Die Class Presentation

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Reymond Dies

Built Brickyard Tough!

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Die-Versity

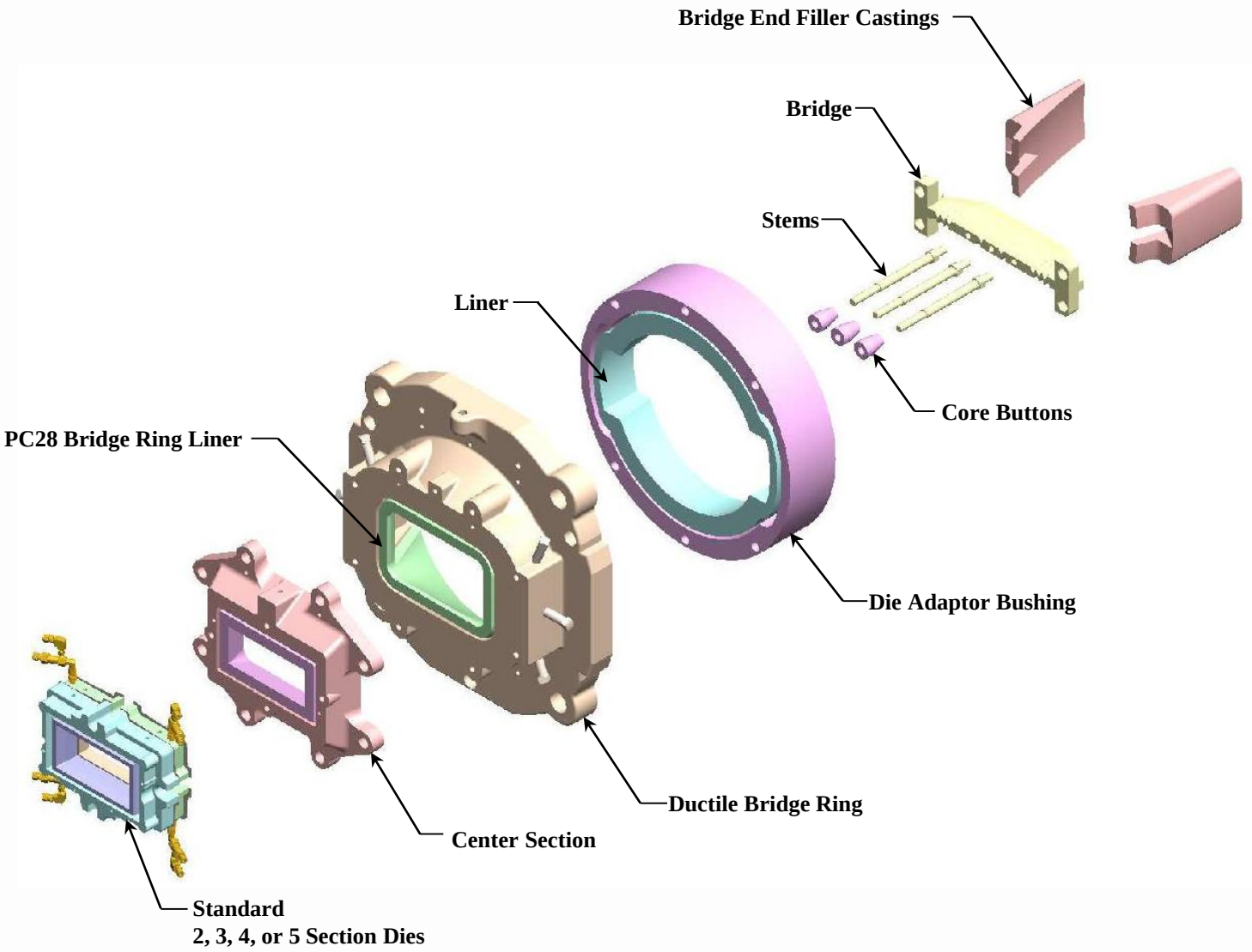
- **Modular size dies**
- **Queen size dies**
- **Standard size dies**
- **King size dies**
- **Norman dies**
- **Utility dies**
- **Kiln car refractory dies**
- **Corner veneer block dies**
- **Solid refractory unicircle block die**
- **6 x 12 CSR dies**
- **8 x 12 CSR dies**
- **Standard block dies**
- **16” brick dies**
- **Floor tile dies**
- **Roof tile dies**
- **Split tile dies**
- **Shape dies of all types & sizes**
- **Many more to choose from**

Reymond dies are designed to outperform and outlast off-the-shelf dies. Quality material and workmanship are used in conjunction with state-of-the-art technology in every product Reymond produces. Ductile iron housings and chrome alloy & tool steel liners provide wearability.

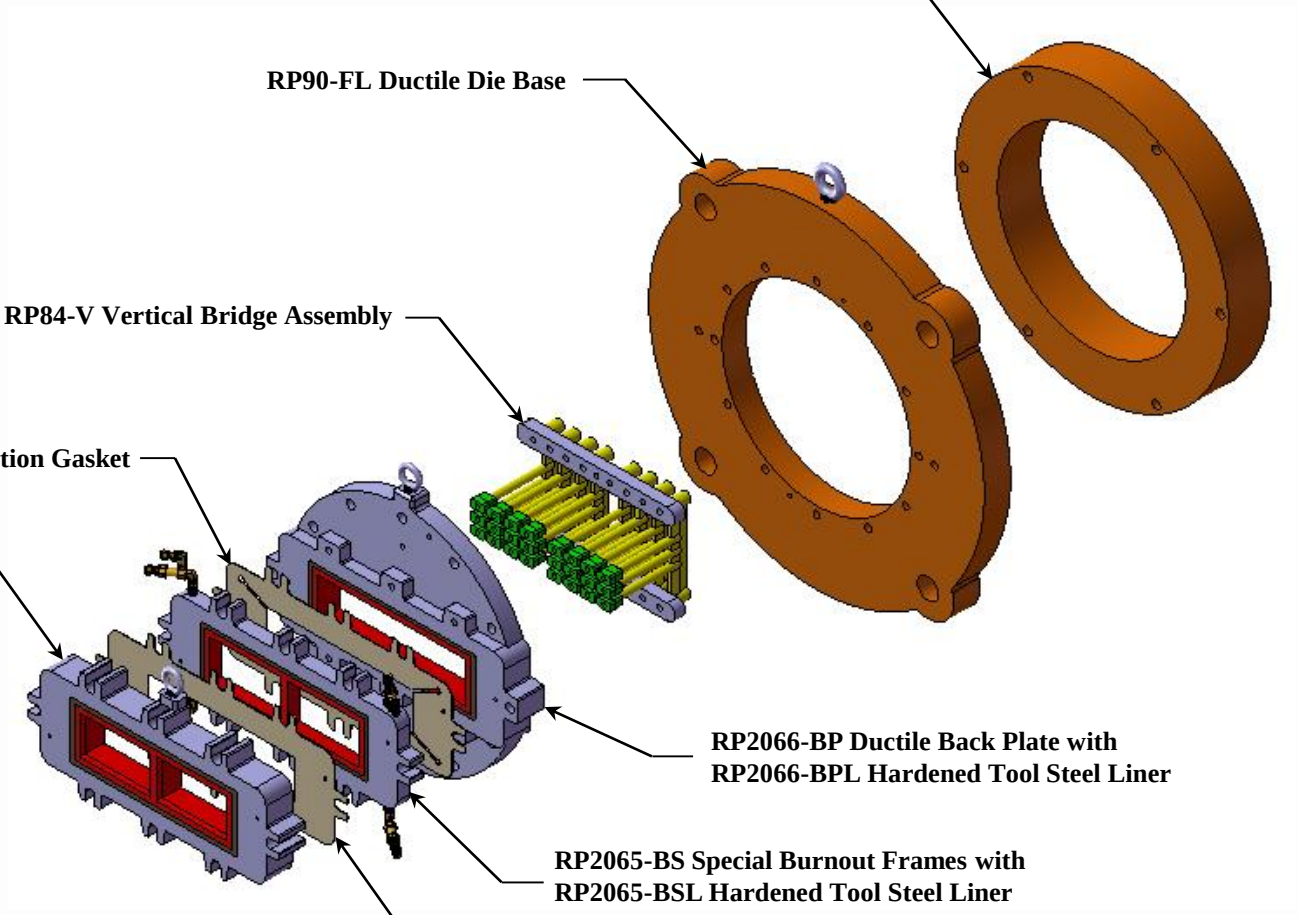
Reymond’s unique lubrication system provides precise volume control The dual lubrication system of a Reymond die unit ensures valuable lubricant control from start to finish. Lubrication systems from 4 to 12 points are used, depending upon the application. Each point can be individually controlled to ensure precise and adequate lubrication.

Flow consistency ensures end-product quality. Consistency and uniformity are vital in manufacturing a quality product. Reymond strives to lead the way to help our customers continue to produce the highest quality products possible.

