



KNOWLEDGE BASE

Article Type: Instructions

Mold Assembly for Models, 10, 12, 16, 22HF, 16HF, and 1600

Description:

Instructions on “How to” properly assemble, clean and inspect, repair and rework molds, and proper mold care.

WARNING

Never work on, clean or service this unit, control panel or any machine or open or remove any protective cover, guard, grate, door, or maintenance panel until the power or energy sources has been turned off, locked out / tagged out, and all moving parts have come to a complete stop and or blocked to prevent movement. Machinery is dangerous - avoid personal injury and or death by following manufacture, Local, and OSHA safety procedures. Contact Columbia Machine for safety decals, guards, horns and beacons.

Columbia

Columbia Machine Inc.
107 Grand Boulevard
Vancouver, Washington 98668

Recommended Procedure for Mold Assembly

Model 10AC
through Model
1600

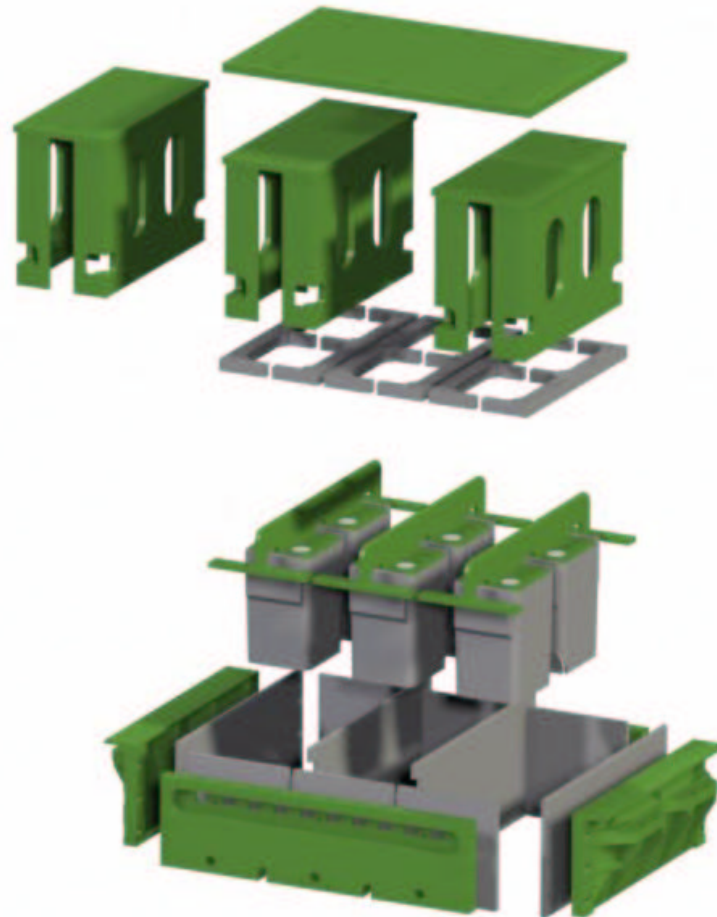


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Introduction

“How to” Manual to help in assembling Molds for Columbia Concrete Products Machine.

Prolonging Mold Wear Life of *Columbia* Molds.

For Model 2-Block molds (10AC, 21, & 22)

For Model 3-Block molds (12AB, 12AC, 16, 20)

For Model 4-Block molds (1600)

Recommended Tools

- Fixtures - Working surface
- Tools - Wrenches
- Gauges
- Accuracy Checking

Recommended Tools

Working Surface for Assembling

- **Locate a flat surface** upon which to rebuild the mold. If the bottom of the mold is not assembled on a flat surface, the mold will not be built square. Therefore the pallet, during machine operation, will contact the mold unevenly, causing poor block quality and premature mold wear.
 - ❖ **There is also potential machine vibrator bearing failure due to non-parallel mold- mounting brackets.**

Columbia recommends a sturdy table with a removable top plate, which can be reground as the surface deteriorates due to wear.



Columbia part number 405.32.1 (assembly table & surface height gauge-vernier calipers)



Recommended Tools cont.

- **4” Steel Wedges** (for usage see page 28)
- **Brass Hammer (Soft headed)**
- **Vernier Dial Calipers-Surface height gauge** (for usage see page 29)
- **10” Machinist Square** (for usage see page 32)
- **Torque Wrench** (range to 500 foot-pounds)
- **Miscellaneous Wrenches** appropriate for each bolt size (socket head, hex head, flat head capscrews)
- **Replacement supply** of grade5 & grade8 bolts, nuts, nylon insert locknuts, lockwashers, setscrews, (see Mold Torque Specifications Sheets)
- **Thread locking compound**, such as “Loctite #262” to be used on torqued bolts

Mold Gauges

for Corebar Assembly alignment



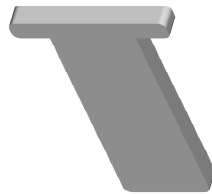
1"



1-1/8"



1-1/4"



1-1/2"



1-3/4"

Corebar Assembly Gauges

Part #'s

607002.01.00	1"
607002.01.13	1-1/8"
607002.01.25	1-1/4"
607002.01.50	1-1/2"
607002.01.75	1-3/4"

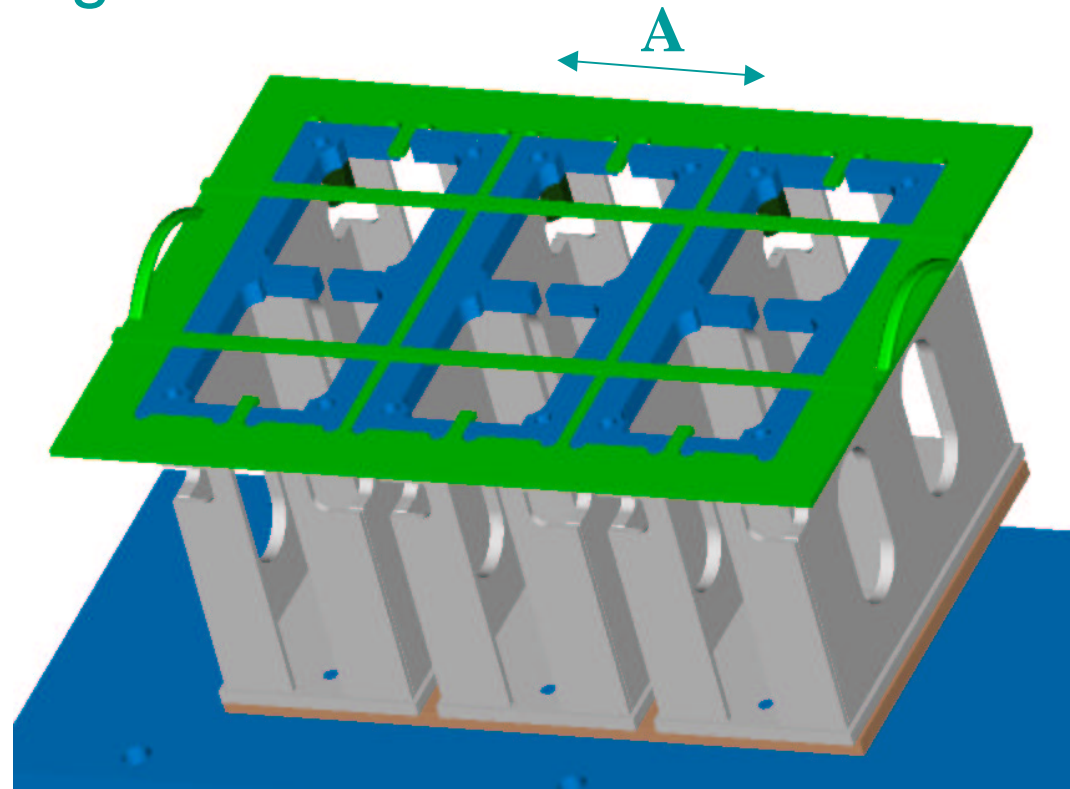
See Page 35 for usage

Mold Gauges cont.

- Optional Compression Shoe Setup Gauge

Shoe Alignment Gauges

<u>Part Number</u>	<u>Dim A</u>	<u>CPM</u>
<u>604899</u>	<u>3.625</u>	<u>12C/16</u>
<u>604899.A</u>	<u>3.625</u>	<u>1600</u>
<u>604636</u>	<u>5.625</u>	<u>12C/16</u>
<u>604636.A</u>	<u>5.625</u>	<u>1600</u>
<u>603823</u>	<u>7.625</u>	<u>12C/16</u>
<u>603823.A</u>	<u>7.625</u>	<u>1600</u>



Regular Mold Care

- After production, thoroughly clean all mold wear surfaces of any concrete materials and apply oil to the wear parts prior to storage. (Cement is a caustic that can deteriorate even hardened steel)
- Coating the wear parts with oil before storage will protect their hardened wear surface from oxidation and pitting. A cause of premature mold life.
- Inspect parts for cracks and/or wear and replace before storage.

Mold Repair and Rework

■ Welding Mold Wear Parts

- ◆ Insure good heat isolation to surrounding area
 - ◇ Surface Hardness is effected at temperature starting at 250 degrees
 - ◇ Immersion in water
 - ◇ repeated small incremental welds with quenching to cool between each step
- ◆ Welding rod recommendation:
 - ◇ Low Hydrogen based welding rod for general welding
 - ◇ E4130 (rod used for welding SAE 4130 type Tool Steel)
 - For small spot repairs
 - ◇ Hard surfacing rod

■ Welding Non Wear Surfaces

- ◆ Low Hydrogen based welding rod
 - ◇ For welding Corebar Clips onto Corebar Assemblys
 - ◇ For Welding Cores onto Corebar Assemblys
 - ◇ General welding and patching
- ◆ Cores should be welded to Corebar (T-1 Spring steel) using 4 passes, 2 per side of the corebar, starting from outside edge of core and stopping at the middle of the core.

■ Drill and Tap Rework

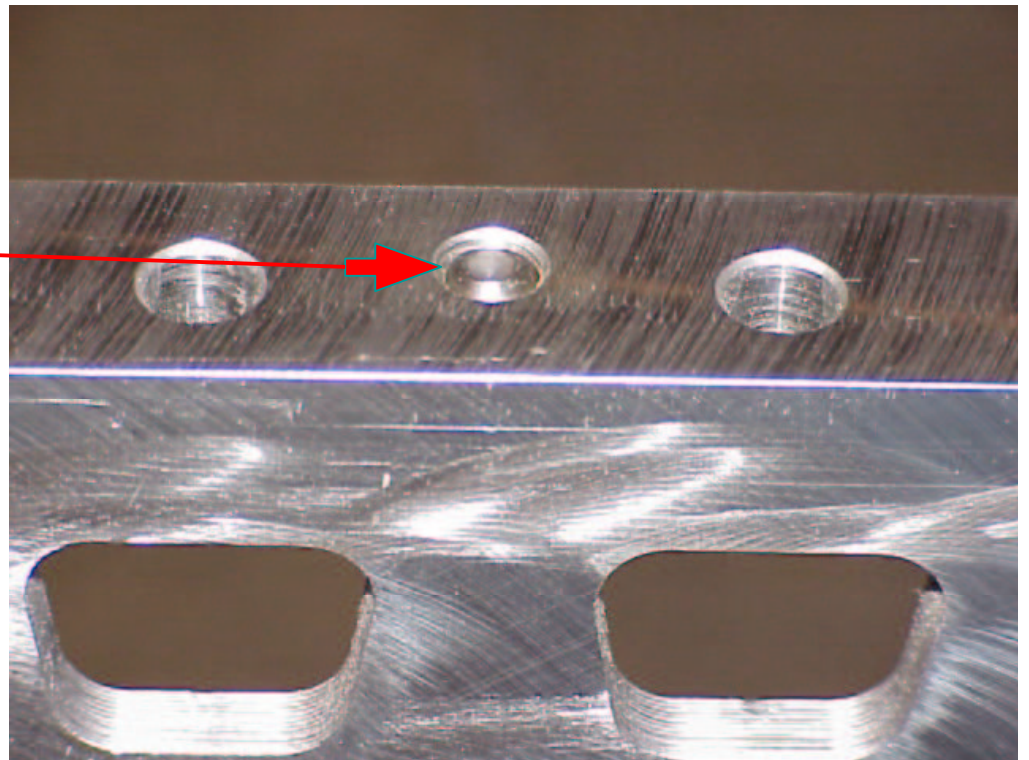
- ◆ Non wear parts can be reworked in a typical manner for mild steel
- ◆ Hardened wear parts have same characteristics as tools used to drill and tap, requiring carbide tools
 - ◇ Soften area utilizing heat and then slow cooling **Note: This will reduce mold wear life**
 - ◇ Grind through case in area to be reworked

Clean and inspect all parts prior to assembling mold.

