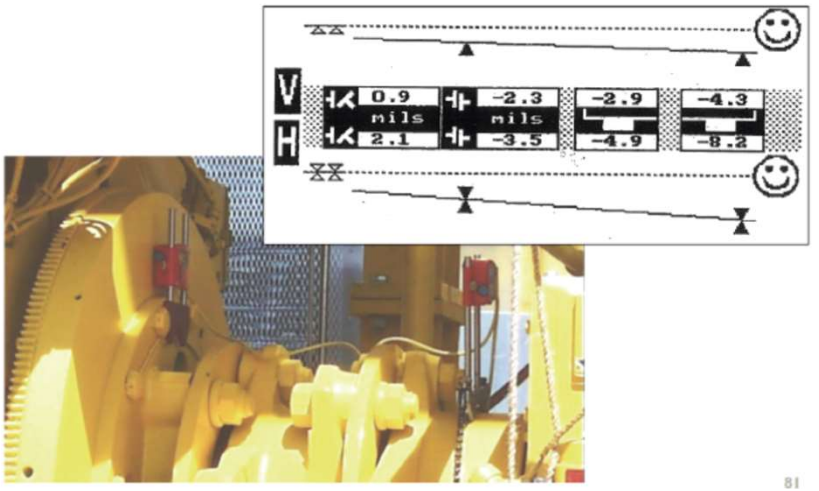
WORLD STANDARD COMPRESSORS

GMRC GUIDELINE FOR HIGH-SPEED RECIPROCATING COMPRESSOR PACKAGES

Section 13.2

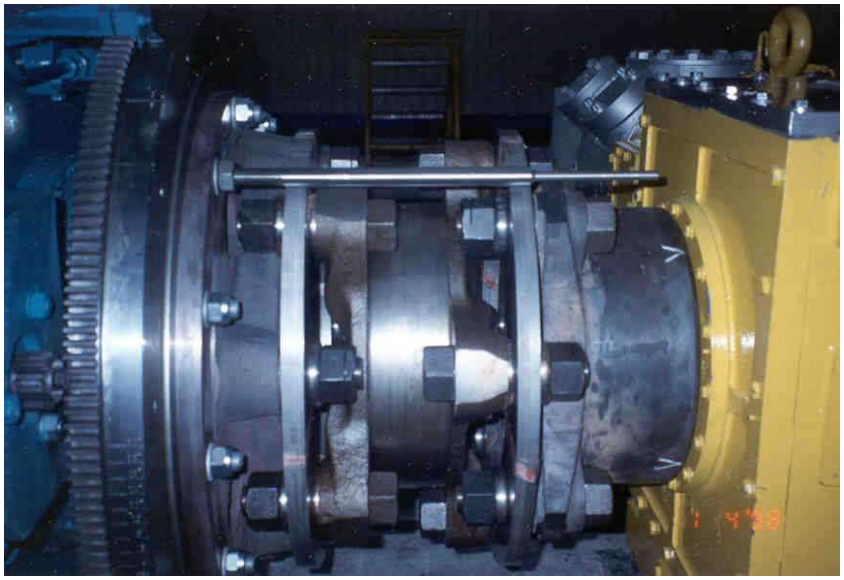
API Recommended Practice 686 Section 4

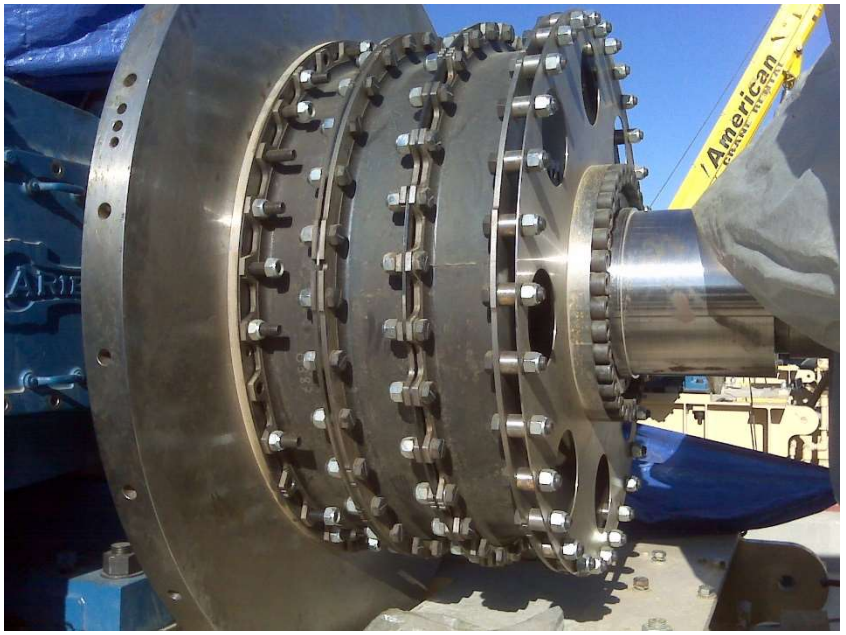
- Use trained personnel
- Ensure equipment is calibrated
- Monitor and account for temperature during alignment
- Use correct tolerances
- The compressor is the stationary part of the alignment train



# ESSENTIAL #5 SHAFT ALIGNMENT

WORLD STANDARD COMPRESSORS





# ESSENTIAL #5 SHAFT ALIGNMENT

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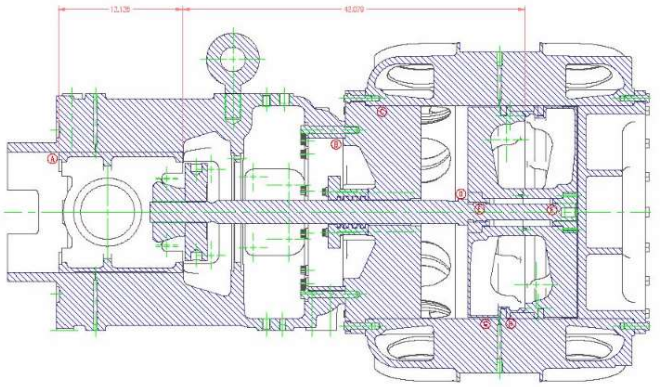
- Follow the equipment manufacturer's specifications, not the coupling tolerance
- Laser tools have made things faster, not more accurate
- Crankshaft thrust clearance and position is a critical last check
- Hot alignment verification and follow up after 30 days are necessary

# ESSENTIAL #6 COMPONENT AND PIPE ALIGNMENT

- Crosshead Clearances and piston rod run-out are critical start up checks
- Skid deflection and relaxation can cause dimensional changes
- Guide support shimming and discharge bottle supports and cause misalignment
- Pipe misalignment can cause stress, vibration issues, and component misalignment



# ESSENTIAL #6 COMPONENT AND PIPE ALIGNMENT

GMRC GUIDELINE FOR HIGH-SPEED RECIPROCATING COMPRESSOR PACKAGES

- Section 13.3

API Recommended practice 686

- Section 4.7

Equipment Manufacturer's Standards or Guidelines

- Bottle and head end supports should be adjusted at operating temperatures


# ESSENTIAL #7

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## IF YOU DON'T HAVE TIME TO DO IT RIGHT THE FIRST TIME, WHEN WILL YOU HAVE TIME TO DO IT AGAIN?


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