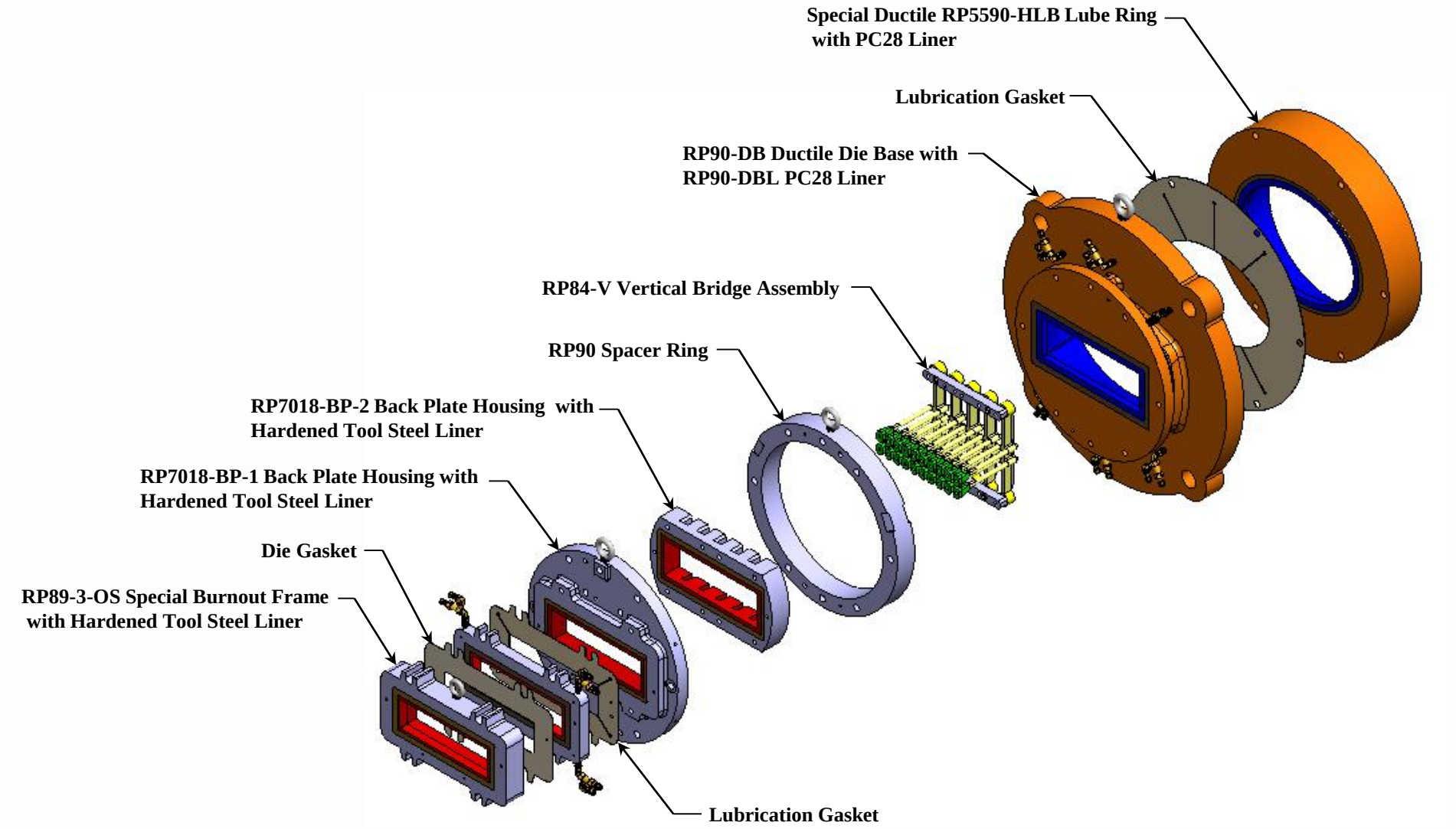
Reymond Die Assembly



Reymond Flat Back Die Assembly



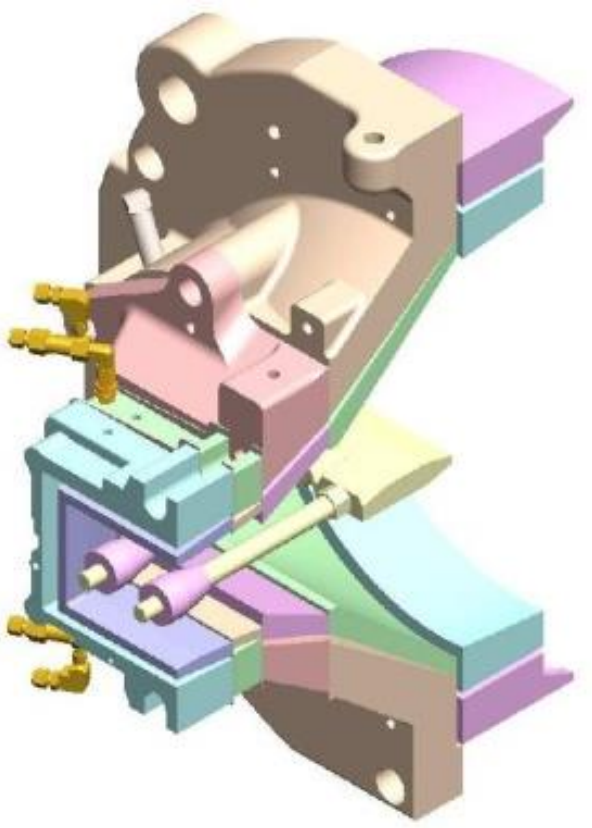
Reymond Hybrid Die Assembly



Linings and Housings

Reline-Ability

- Ability to reline from Front to Rear
- Cost Effectiveness
- Typically Cap is relined 2-3 times to 1 Center Section
- Center Section is relined 2-3 times to 1 Bridge Ring
- Bridge Ring and Oil Ring are typically relined together



Ductile Housings

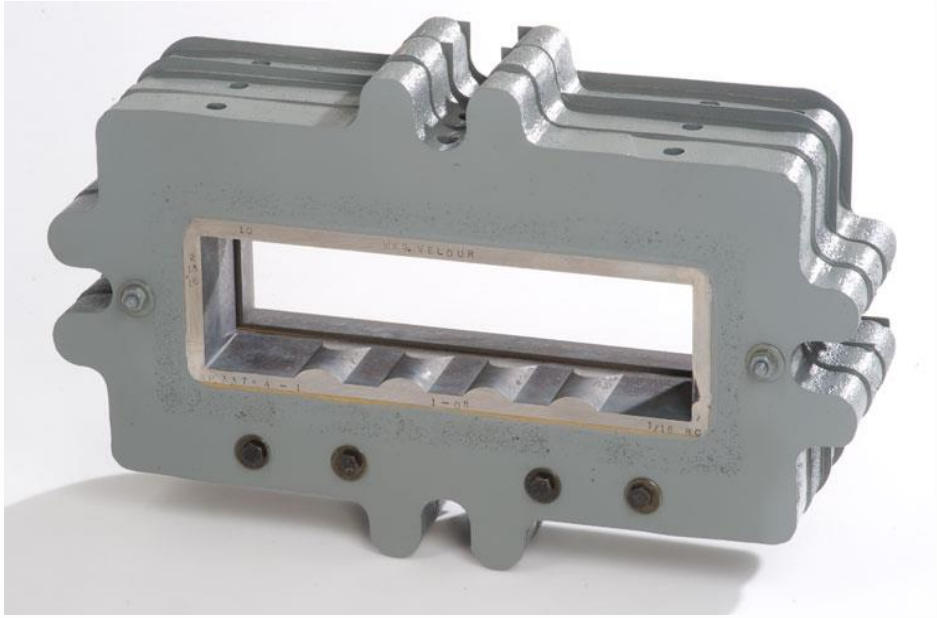
- Consistency of all casted irons are controlled by spectrometer testing
- Each mating surface is machined to ensure a proper fit with other mating parts
- Each housing is totally reusable
- Center section housings and die frames have alignment holes drilled to match corresponding pins to ensure proper alignment.

PC28 Liners

- Consistency of each pour controlled by spectrometer testing
- PC 28 iron is used in all areas of the unit except for the cap.

Tool steel liners

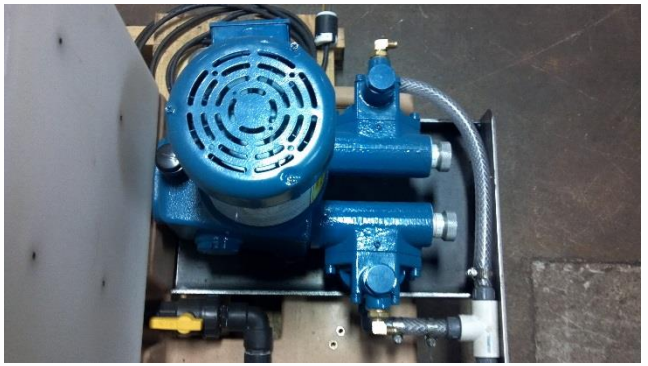
- Die caps are lined with fabricated tool steel liners
- Tool steel is harder than PC28
- Tool steel liners resist wear and streaks better than PC28
- Tool steel liners are heat treated to 62-63 RC and annealed back to 60-61 RC to minimize breaking
- Liners are stamped with size, radius corner, work order, product description & date
- Each liner is machined to exact size using a wire EDM



Lubrication and Lubrication Systems

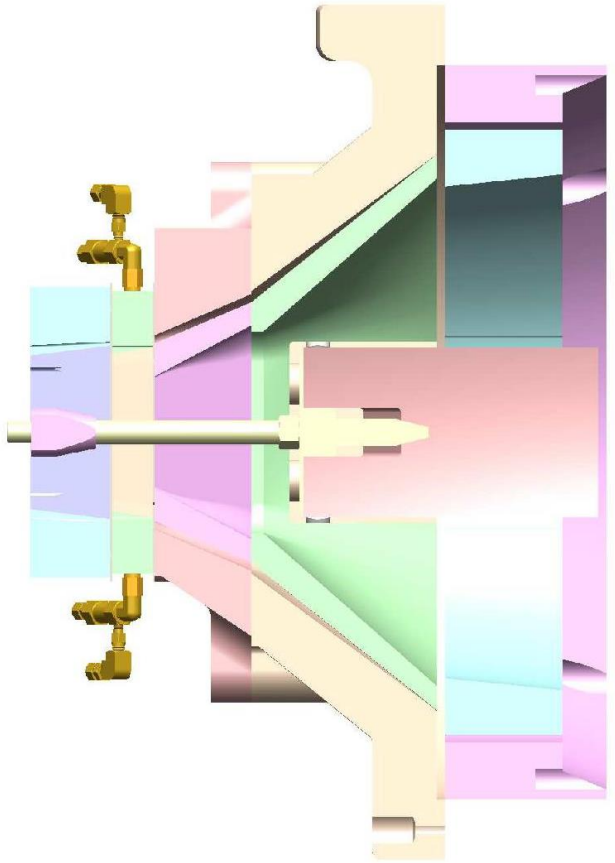
Why use lubrication?