- Check for excessive wear on all surfaces, including gouges and scored surfaces (0.025" depth or greater, consider replacement).
- Radiused edges on the bottom (pallet side) of end liners, partition plates, cores, etc., cause feathered edges on the pallet side of the block.
Tip: Outside partition plates can be rotated 180 degrees ↻.
- Check tapped holes for clean complete threads.

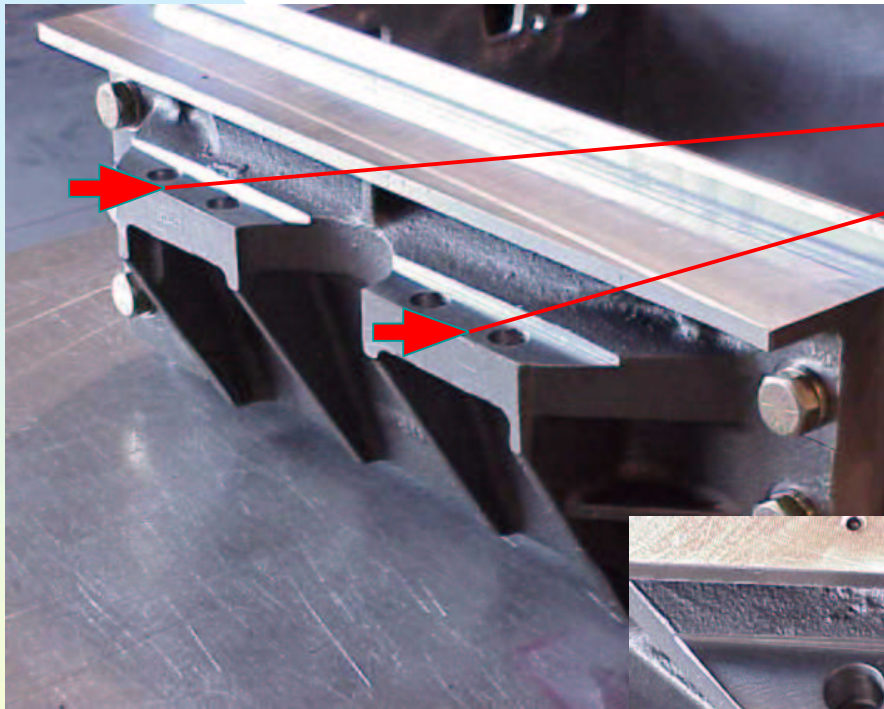
Clean and inspect all parts prior to assembling mold. cont.

- Replace self locking (nylon insert) setscrews in end plates. (area of end plate under the top tab of partition plates).
- See Page 34 for proper adjustment



Note: The partition plates and end plates will prematurely fail during operation if the operator/assembler fails to keep the setscrews tight.

Clean and inspect all parts prior to assembling mold. cont.



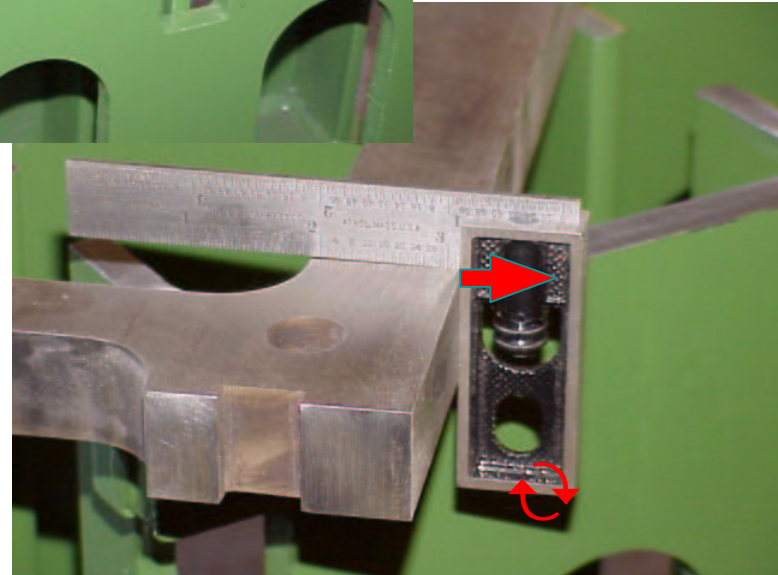
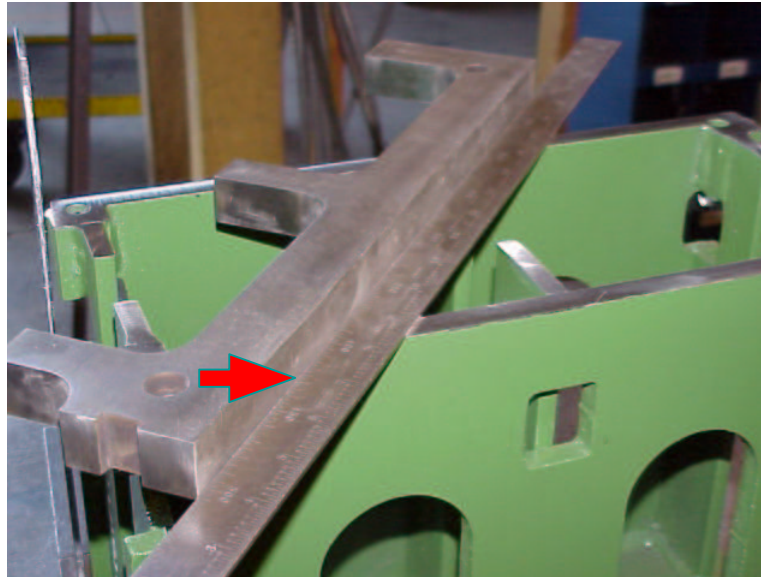
Mounting Bracket Die Support mounting surfaces should be clean, flat, free of paint or foreign material, and parallel. Mounting holes should not be elongated or cracked.

Tip: Also check condition of the machine die supports. The mating surfaces should be flat, parallel, and square.

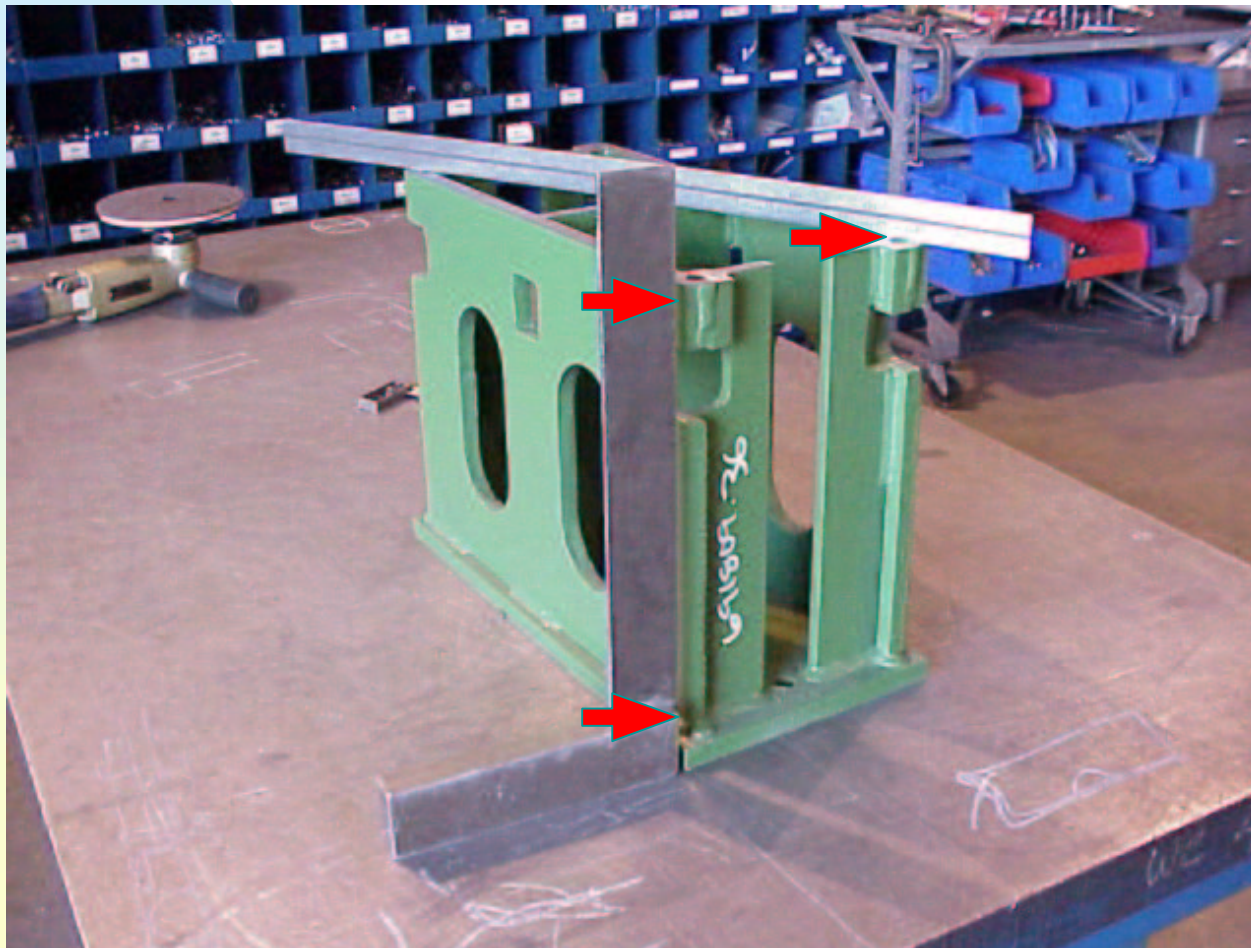
Clean and inspect all parts prior to assembling mold. cont.

- Compression shoes should be flat and straight and have clean sharp edges (rounded edges will create feathered edges on the tops of the product).

Tip: In Most Cases, Shoes can be flipped 180 degrees for added wear life.



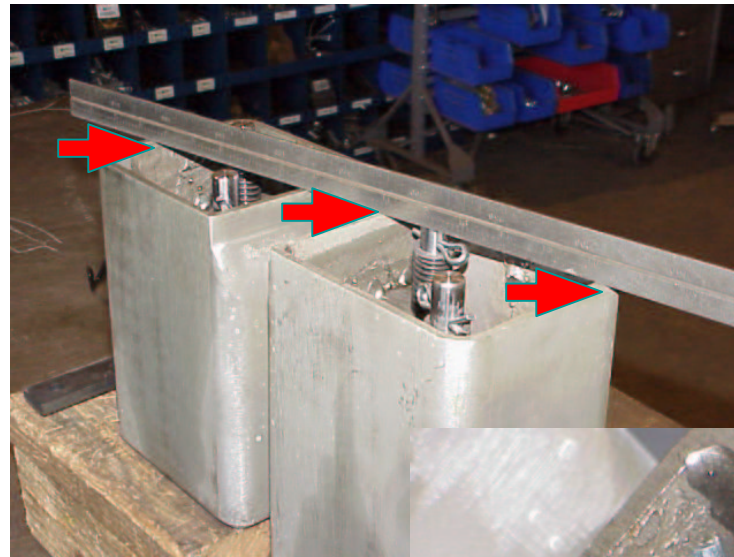
Clean and inspect all parts prior to assembling mold. cont.



- Head plunger legs should be straight and the bottom (shoe side) should be flat.

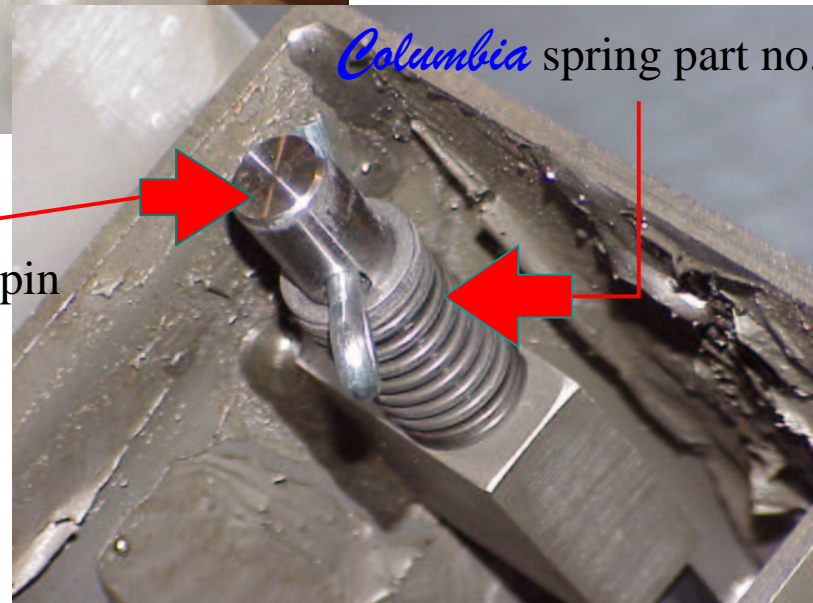
Clean and inspect all parts prior to assembling mold. cont.

- Inspect the Corebar Assembly bottomsides with a straightedge to insure bottoms are straight and flat.
- Check plunger pin to see that it operates smoothly and there is nothing interfering with venting while producing block.



Check for wear on the plunger pin - That the vent hole is closed when the pin is flush with the bottom of the core.

Columbia Plunger pin
part no. 601159



Mold Box Assembly

- Torque Specifications
 - ◆ 2-3 Block Spec Sheet Pgs 20 & 21
 - ◆ 4 Block Spec Sheets Pgs 22 & 23
- Step by Step Assembly of Mold Box
 - ◆ Page 24-35
- Quality Checking to Insure alignment
- Head Assembly
 - ◆ Page 36-37
- Mold Alignment
 - ◆ Page 38-39

Mold Box Assembly

Torque Specifications

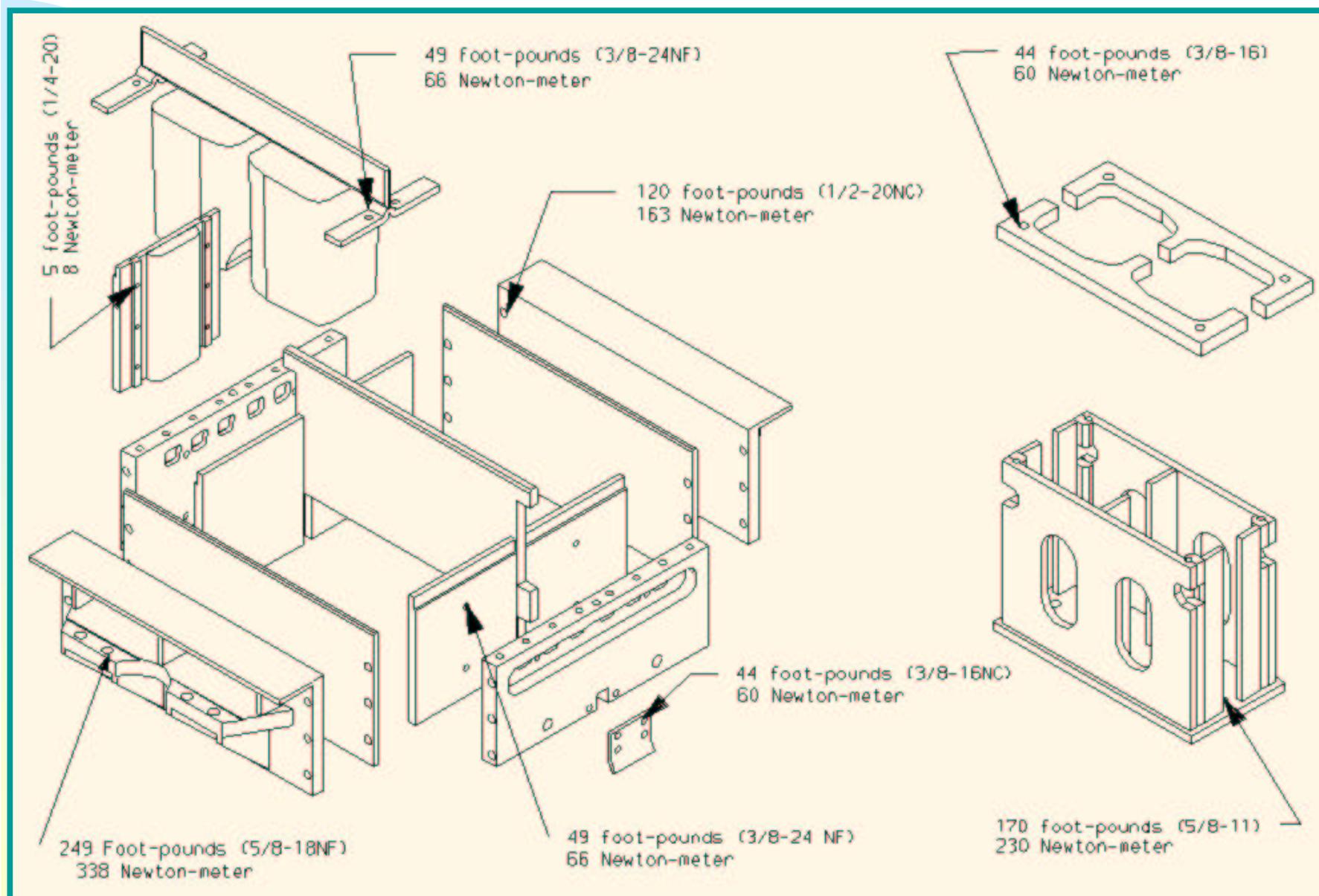
- 2-3 Block Molds
Model 10AC, 21, 22, Mod 12, 12AC, 16, 20
- 4 Block Molds
Model 1600



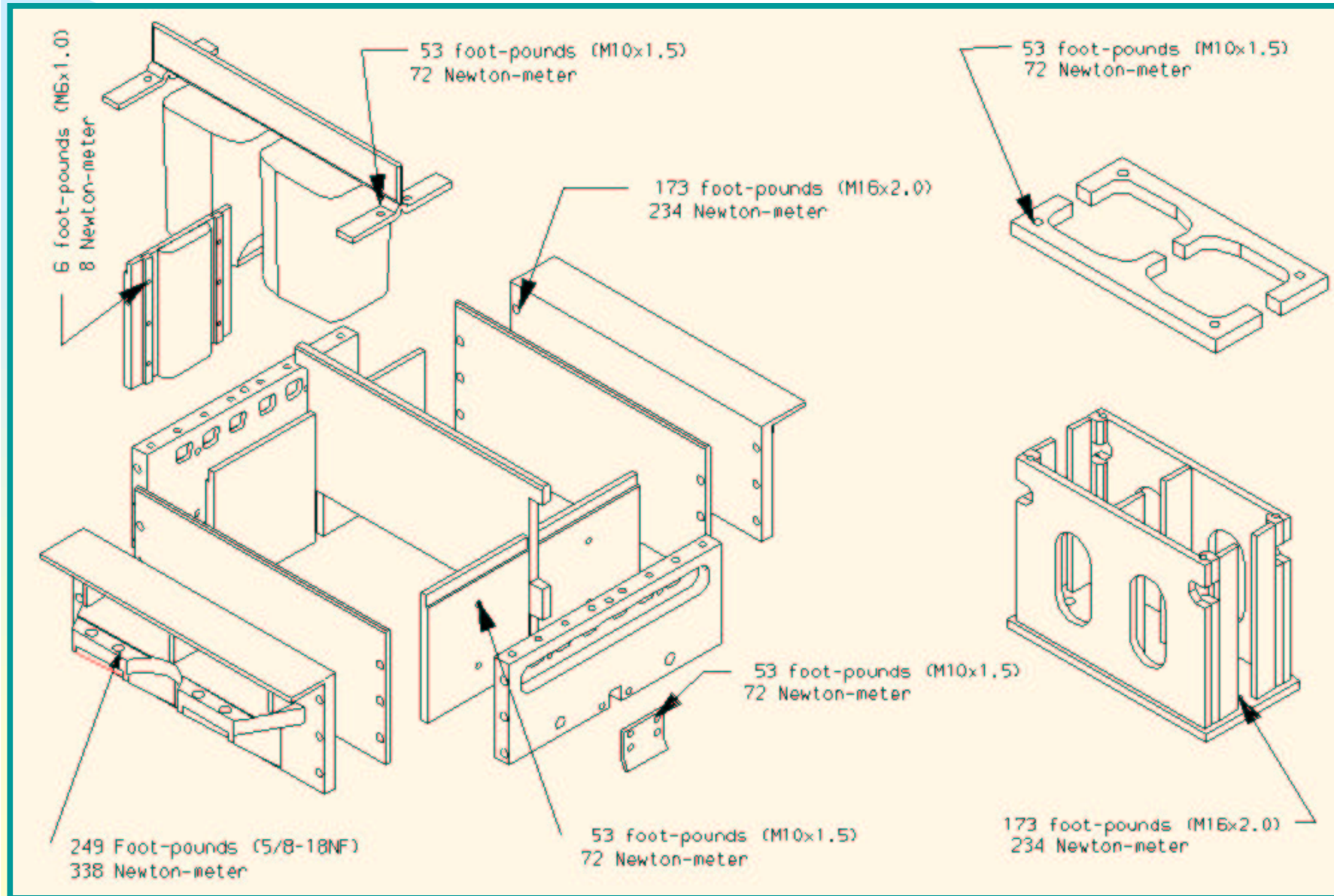
Torque Specifications

- **Torque specifications** are for comparative purposes only. All bolts of similar size and function should be tightened to the same torque. Hex and socket head capscrews used should be SAE grade 8 (or metric equivalent) on the mold box and shoes, SAE grade 5 (or metric equivalent) or better on corebar assemblies and head plungers. Because the mold assembly vibrates during operation, even properly torqued bolts can loosen and regular checking to insure proper tightness is recommended. (See mold assembly torque drawing pages)
- *Columbia* encourages using a thread-locking compound, such as “Loctite #262” on torqued bolts.

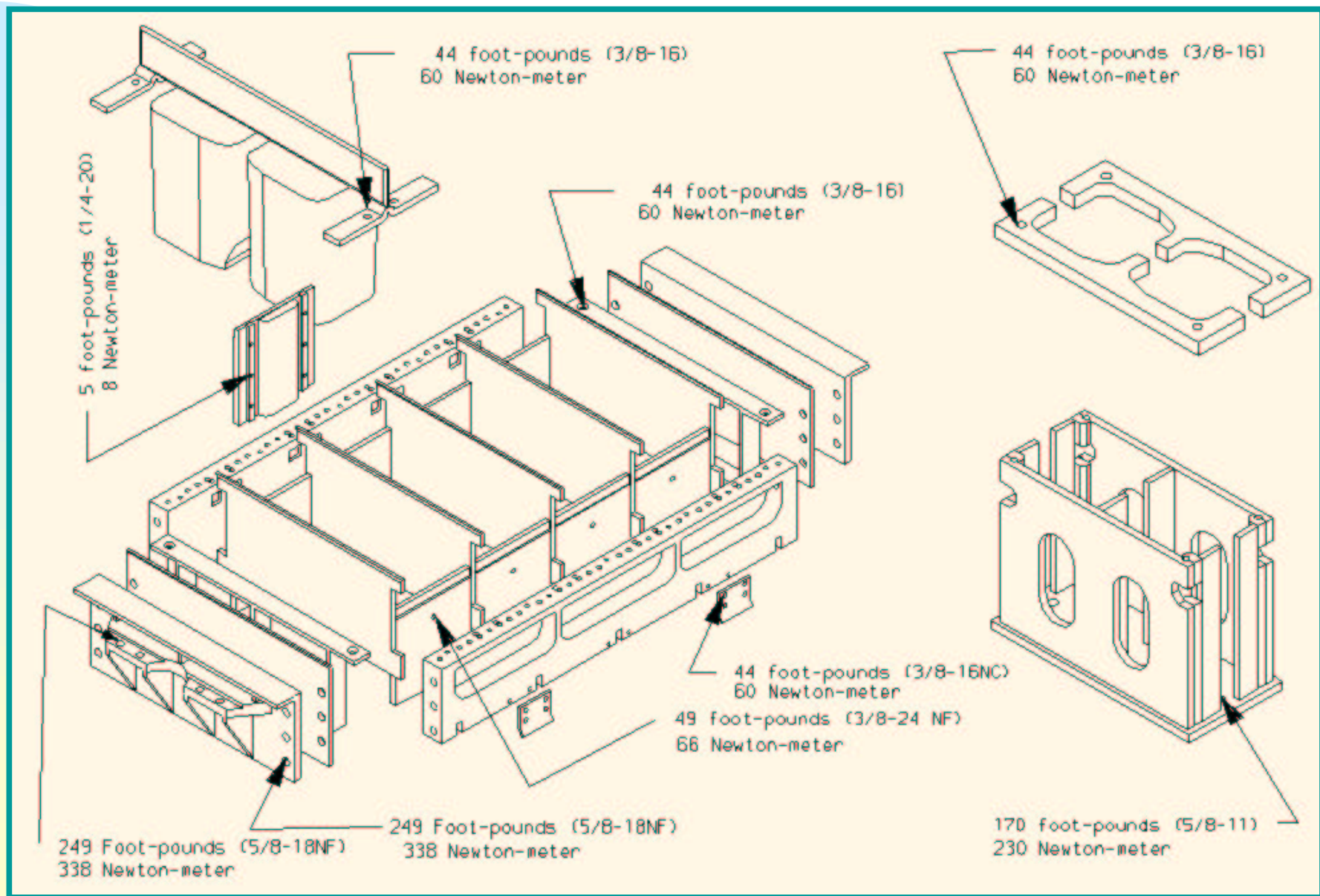
2-3 Block Imperial Torque Recommendations