- Longevity of the interior die surfaces
- Ease of material flow/die balance
- Reduction of column temperature

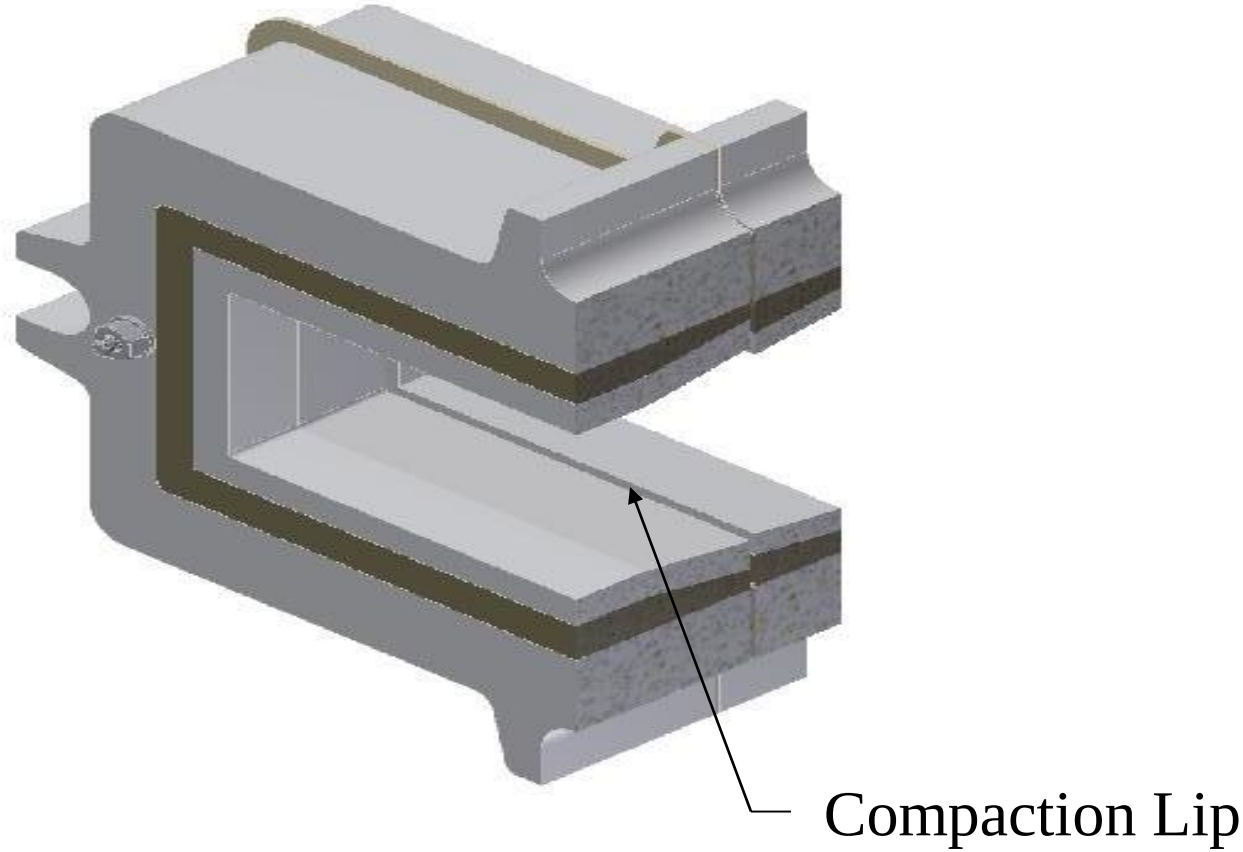


Compaction Lips

- Always maintain a compaction lip. As the compaction lip wears down, it negatively affects the quality of the brick being extruded. If there is less than a 1/32” (0.7938 mm) lip, we highly recommend relining the die.

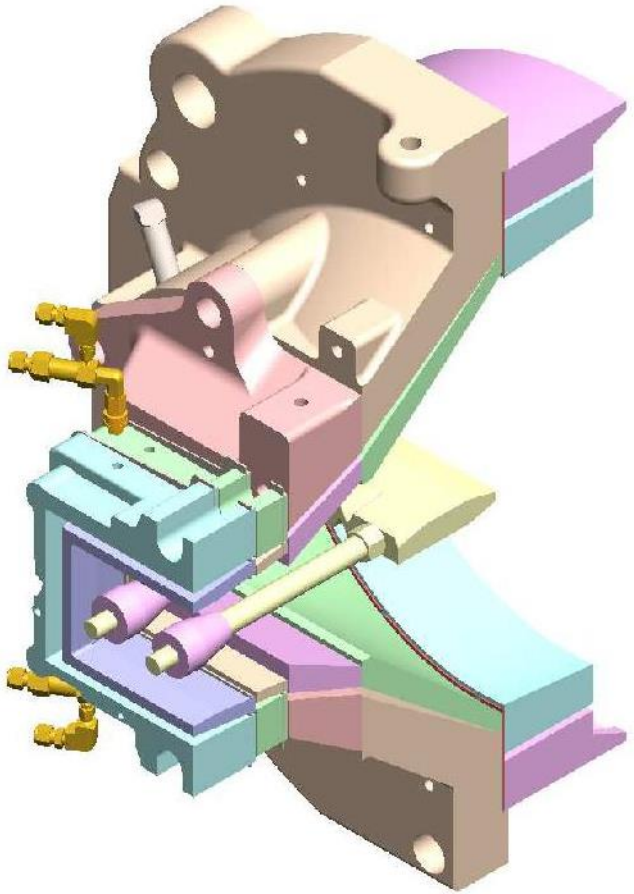


Compaction Lip Within The Cap

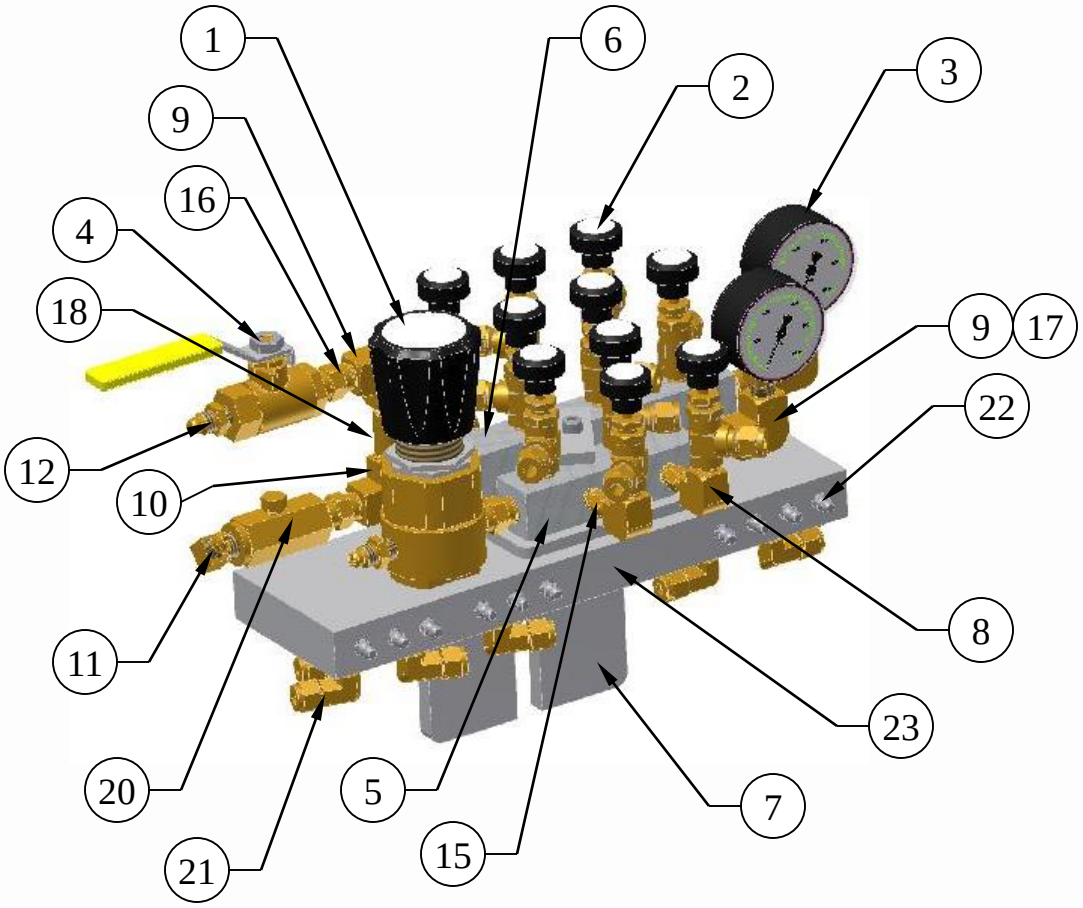


Lubrication Lips

- 1/8” (3.175 mm) lip between each mating part “new”
- Lips act as reservoir for lubricant
- Requires less lubrication pressure from pump

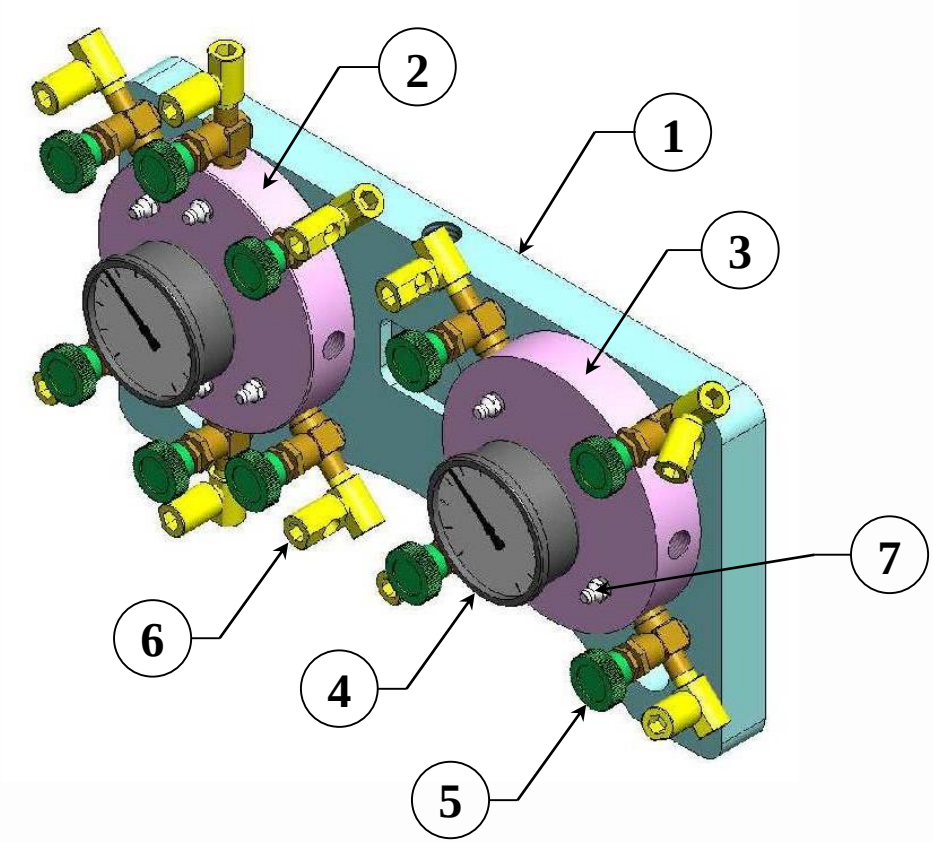


Single Pump Lubrication System



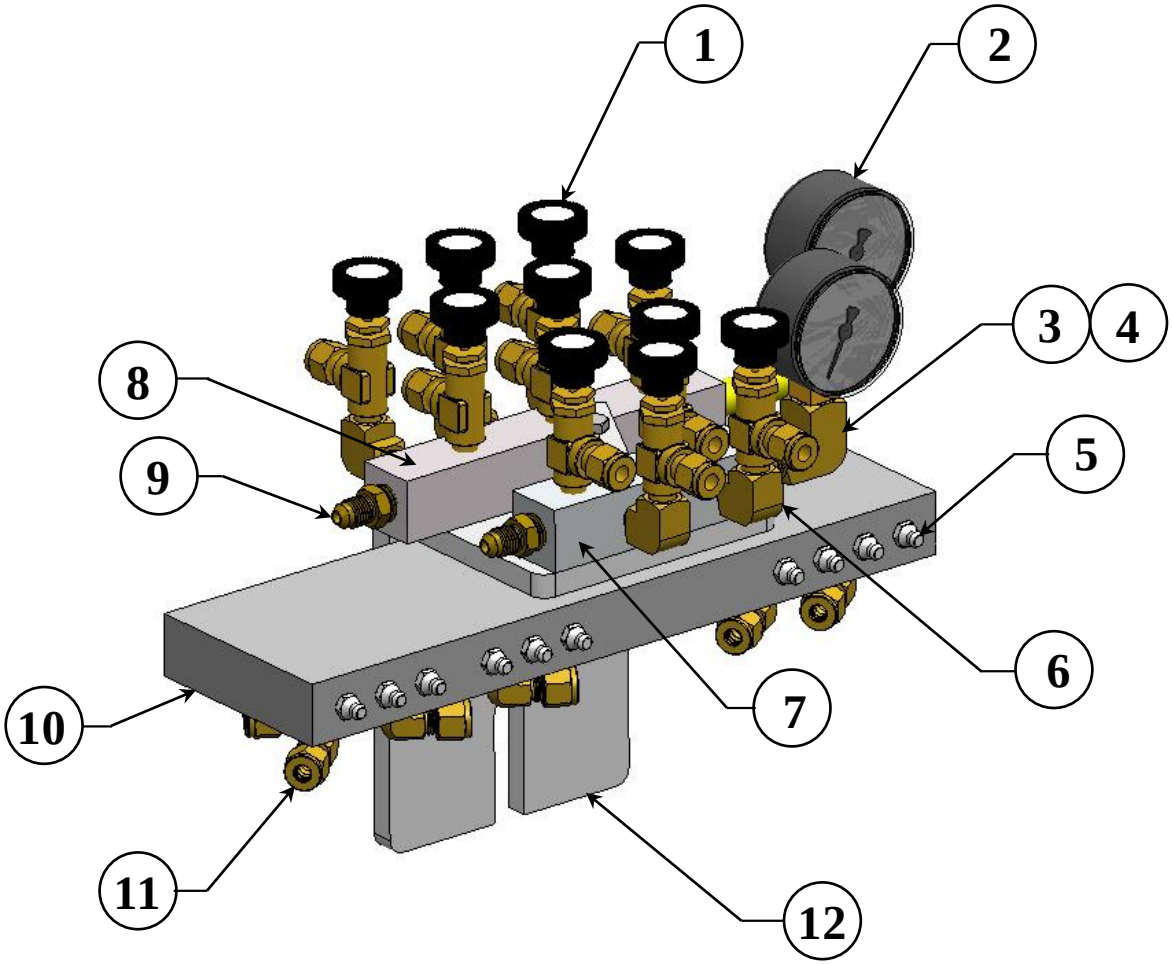
1) "Go" Pressure Regulator
2) Needle Valve
3) Gauge
4) Ball Valve
5) 4 Point Manifold Strip
6) 6 Point Manifold Strip
7) Bracket
8) 1/8" Female Elbow
9) 1/4" Female Elbow
10) 1/4" Female Tee
11) 1/4" Male Elbow
12) 1/4" Male Straight Fitting
13) Hydraulic Hose Assembly 12" (not shown)
14) Hydraulic Hose Assembly 15 Ft (not shown)
15) 1/8" Hex Pipe Nipple
16) 1/4" Hex Pipe Nipple
17) 1/4" x 1-1/2" Pipe Nipple
18) 1/4" x 2" Pipe Nipple
19) Lube Line (not shown)
20) 1/4" Check Valve
21) 1/4" Female Elbow
22) 1/8" Grease Fitting
23) Grease Manifold

New Style Lubrication System



1) New Style Lube Manifold
2) Rear Oil Ring Manifold
3) Die Manifold
4) Gauge
5) Needle Valve
6) Pipe Fitting – Hex Key Elbow
7) Grease Fitting
8) Hydraulic Hoses (not shown)
9) Hydraulic Fittings (not shown)

Double Pump Lubrication System



1) Needle Valve
2) Gauge
3) 1/4” Female Elbow
4) 1/4” x 1-1/2” Pipe Nipple
5) 1/8” Grease Fitting
6) 1/8” Female Elbow
7) 4 Point Manifold Strip
8) 6 Point Manifold Strip
9) 1/4” Male Straight Fitting
10) Grease Manifold
11) 1/4” Female Elbow
12) Bracket

Double Pump Lubrication

- Using two pumps eliminates the use of the existing pressure regulator
- Allows overall superior lubrication control
- Becomes a necessity in high production factories to be able to supply enough lubrication volume

Manifold & Pump-Pressure Settings

- Manifold flow control valves should all be set equally open one half turn
- Manifold pressure typical settings would be:

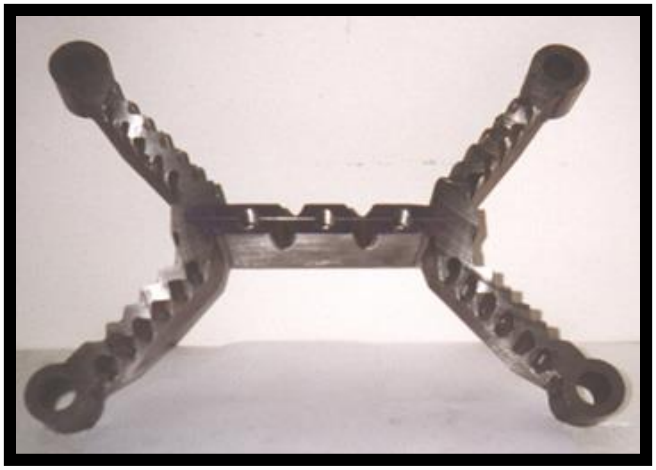
  Front: 90-125psi Rear: 300 – 400psi

  However, pressures above or below are not uncommon
- These settings are able to be reached with either single pump or double pump systems

Bridges, Stems, Sleeves, Cores, and Bridge End Fillers

Core Bridges

- Custom made to any specification
- Hardcoated with a nickel based alloy & tungsten carbide powder for longer wear life
- 10-hole double bars & custom bridges also available
- X-type bridges require special bridge ring



Single Bar Bridge

- Each bar is powder hard coated for unmatched wear
- Bars are machined to a precise dimension to ensure a repeatable fit within the die unit
- Knitting grooves are machined into each bar to help promote knitting of material
- Ability to replace stems and reuse bridge bar

Double Bar Bridge

- Each bar is hardcoated for unmatched wear
- Bars are fabricated using a jig to ensure a repeatable fit
- Center openings – front and rear - are spaced to allow material to flow balanced and are based on coring and die openings
- All double bars have welded in stems