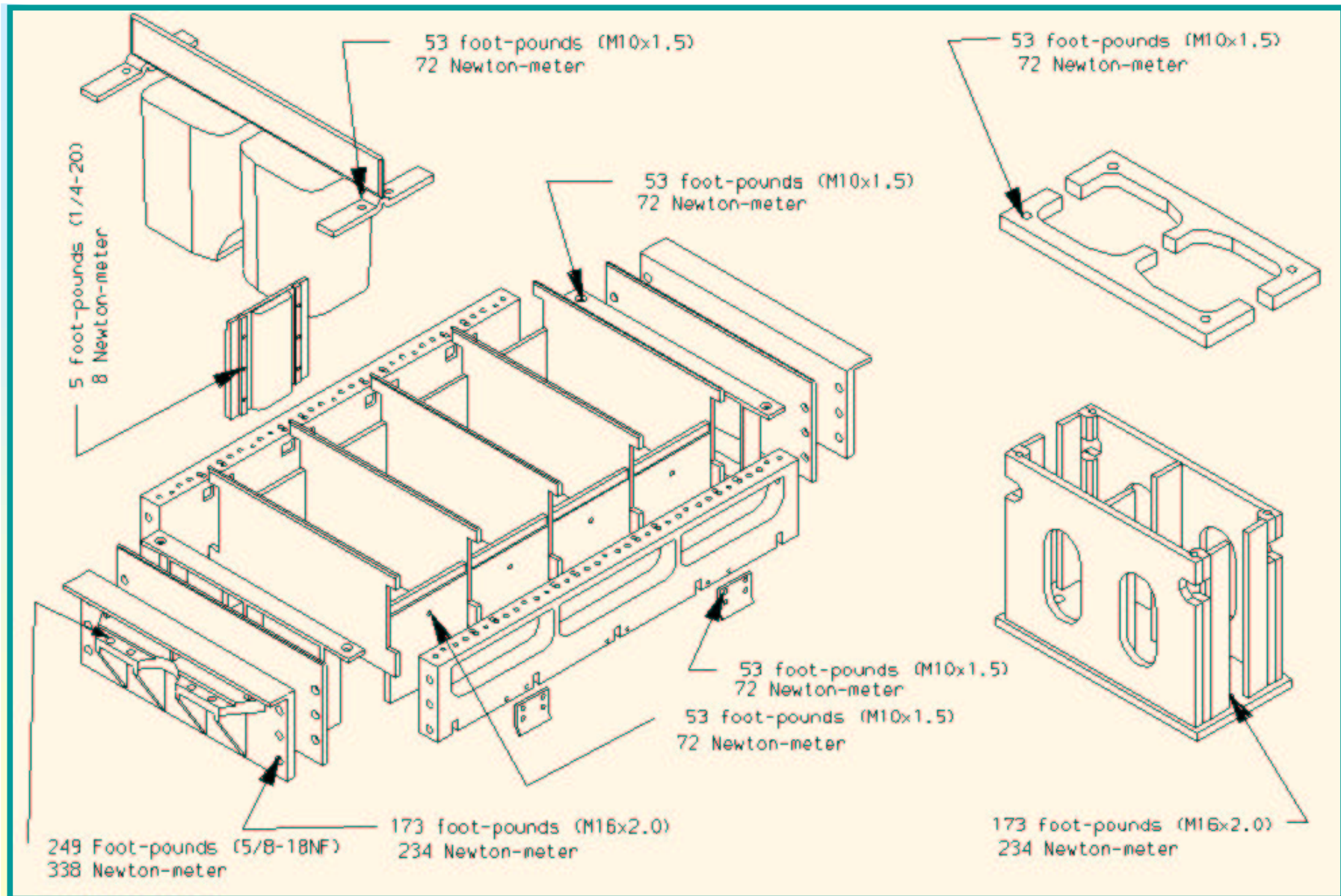
2-3 Block Metric Torque Recommendations



4 Block Imperial Torque Recommendations



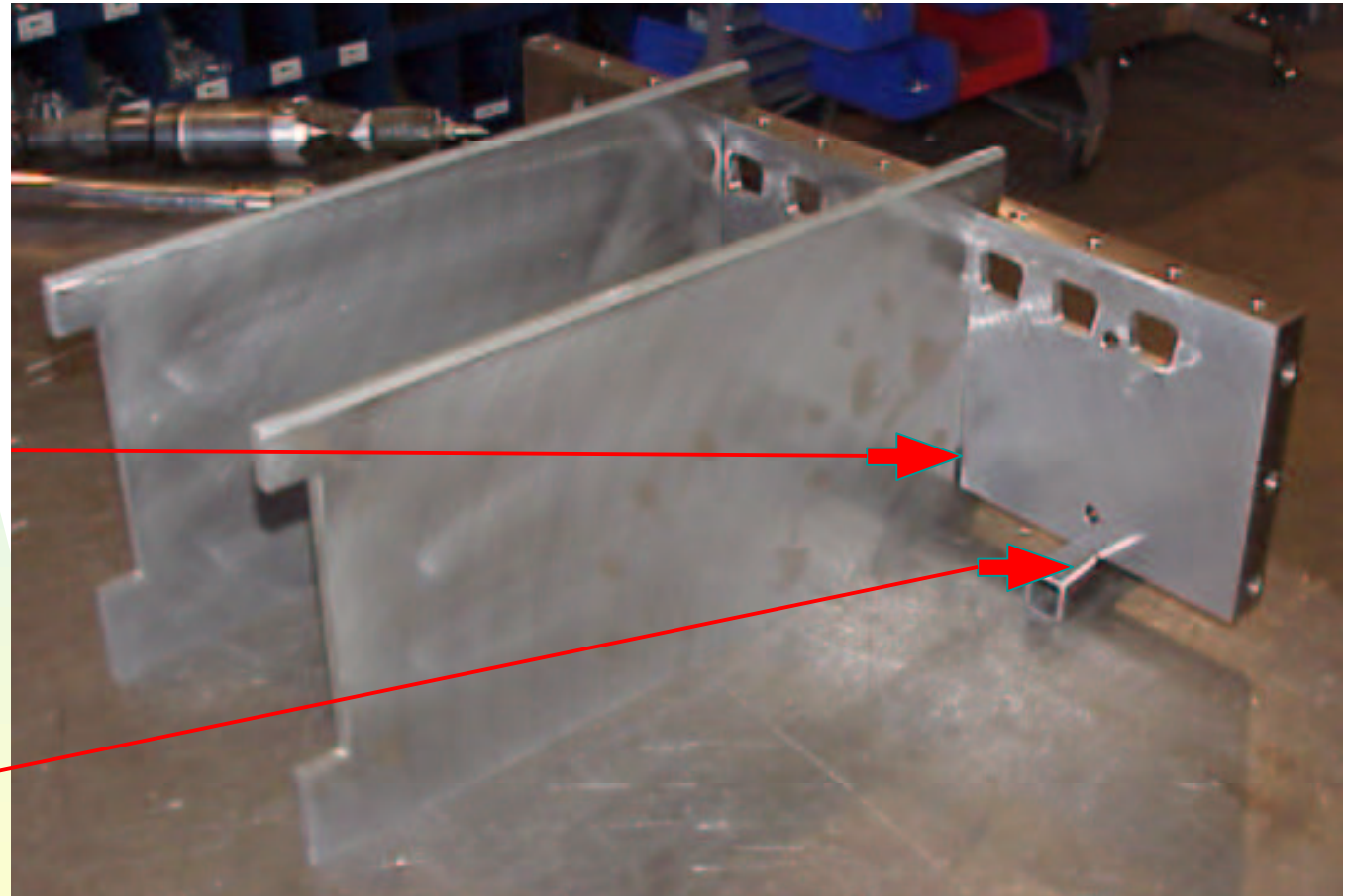
4 Block Metric Torque Recommendations



Mold Box Assembly

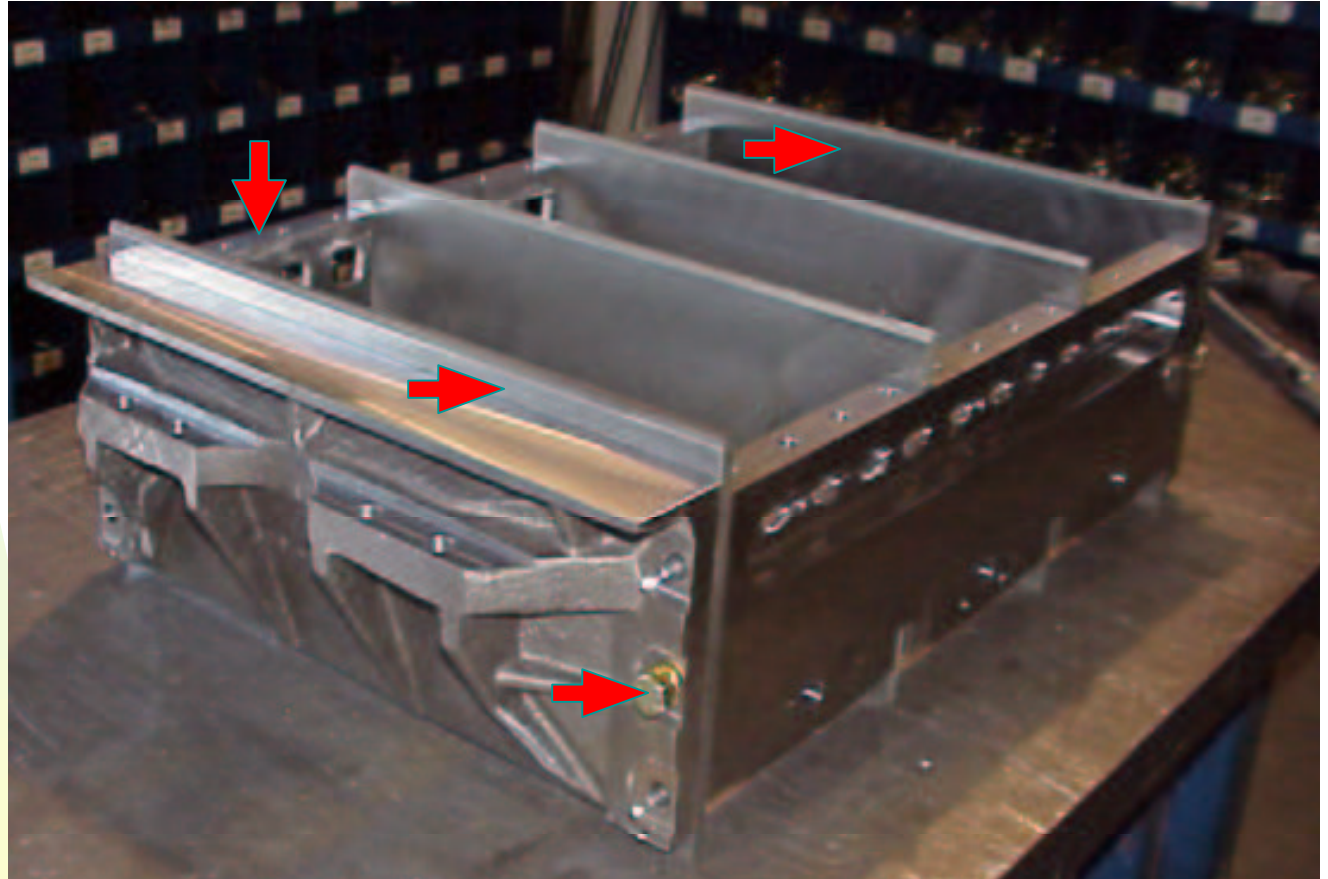
Lift one of the end plates, and position the first partition plate. Sliding one end of the interior (inside) partition plates into the end plate notches.

Optional aid is to use spacer blocks-
1" high spacers for 8-high molds.
3/8" spacers for 4-high molds.



- Position the remaining end plate on the opposite end of the inside partition plates.
- Locate the drilled (outside) partition plates to the left and right sides of the end plates and the mounting brackets. Securing with one bolt at each corner of the box.