Bridge Sleeves

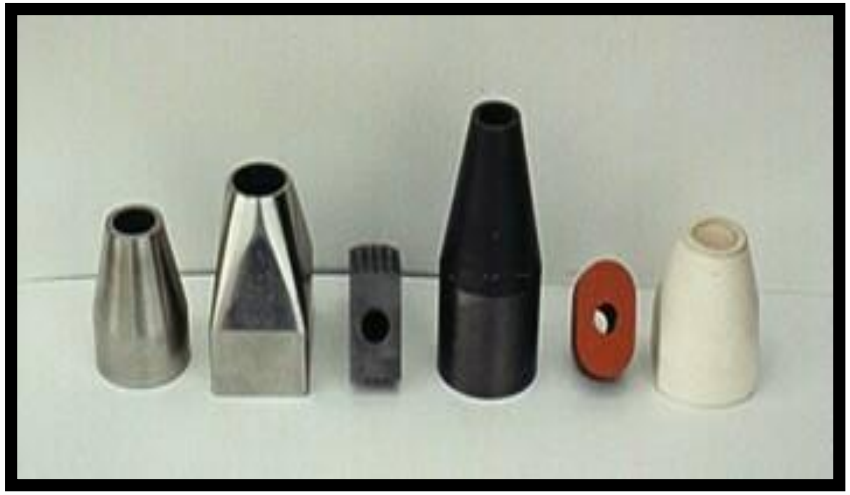
- Sleeves are hard coated with the same coating as bridge bars
- Sleeves are offered in 7/8” (22.225 mm) and 1” (25.40 mm) diameters
- High grade threaded rod is used to mount the sleeves
- Sleeve length is calculated on two items: cap length and core length
- Diameter of the sleeve is based on overall root diameter of core

Solid Stems

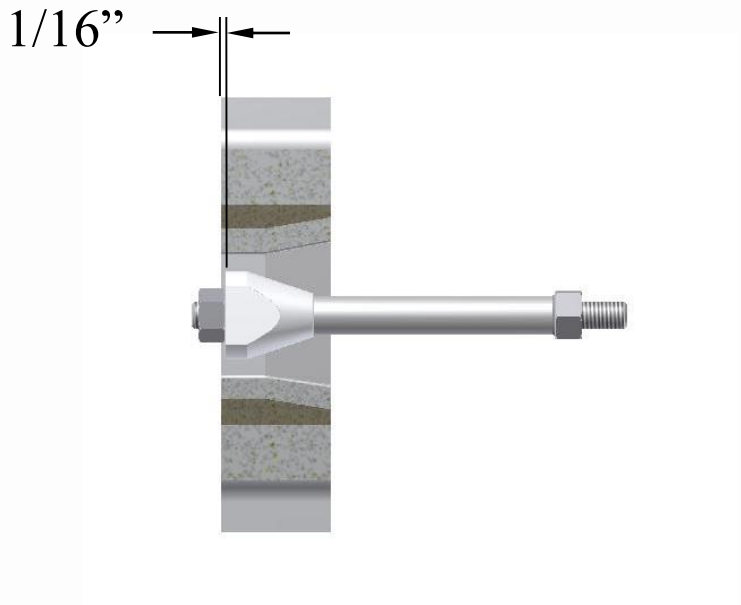
- Stems are machined by CNC lathe to ensure consistency
- Stems are hard coated with the same coating as the bridge bar
- Stems are sold in various diameters
- Stem lengths are based on cap and core lengths

Coring Options with the Reymond Die

- Today, production cost per 1k of brick is everything
- Today's voids reach in excess of 30% & add immense stress to the die unit
- This is key to our "Built Brickyard Tough" slogan
- With the use of a wire EDM, virtually any shape core can be produced
- In conjunction with the wire EDM and a highly skilled bridge fabrication department, technical bridge and coring combinations can be produced



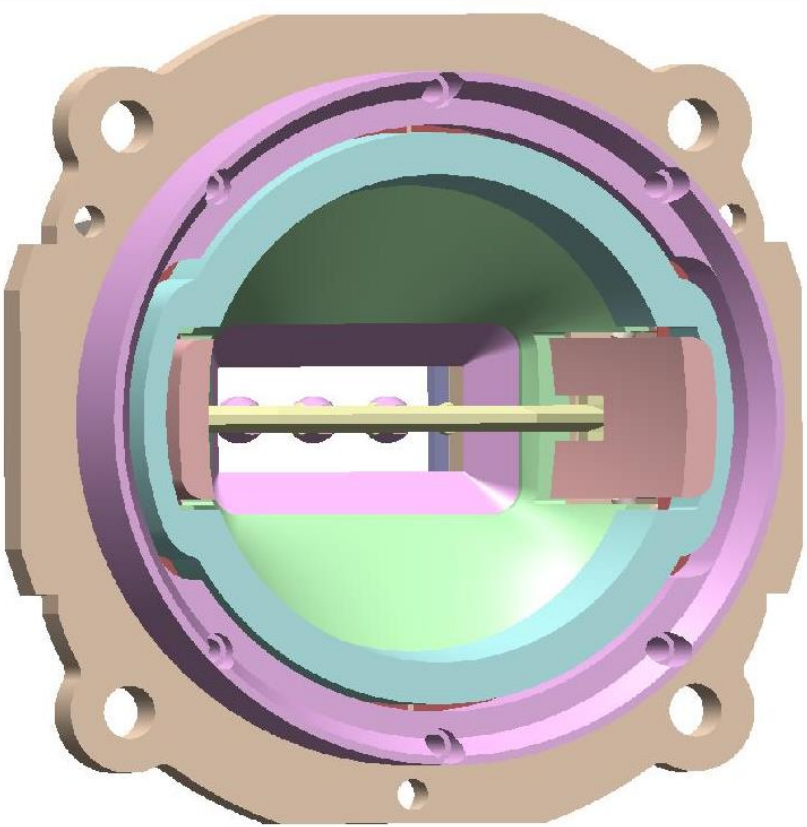
Proper Inset of Core within the Cap



- All Die Combinations are figured so that the Cores are recessed 1/16” (1.5875 mm) inside the Face of the Cap

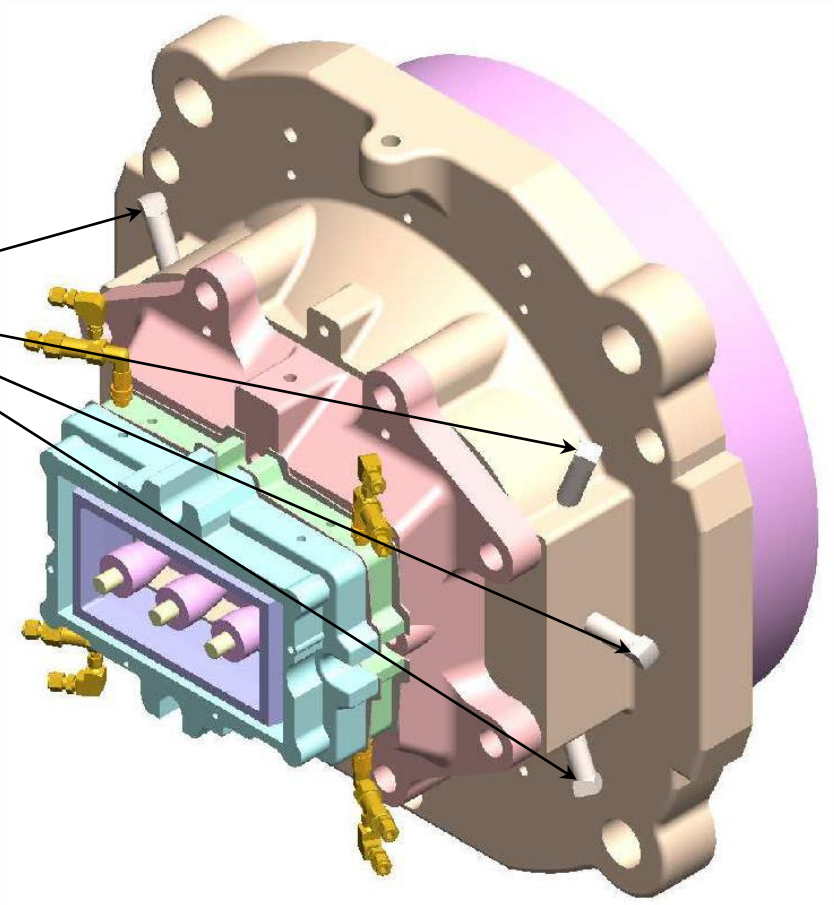
Importance of Bridge End Fillers

- BEF's create a smooth material flow over the bridge pocket (see right pocket)
- Without BEF's, clay-over-clay can result in laminations (see left pocket)
- Without BEF's, undue wear is caused to the die unit
- Without BEF's, premature streaking from the center section out through the cap can occur
- BEF's prevent loose, dry material from lodging in the bridge pockets
- BEF's protect bridge pockets from wear
- BEF's prevent possible flow, balance issues
- BEF's prevent possible lubrication issues



Adjustable Bridge

- Bridge is externally adjustable from the outside of the unit
- On each side of the unit you will find (3) bolts that are used to adjust the bridge: left, right, up and down
- Bridge is easiest to adjust during operation
- It is important NOT to over-tighten the mounting bolts so that that bridge can be adjusted



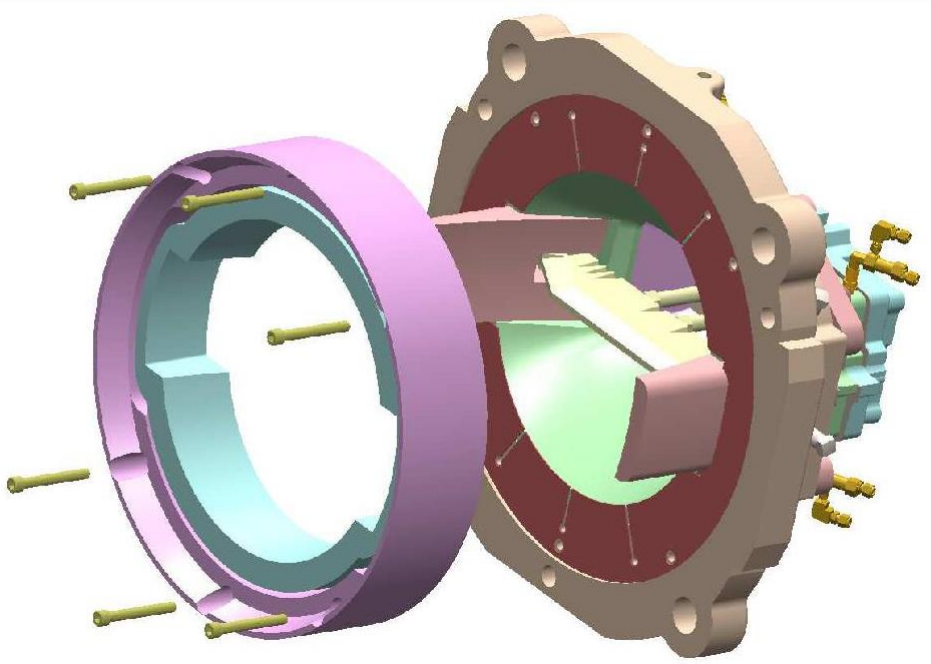
Oil Rings

Hinge Door vs. Slider

- A hinge door would require a tapered flange oil ring to seal once the door is closed

- A hydraulic die changer would require a flat back oil ring that has no flange so that it would not catch during shifting of the slider

Attaching Oil Ring



- Bolts should be torqued to 250 ft/lbs on dies attached to J.C. Steele 90 machines.
- Bolts for all other machines should be torqued to 125 ft/lbs

Telescoping Ability

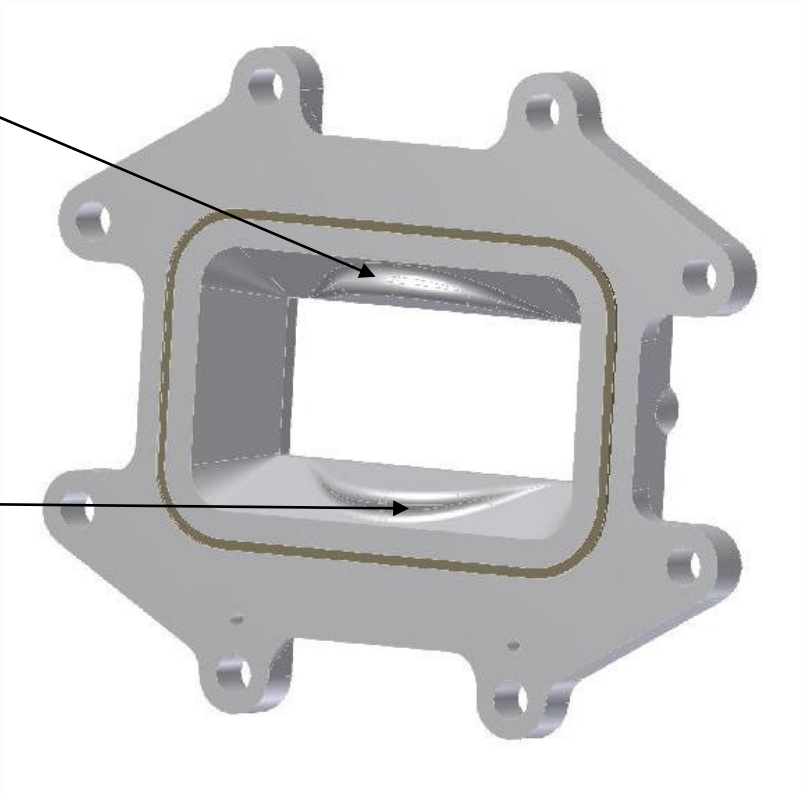
- It is possible to telescope the die unit roughly 2” (50.800 mm); anything beyond this may cause lubrication leaks in the unit.

- It is preferable to make internal corrections to the unit to resolve balance issues.

Clay Flow and Column Balance

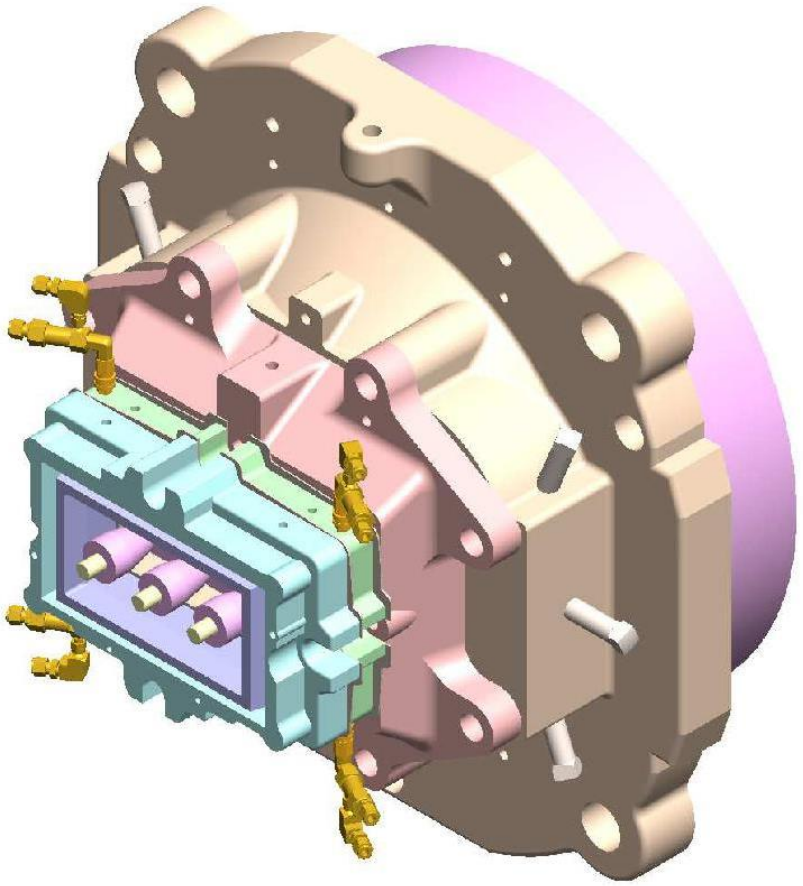
Diversion Bulges

- Bulges can be casted into the bridge ring and/or the center section
- Diversion bulges are used for die balance and also to compress material in the outer corners
- Bulges can vary in size based on clay flow



Various Lengths of Die Units

- Each Reymond die is variable in length
- Oil rings are a consistent length, except for a flat back or taper back
- Bridge rings are a consistent length within generations of die units
- Center sections are typically 3” or 6” long, but can be made in various lengths
- Cap assemblies vary according to material

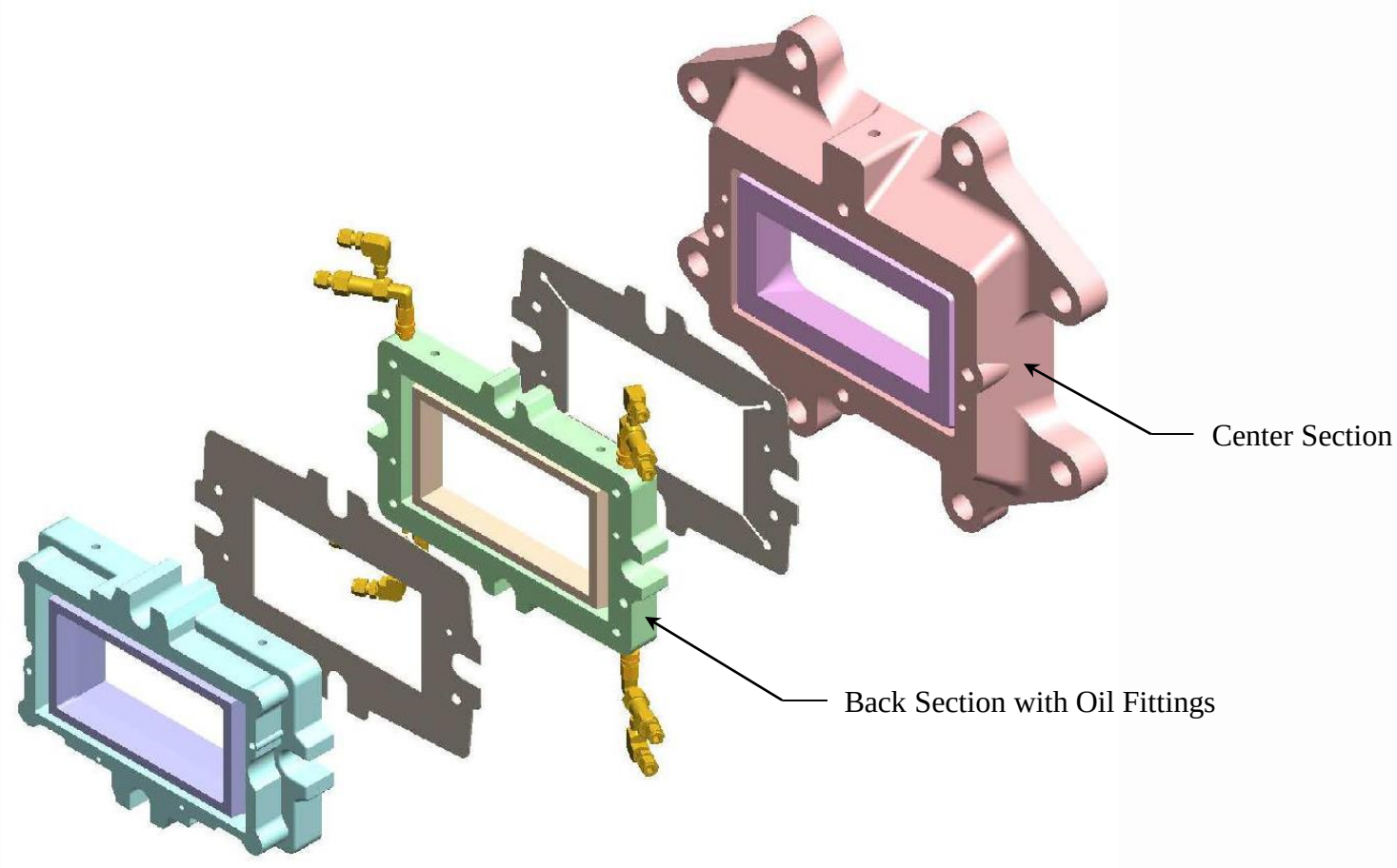


Die and Die Gasket Assembly

Assembling a Cap

- Various lengths of cap can be assembled to match material types
- Gaskets are placed between each adjoining frame
- Before assembling, all surfaces must be free of dirt and debris
- Caps are drilled for a 1/4” (6.350 mm) bolt to lock all frames together so the assembled unit can be aligned and installed as a whole onto the center section
- In most cases, the frame closest to the center section is the frame that supplies lubrication to the cap