Mold Box Assembly

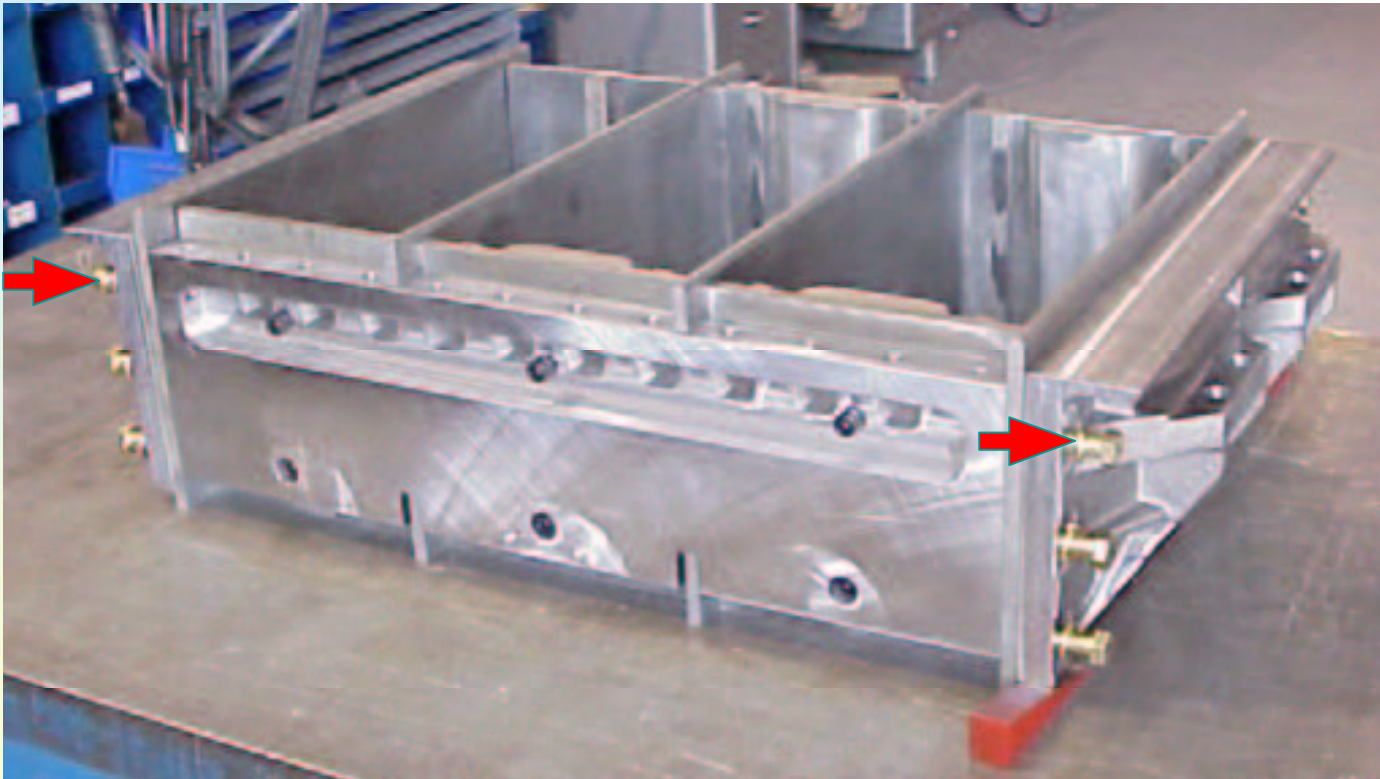


Mold Box Assembly

- Set the end liners into the cavities and install all fasteners using locktite thread locking compound. Use high collar lock washers to ensure correct thread depth.

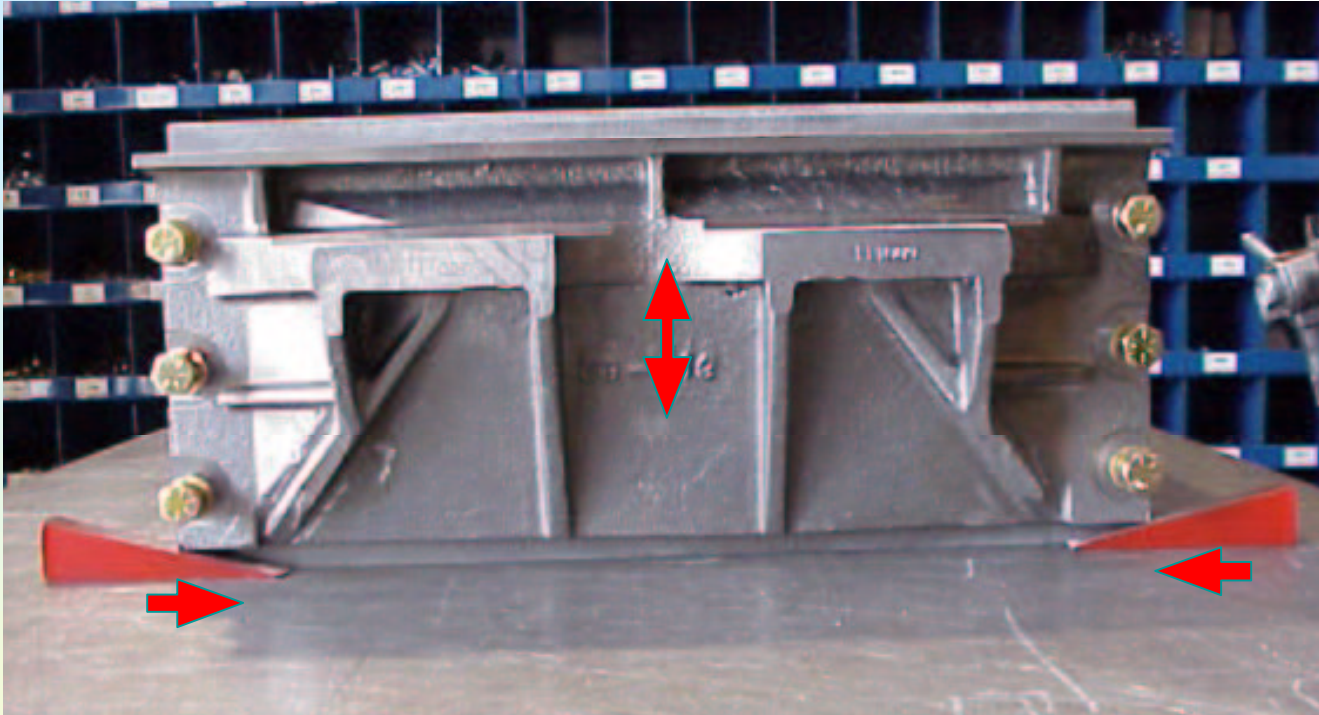


Mold Box Assembly



- Thread the remaining mounting bracket bolts and tighten to approximately 5 ft-lbs (6 Nm)

Mold Box Assembly



- Place two wedges under one mounting bracket, one under each side. Use the wedges to lift the mounting bracket only, do not lift the mold off the table. Tighten the bolts to a snug fit, you only want to hold the brackets in place, and you will need to adjust them later. Repeat this step on the other mounting bracket.

Mold Box Assembly

Mounting Bracket alignment on mold

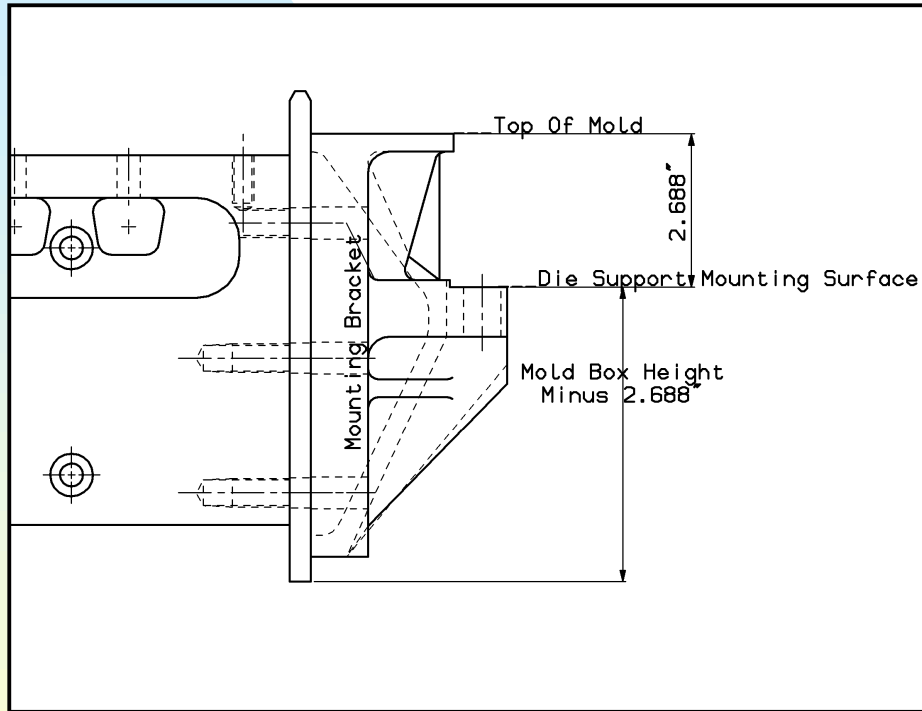
- Set the height from the bottom of the mold (flat surface in which the mold is being assembled on) to the top of the mounting bracket die support surface to within 0.005" using a mallet and height gauge (vernier dial calipers).



Mold Box Assembly

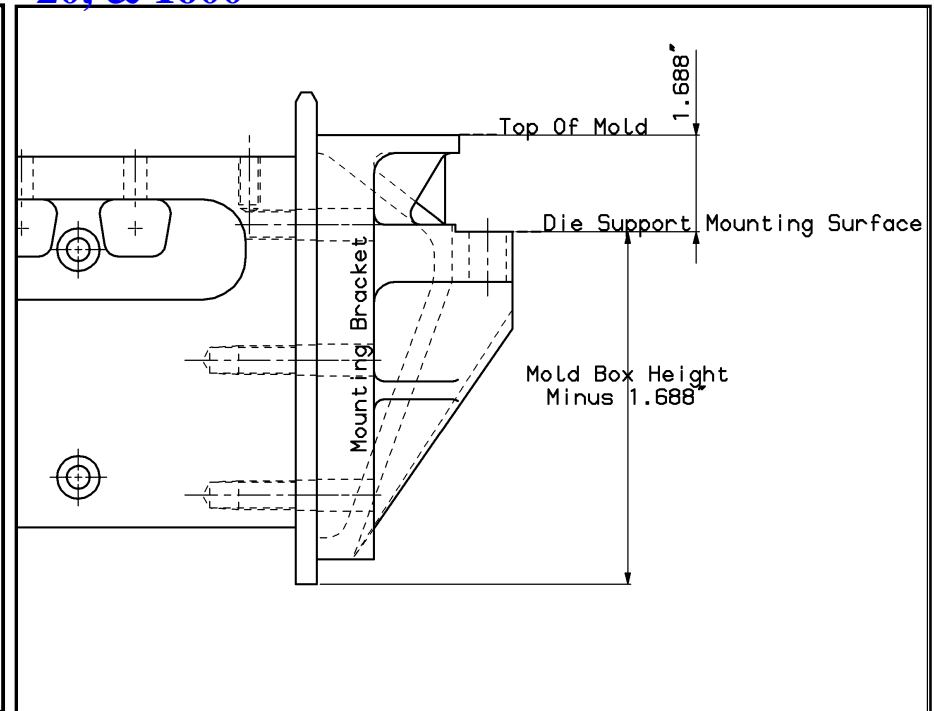
Mounting Bracket Height Adjustment Specification

2-Block Molds Model 10AC, 21, & 22



For Model 10AC, 21, & 22 the height of the die support surface to the bottom of the mold is determined by subtracting 2.687" from the overall height of the mold box.
(i.e. $7.875'' - 2.687'' = 5.187''$)

3&4-Block Molds Model 12AB, 12AC, 16, 20, & 1600



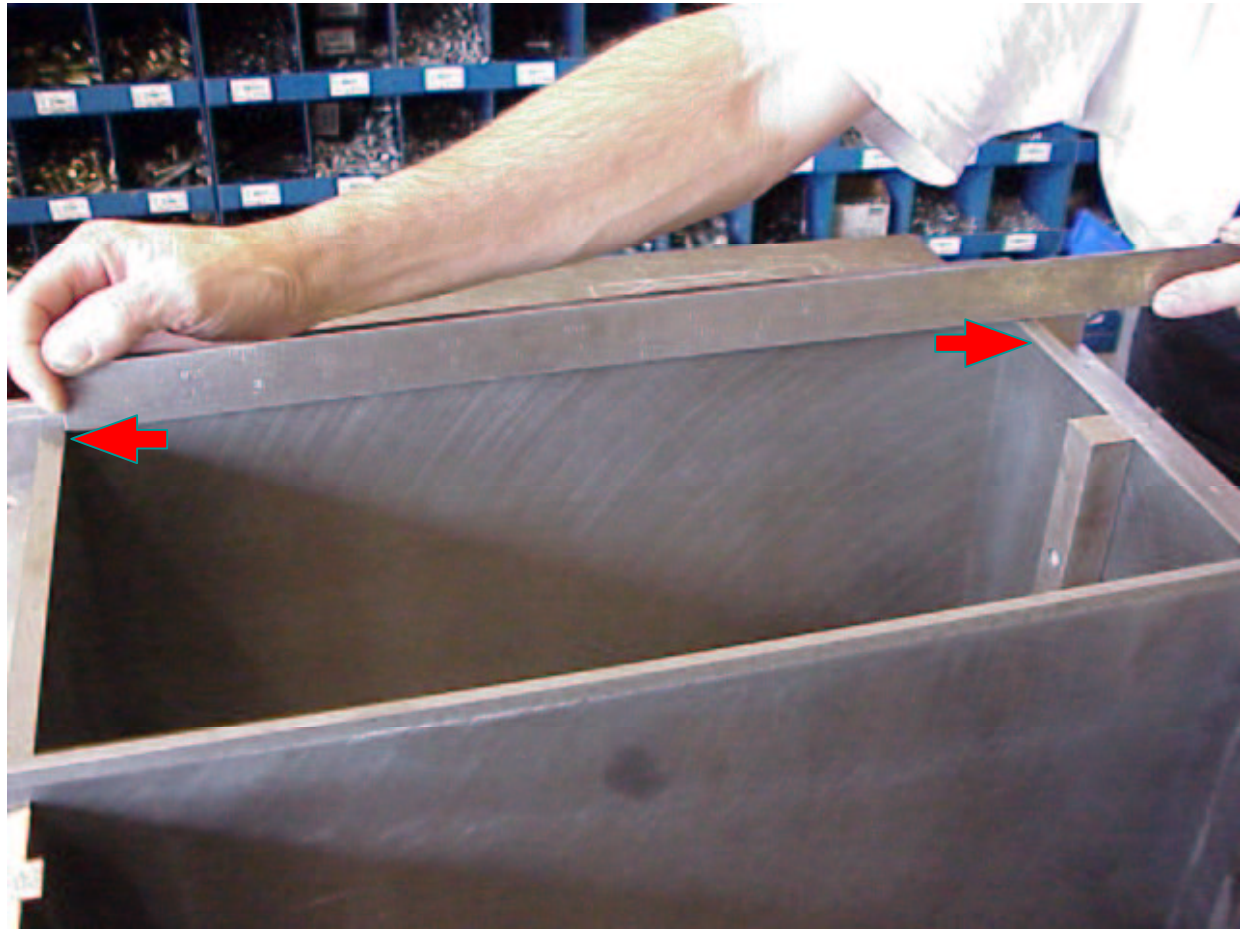
For Model 12AC, 16, & 1600 the height of the die support surface to the bottom of the mold is determined by subtracting 1.687" from the overall height of the mold box.
(i.e. $7.875'' - 1.687'' = 6.187''$)

Mold Box Assembly

Cavity Adjustment Process

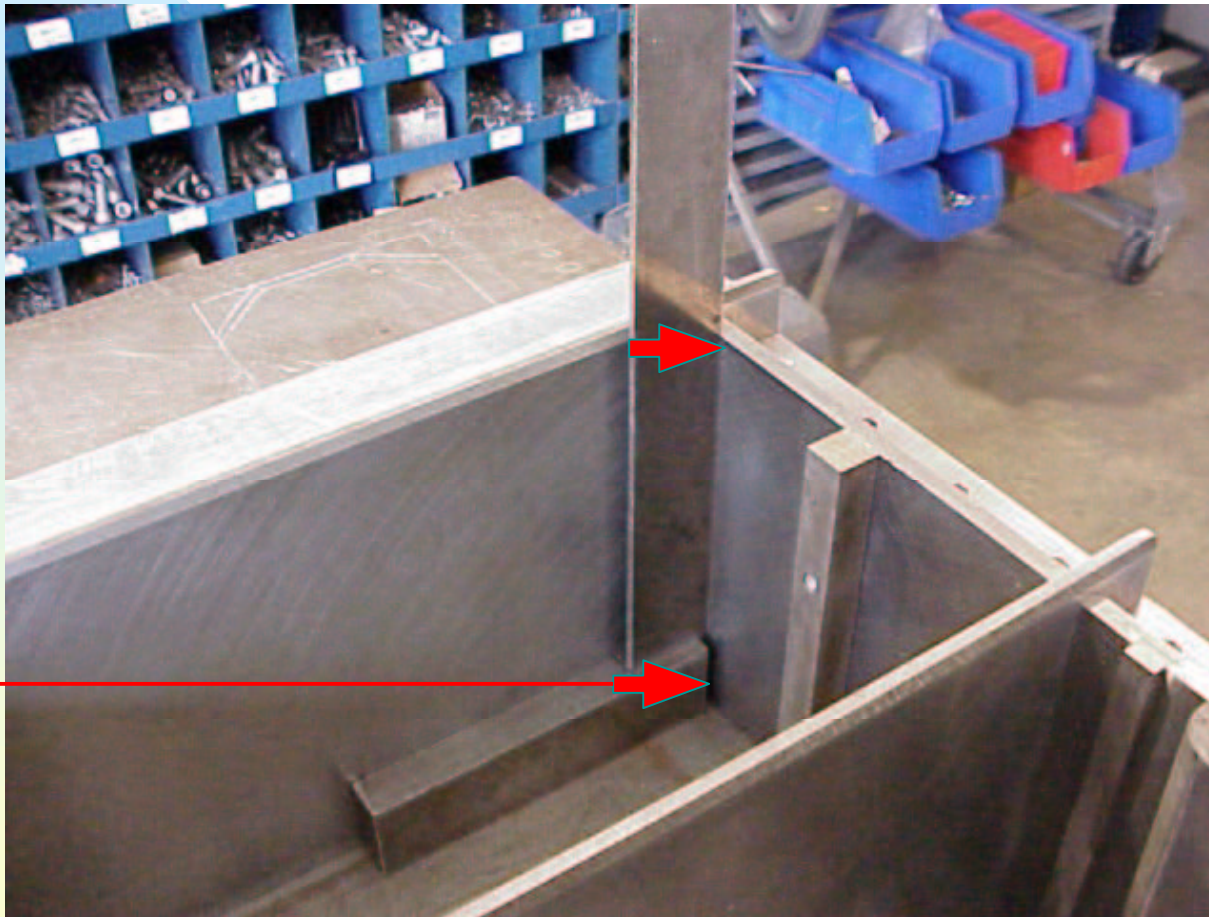
- Measure the cavity length at the top of the Mold.

Columbia assembles the cavity to 1/32" under the modular block length.



Mold Box Assembly

Cavity Adjustment Process

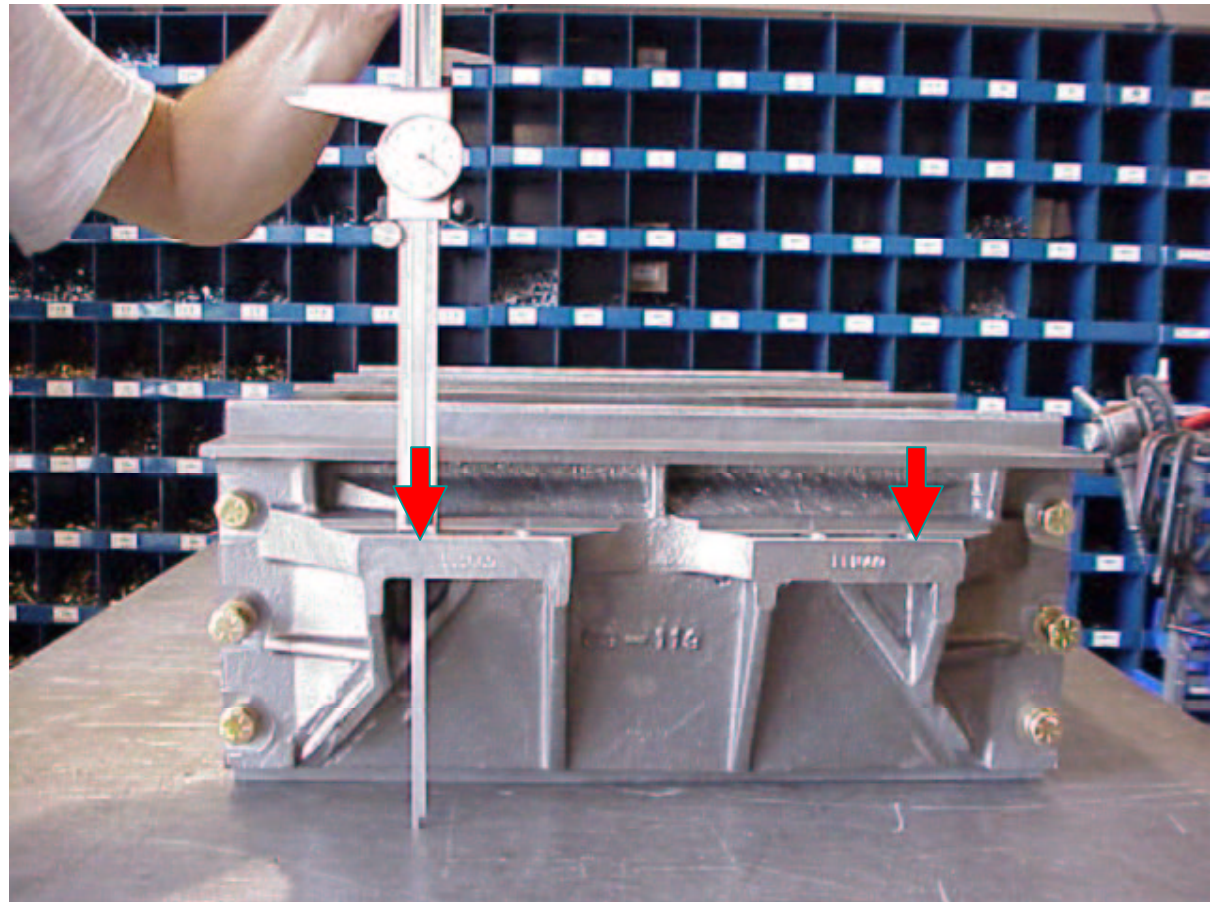


- Use a Machinist's square to check for draft on the cavity ends. Place the square inside the block cavity on the surface that the mold is being built on and slide the upright end of the square up against the end liner.

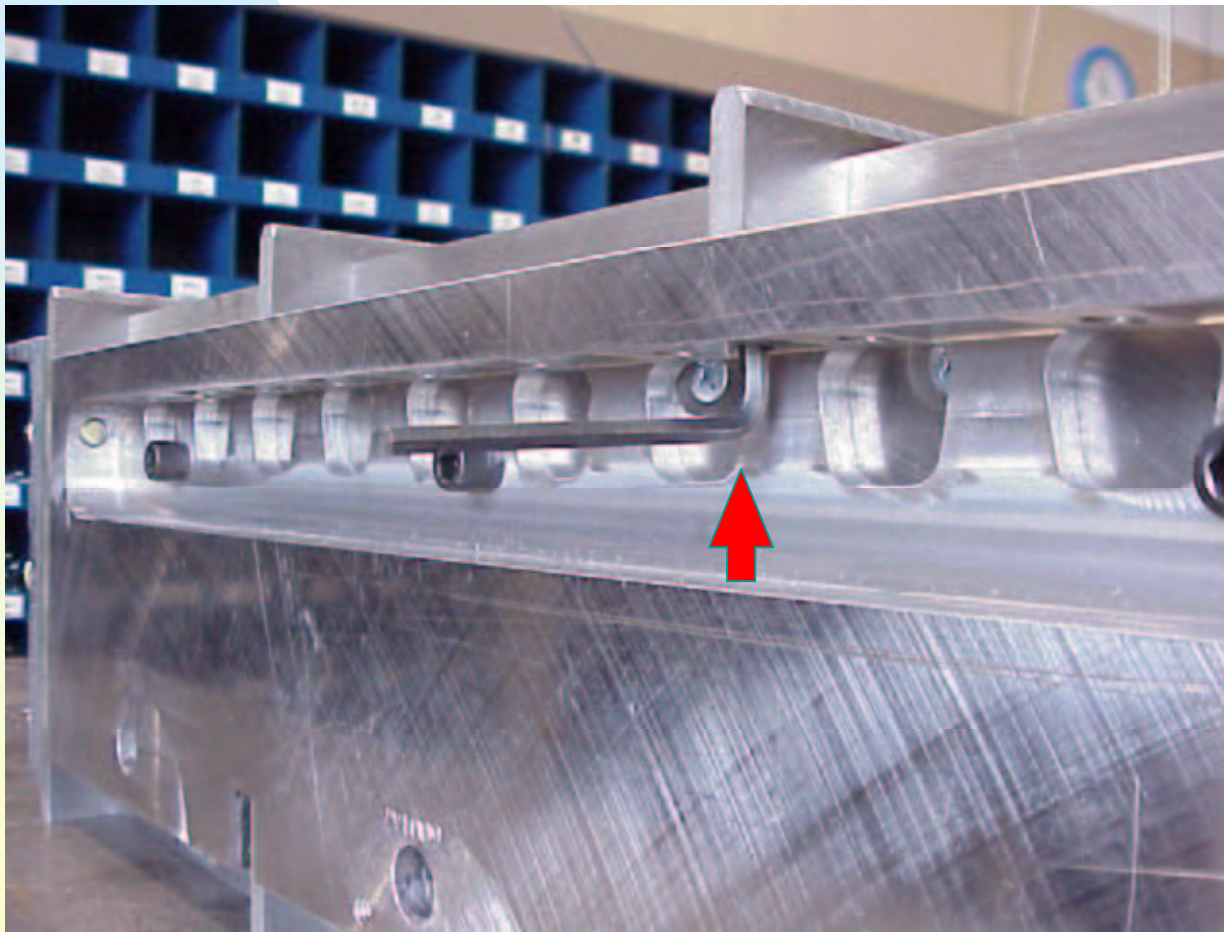
A slight positive draft (light shining through near the bottom up to 1/64" per end) is acceptable and aids in stripping the product and reducing mold wear. **Avoid Negative Draft!** Adjust the draft using a soft headed mallet prior to fully tightening the mntg bracket bolts. 32