Die and Gasket Assembly



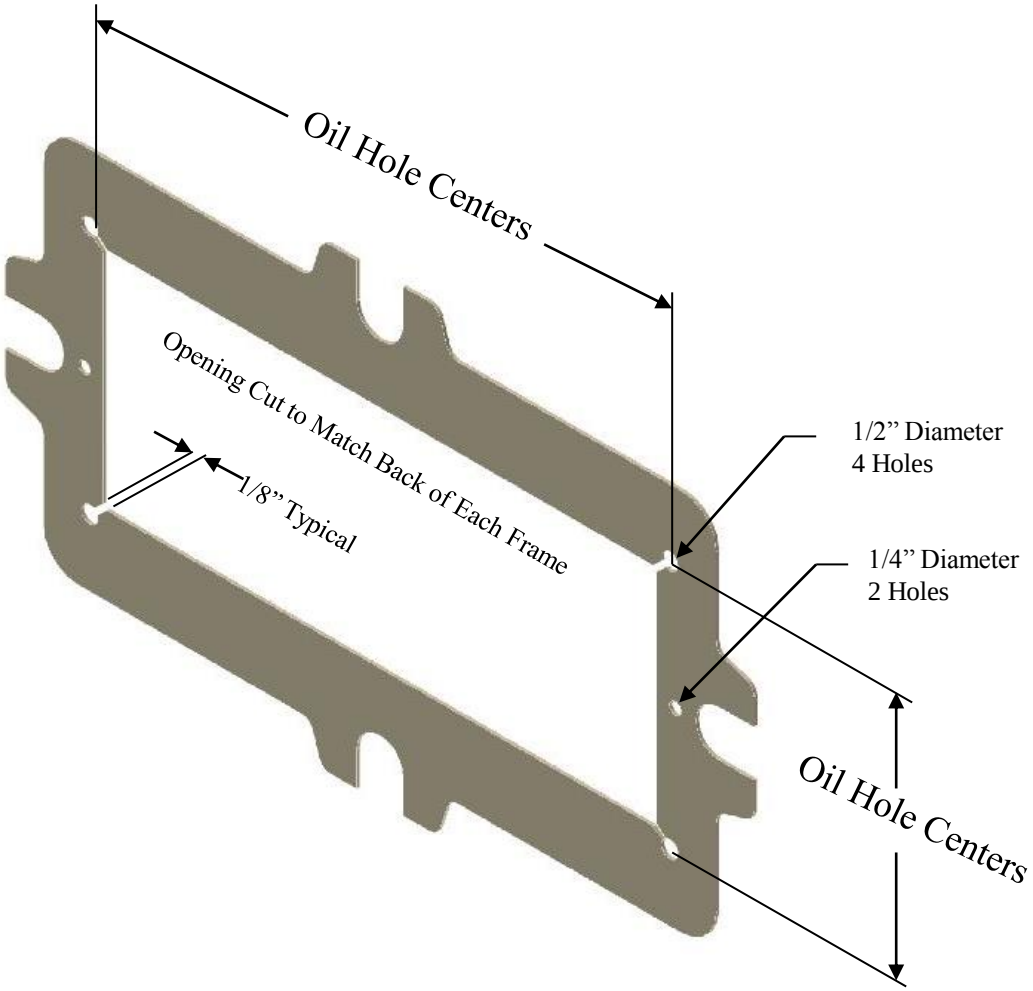
How to Cut Gaskets

Die Frame Gaskets

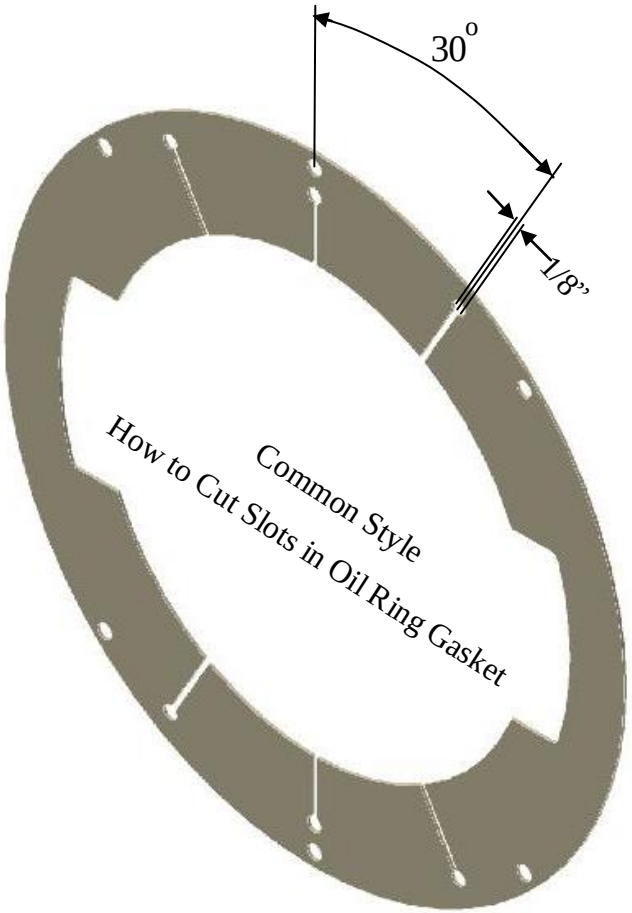
&

Oil Ring Gaskets

Die Gasket Cutting



Oil Ring Gasket



Proper Start Up of a Die Unit

- Before start up, be sure that the unit has been cleared of material
- Make sure all components, including the bridge and BEF's are assembled in the unit
- Mount the unit firmly against the hinge door or die changer
- Connect the lubrication supply line to the unit

- Close all needle valves on lubrication manifolds
- Turn lubrication pump to “manual”
- Crack each needle valve open until lube line is full without air bubbles, then turn off
- Repeat this until all lines are full of lubricant

- Once all lines have been filled, open all needle valves 1/8 to 1/4 turn
- Begin extrusion
- Unit generally lubes well at these settings; however, other settings may be necessary

- With a new unit, it is not uncommon to have elevated column temperatures much like a new set of augers causes. Typically, several hours may pass before the die is broke in

- After 30-40 min. all center section and cap bolts must be re-tightened

- Only after break in can a determination be made as to how the unit is performing and if adjustments are necessary

Die Maintenance for Optimal Performance

Daily Die Unit Maintenance

- Twice per day it is recommended that each oil port be greased
- Check needle valve setting in case of tampering
- Check for any lubrication leaks
- Maintain a clean unit so leaks are easily visible

Weekly Die Unit Maintenance

- Clear out the unit completely
- Inspect the unit for wear
- Inspect the bridge bar for wear
- Inspect the stems/sleeves for wear
- Inspect the BEF's for wear

Bi-monthly Die Unit Maintenance

- Perform a grid test to ensure proper die balance

Die Trouble Shooting

- Die leaking
- Change in oil pressure

Die Leaking

- Make sure all bolts are tight
- Check to see if dirt is in between die sections
- Check to see if gasket is torn
- Check “Go” regulator for proper distribution of oil

Change in Oil Pressure

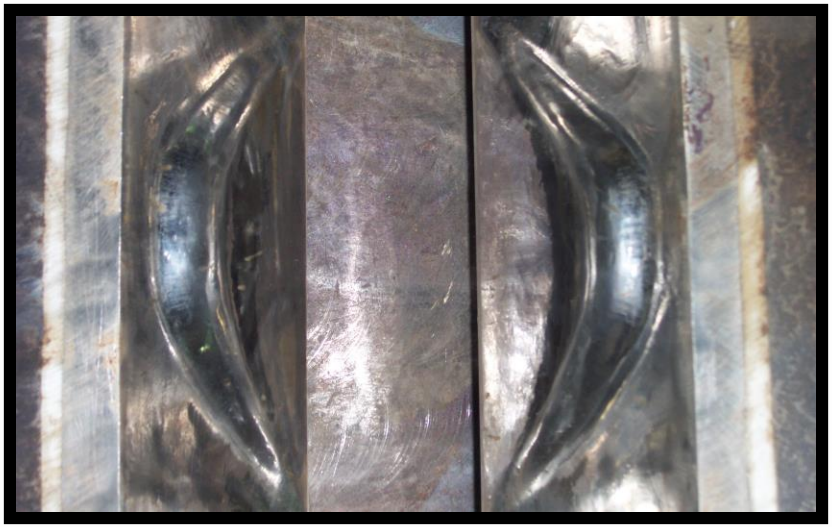
- A jump in oil pressure is an indication a port is clogged
- Make sure valve settings have not been changed
- Make sure “Go” Pressure Regulator setting has not been changed
- Make sure oil pump setting has not been changed
- In the event that grease goes into an oil line, remove check valve and replace it or remove the grease fitting and small bolt (using care not to lose the small spring and ball) and clean the check valve

Extrusion Trouble Shooting

- Units with backside bowed toward the extruder “fast center”
- Units with front side bowed away from the extruder “slow center”
- Wet checking
- Web cracking
- Laminations
- Header cracks
- Vertical face cracks