Mold Box Assembly

- Double check the measurements of the cavity, length, draft, and mounting bracket height.
- Torque all mounting bracket bolts to 120 ft.-lbs. when the height measurements are correct.



Mold Box Assembly



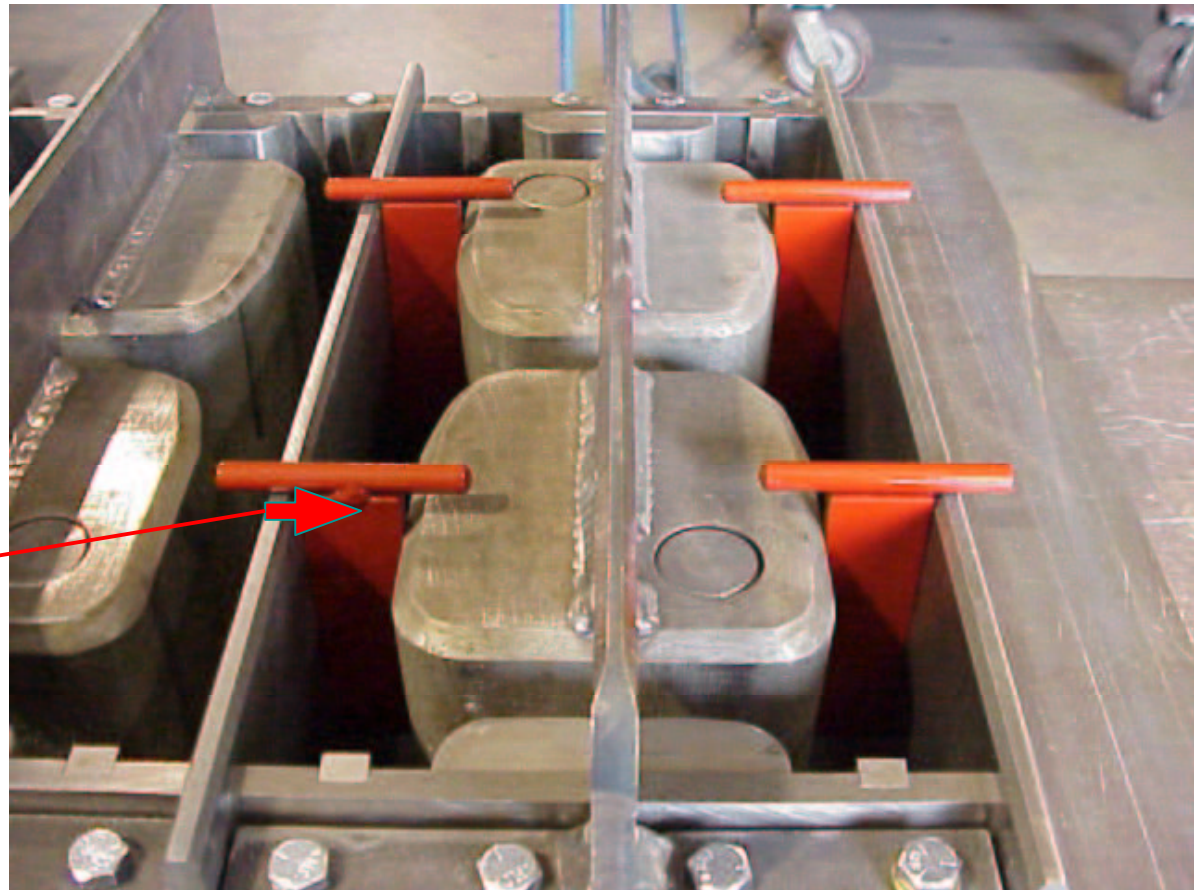
- With the cavity length and end draft adjusted, tighten the self locking setscrews (see pg 12) which lock the partition plates. These are located on the underside of the end plate top flange.

Note: The partition plates and end plates will prematurely fail during operation if the operator/assembler fails to keep the setscrews tight.

- Block up the mold box to approximately 1" off assembly surface, and install the corebar assemblies. Ensure that lock washers and lock nuts are used on all corebar assembly mounting bolts. Do not tighten the corebar assembly fasteners.
- Utilizing alignment gauges to set the walls and end webs, position the corebar assemblies to the correct alignment within the cavities and tighten fasteners to proper torque.

Mold Box Assembly

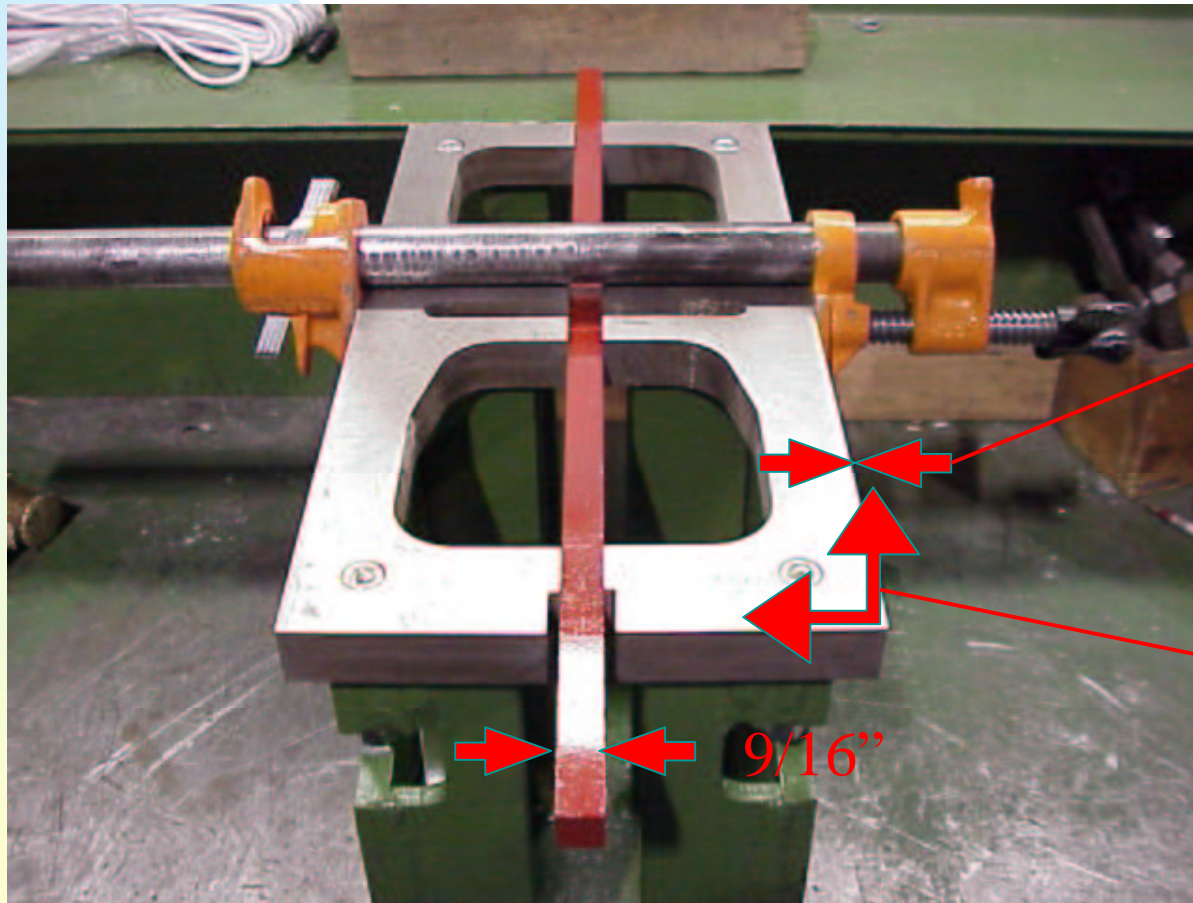
Corebar Assembly Alignment in Mold Cavity



Reference Page 7 for correct gauges

Mold Box Assembly

Compression Shoe to Head Plunger Alignment

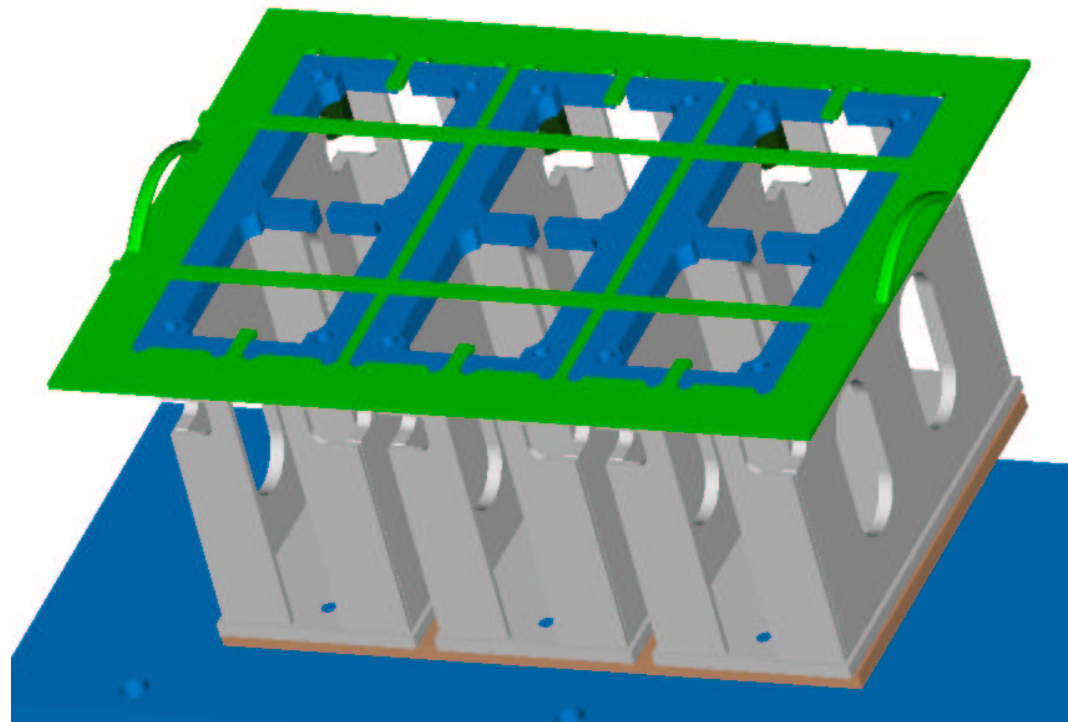


- Set One head plunger onto the table shoe side up. Bolt the shoes to head Plungers using lock washers and Nylon Insert lock nuts. Maintain a 3/8 to a 9/16" gap between the shoes; (depending on the style of block manufactured – 9/16" is the standard for basic Concrete Masonry Units).
- This should give a 1/32" clearance on each side (between shoe and partition plate) when the shoes enter the mold box.
- Make sure both shoes are parallel and square.
- Set the shoes to 1/32" per side (1/16" total) under the block width. Square ends, and tighten to 44-ft. lbs.

- **Optional Compression Shoe Setup Gauge**
- Assemble Head Plungers onto the Head Plate snugging the bolts tight but not torqueing at this time.
- Assemble the Compression shoes onto the Head Plungers with bolts tightened finger tight.
- With the Head Assembly positioned upside down, (compression shoes up, as shown) place the Shoe Setup Gauge onto the shoes, moving the shoes until all fit into the gauge cavities.
- Tighten shoe and Head Plunger bolts to torque specifications and remove the gauge. (page 20-23)

Mold Box Assembly

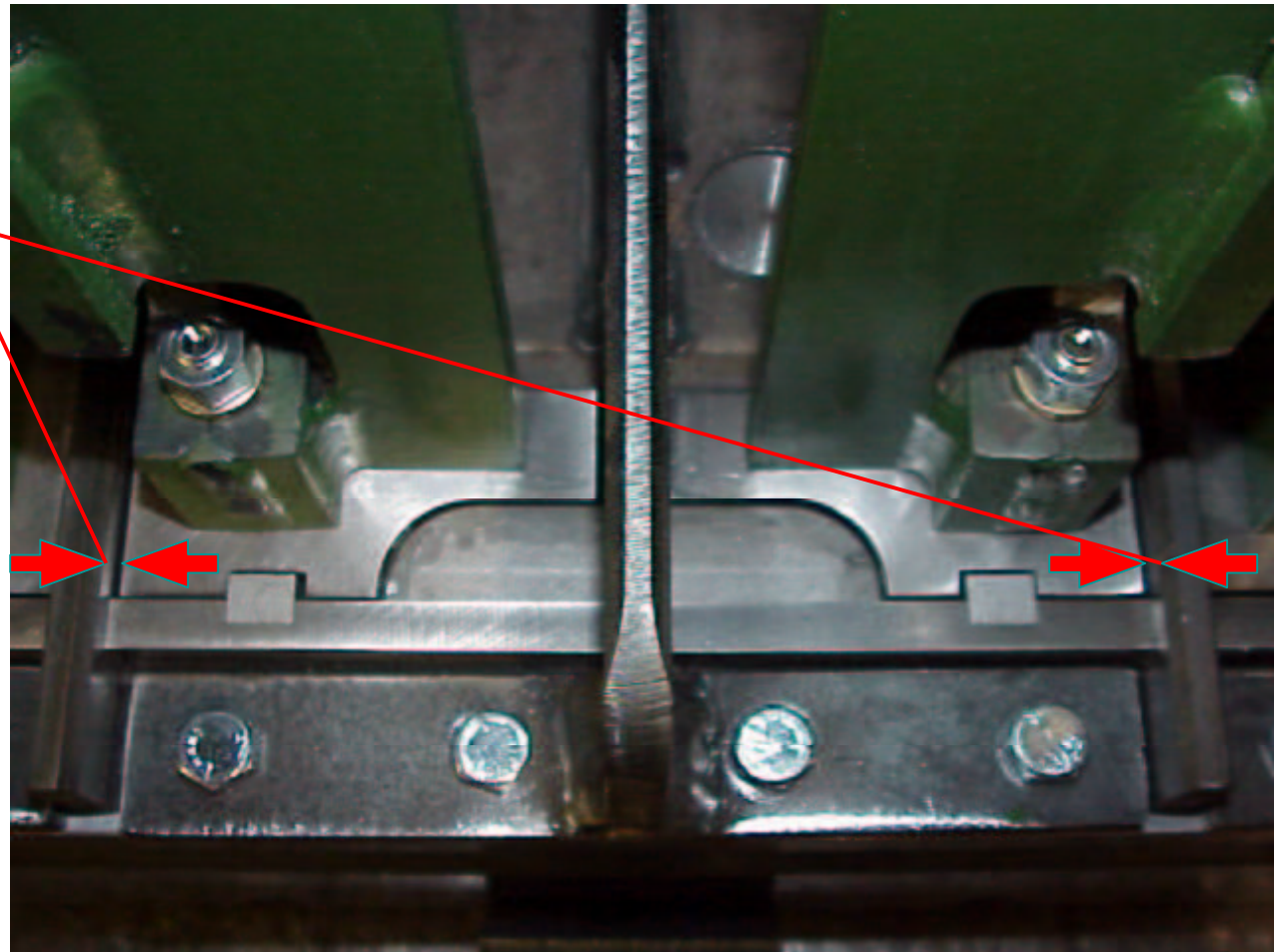
Compression Shoe to Head Plunger Alignment



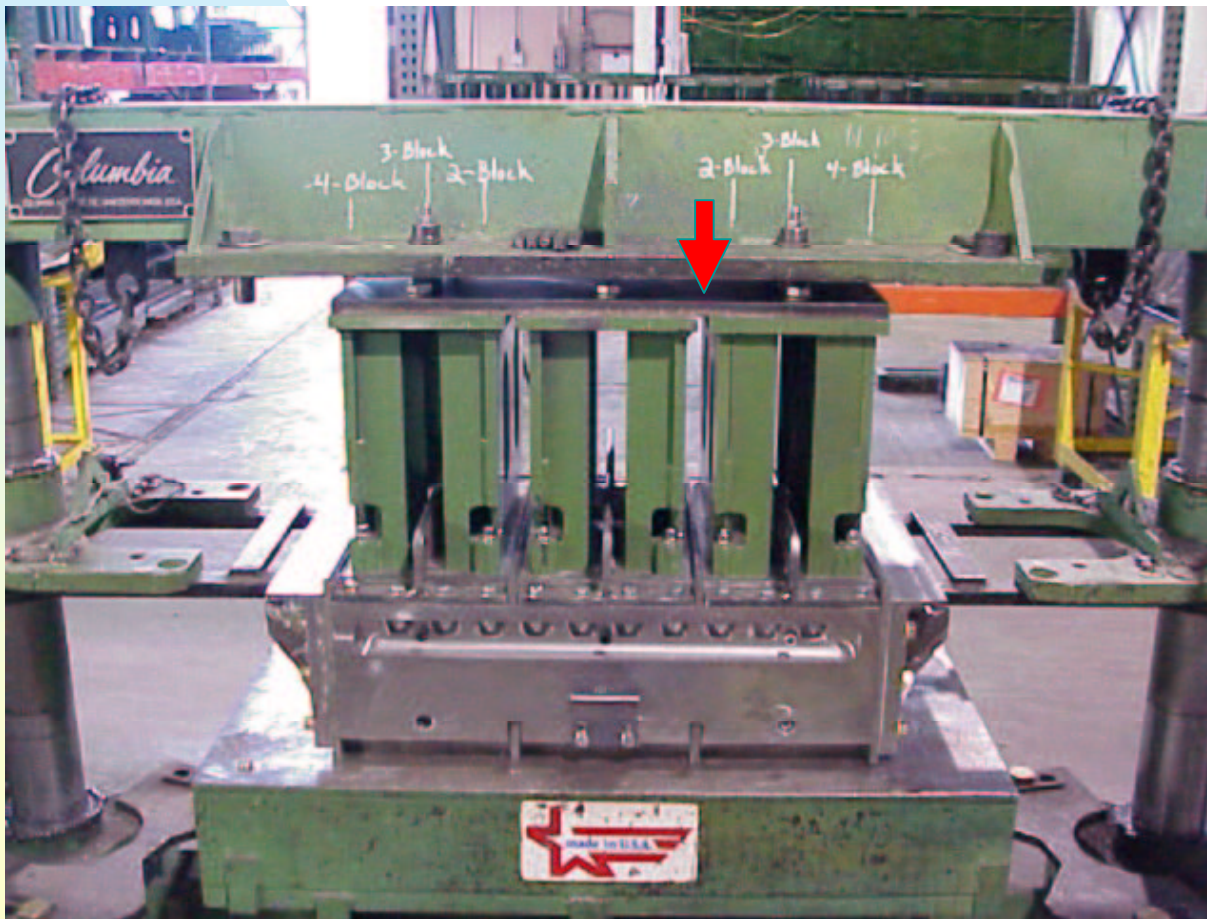
- Set the mold box in the mold alignment fixture or Block Machine.
- Place each head plunger/shoe assembly into their respective cavities, centering them. Ensure that a $1/32$ " clearance exists between the shoes and the partition plates. Place the head plate on top the head plungers and insert bolts (placing lock washers on the bolts). Do not tighten the bolts to full tension. This allows adjustment from side to side.

Mold Box Assembly

Head Assembly to Mold Cavity Alignment



Mold Assembly Alignment

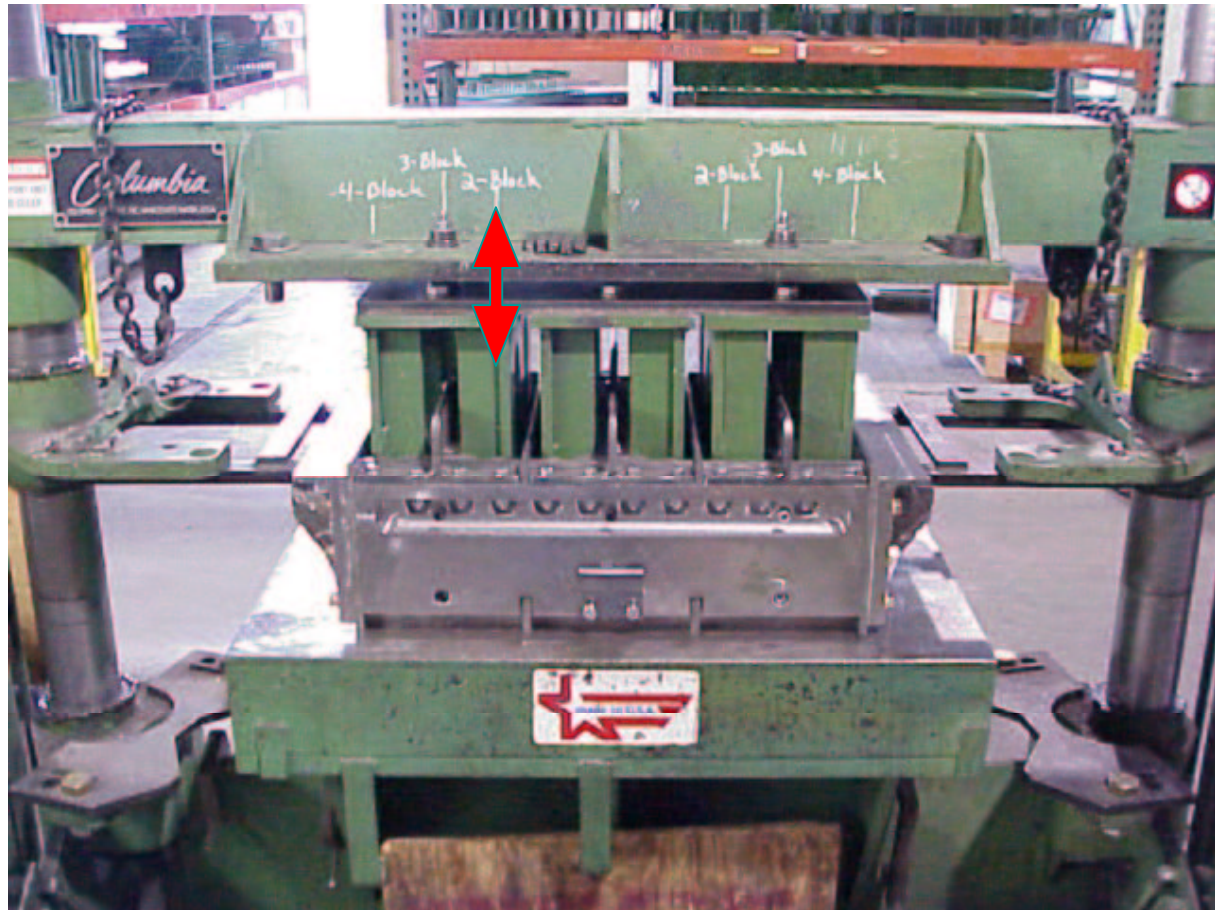


(Mold is shown in Mold Alignment Fixture)

- Bring Machine compression beam, or upper beam of Mold Alignment Fixture, down until it contacts the head assembly and bolt head assembly to compression beam.

Mold Assembly Alignment

- Cycle the head assembly in and out of the mold box to check for proper fit. *Cycle it slowly the first few times just in case the shoes are not lined up correctly.* When cycling the head assembly up and down, listen for any squeaks or clicks. Note their locations and adjust the head plungers or shoes for clearance.



(Mold is shown in Mold Alignment Fixture)

Mold Box Assembly

Conclusion

- When you are done testing the mold, Torque the head bolts to proper specifications and re-check for Proper clearances.
- **The Mold Is Now Ready For Production**