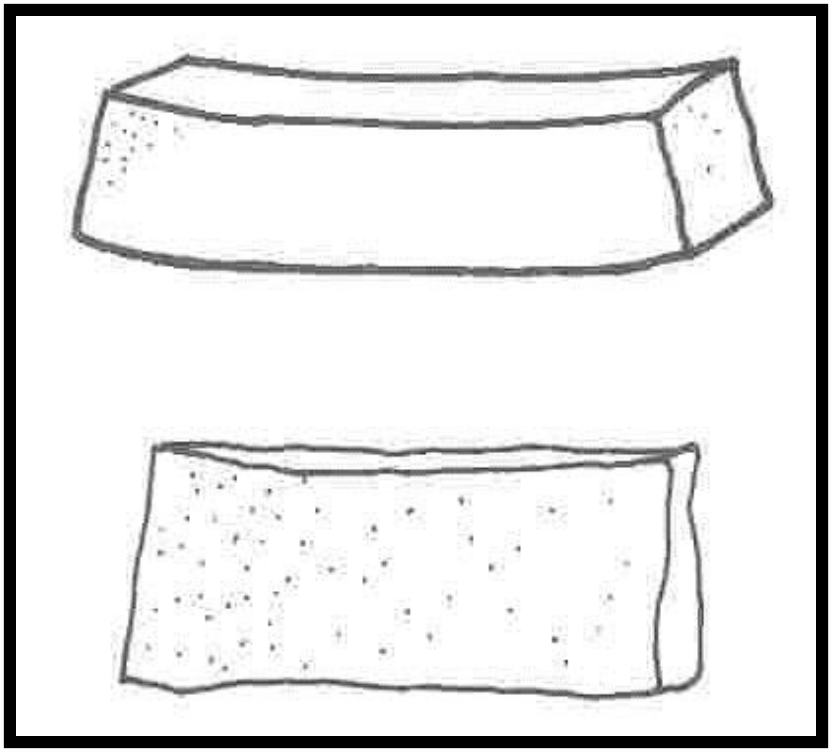
Units with backside bowed toward the extruder: “ Fast Center”

- Lengthen the die unit
- Diversion bulges can be added to bridge ring and center section to divert clay towards the outsides
- Bridge clips can be added to slow the center down
- Telescope die unit out
- It may be necessary to add an extension ring to move die away from the point auger
- Check for even lubrication



Units with front side bowed away from the extruder: “Slow Center”

- Shorten the length of the die
- Add bridge clip to edges of bridge
- Check for even lubrication
- Telescope die in



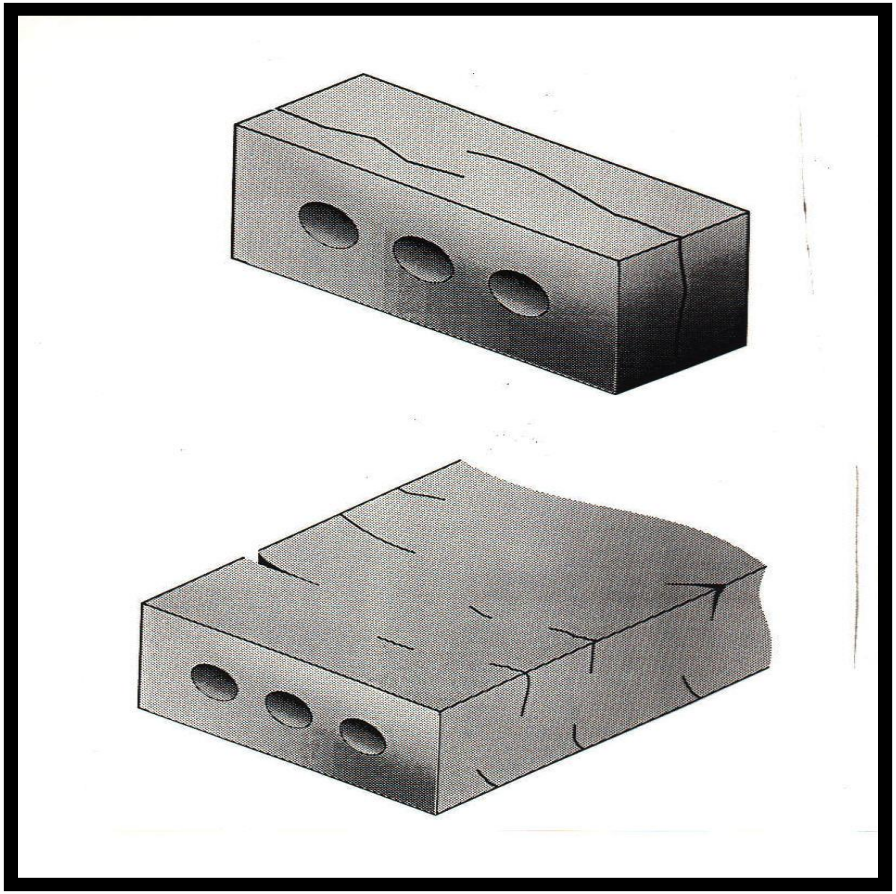
Wet Checking

- Cap lube pressure is too high

- Reduce oil pressure on cap with “Go” Pressure Regulator and/or lube pump

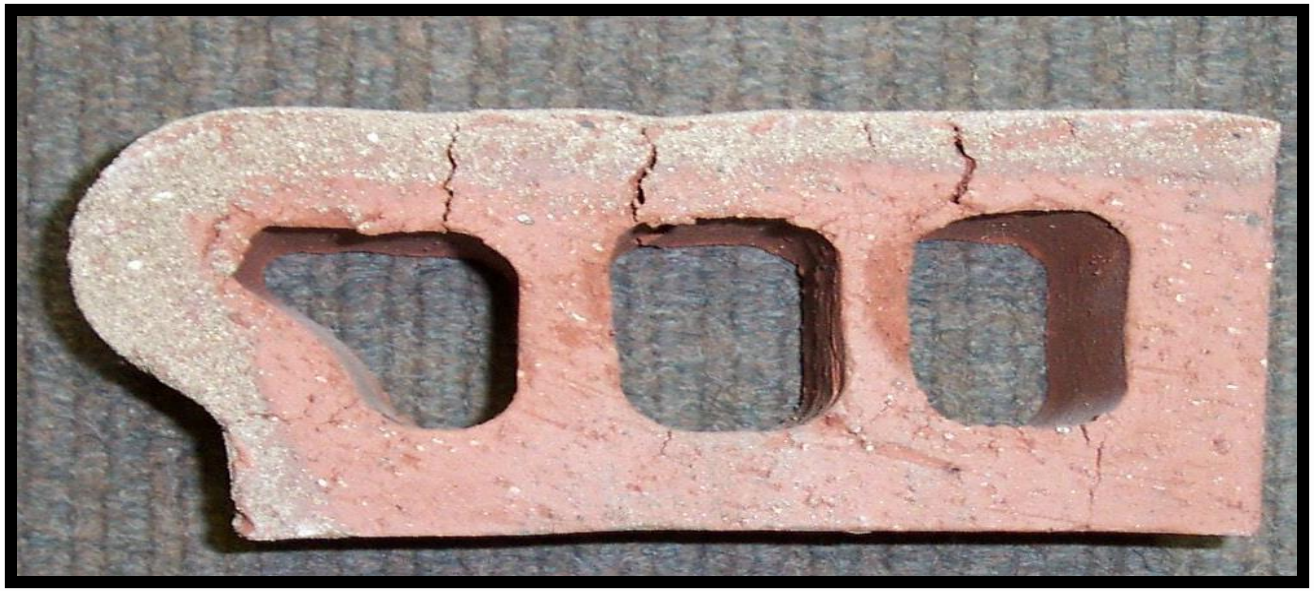
Corner Tearing: "Dog-Earing"

- Not enough lubrication on one or both outsides
- Die unbalanced
- Worn out lube lips
- Misaligned cap



Web Pulling/Core Cracks

- Cores set back into die face too far
- Lead up angle on cores too steep
- Not enough lead up angle
- Not enough flat on cores
- Material flow not being compacted enough around bridge



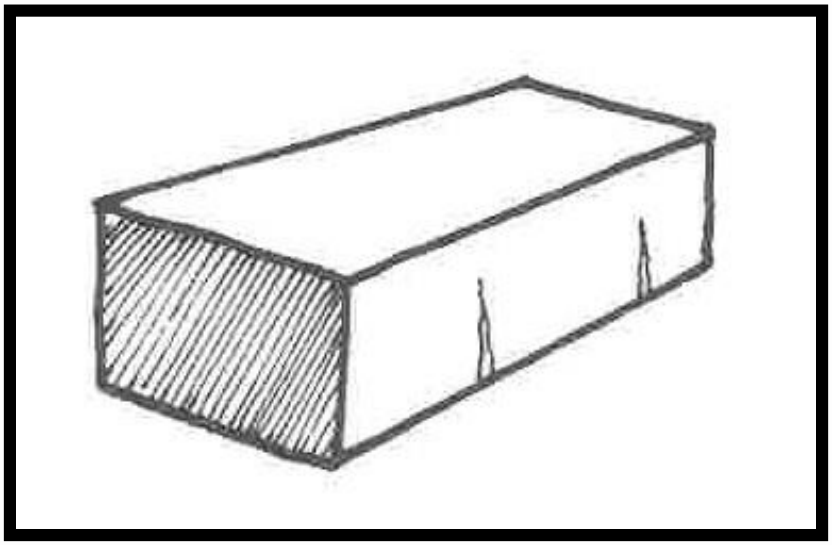
Laminations

- Check to see if lube pressure is excessively high
- Check to see if reverse lips are present within the die unit
- Check to see if the bridge end fillers are in place and in good shape
- Unit may need telescoped out and or a spacer ring added between the extruder and the die unit

Horizontal Header Cracks

- Header cracks are generally caused by the bridge bar
- Bridge bar maybe worn and sharp, acting as a knife and preventing surfaces from knitting back together
- Rear lube pressure may be set too high; lower the pressure through the lube pump

Vertical Face Cracking



- Uneven clay flow (die balance)
- Uneven lubrication distribution causing balance issues
- Internal die changes maybe necessary
- Unit may need to be relined

Hot Column

- Insufficient lubrication
- Use grease gun to ensure the lube ports are not plugged
- Apply more lubrication to the unit with the lube pump

Crazing Cracks

- Insufficient lubrication
- Hot column
- Front section may have too much angle

Questions ?