This is an Example Problem for the Hydraulic Unscrewing Device 11-13-1997
The Item picked is a cap for the DME Mold Saver Plastic Cap
Catalog number SAV 0012 which is a Case of (12) 15 oz. cans ( no trigger pumps)
or Catalog SAV 0001 (1) 15 oz. can with trigger pump see page ( O - 31 )

This example will follow the DME Hydraulic Unscrewing Device “Engineering Design Guide”

D-M-E Company Hydraulic Unscrewing Customer Cap Information

A.1 = Plastic Cap Maximum Outside Diameter
A.2 = Threaded Core Maximum Outside Diameter of the Threads
A.3 = Threaded Core Thread Lead (= 1 / Pitch where Pitch = # Threads/unit distance )
A.4 = Threaded Core Maximum Threaded Length

Dimensions for the D-M-E Mold Saver Cap Example (Customer Application information) is given as follows:

A. ENTER IN APPLICATION INFORMATION FOR THE CAPS

☐ **1.206”** A. 1 ) Enter the maximum outside dia. of Cap in Inches.

☐ **1.106”** A. 2 ) Enter the maximum outside Thread dia. in Inches.

☐ **0.157”** A. 3 ) Enter the Thread Lead in Inches / Thread .
  (example: 8 threads per inch would be = 0.125 Inches / Thread )

☐ **0.422”** A. 4 ) Enter threaded length of Cap in Inches.

☐ **15,000** A. 5 ) Enter the maximum Injection Molding Cavity Pressure that will not
  be exceeded ( Typical Injection Molding Machines generate up to
  20,000 PSI Max. at the barrel )

☐ **2,000** A. 6 ) Enter the maximum Hydraulic Pressure available (maximum is 2,175 PSI)

☐ **8** A. 7 ) Enter the desired number of cavities in the mold.
B. CALCULATE THE # OF THREADS / REVOLUTIONS TO REMOVE THE THREADED CORE

☐ 3.2  B. 1 ) Enter the number of Threads or Revolutions to remove the Threaded Core.

Approach 1 - Exact Calculation from Catalog

\[
\frac{A \cdot 4}{A \cdot 3} + \text{(minimum 0.5 revolutions)}
\]

\[
\frac{0.422}{0.157} + 0.5
\]

\[
2.687898089 + 0.5
\]

\[
3.187898089
\]

Let's round to 3.2 turns - this is the value we will use for this example.

Note that the entire threaded core will be removed from the cap.

Approach 2 - Use only the number of turns required to remove threads:

Assume that the stripper plate will push the cap off the core.

Visually it takes 1.25 turns before the cap can be removed from the bottle.

\[
1.25 + 0.5
\]

\[
1.75 \text{ turns}
\]

Note that the threaded core will still be overlapping inside the cap.
The stripper plate must push the cap completely off the remaining core.
C. SELECTING THE MINIMUM SPACING BETWEEN CAP CAVITIES

☐ 2.125” C. 1) Enter the minimum Cavity Spacing, Center to Center Distance in Inches.

Approach 1 - Mold Maker knows the distance through years of experience and available bar stock diameters

The Maximum O.D. of the Cap in [ A . 1 ] was 1.206”.
Assume the Mold Maker would leave 1/2” material around Cap cavity.
Assume Mold Maker would pick inserts of 2-1/2” O.D. Material.
When using cavity inserts, the Mold Maker might leave 1/8” Spacing between inserts
Standard D-M-E Cavity Insert Rounds are 1”, 1-1/2”, 2”, 2-1/2”, 3”, 3-1/2” and 4” Diameters (See DME catalog page H-13)

= 2.500 + 0.125”

= 2.625”

Approach 2 - DME Appendix A - Procedure 3 Lookup Table
This Table assumes a P-5 Cavity Insert Material with a Core Hardness of Rc= 15 - 25
The maximum cavity deflection that would be allowed is 0.001” total

From the Table using [ A . 1 ] = 1.206 use 1.3 and [ A . 5 ] = 15,000

For a solid Steel Plate, Minimum O.D. = 1.973 “ with 0.673” steel inbetween cavities
When using cavity inserts, we must add extra stock, lets say 1/8” or 0.125”
Also, you typically pick the next larger standard round size up, so O.D. = 2”

= 2.000” + 0.125”

= 2.125” - Note: This is the value we will use for this example problem

Approach 3 - DME Appendix A - Procedure 2 Step by Step Calculation Method

Let’s use an H-13 hardened core at 800F service.
Step 1 - Calculate the Minimum O.D. due to Cavity Deflection Criteria
since [ A . 1 ] = 1.206” use 1.3” and [ A . 5 ] = 15,000
From the table, Min. O.D. = 1.917”, between = 0.616”, & stress = 40,543 PSI
Step 2 - Max. Hoop Stress = 15,000PSI x ( (1.919^2 + 1.206^2) / (1.919^2 - 1.206^2))
Max. Hoop Stress = 15,000 x ( 5.136997 / 2.228125 ) = 15,000 x 2.3055246
Max. Hoop Stress = 34,582 PSI
Step 3 - Check Design Stress Levels, for H-13 Rc 44 Design Stress < 68,400 PSI
Note: Max. Hoop Stress 34,582 PSI < Design Stess 68,400 PSI “True goto Step 4”
If this were not true then we would calculate the Min. Design Stress O.D. =
= SQRT { [ (15,000 x 1.206^2) / 68,400 + 1.206^2 ] / [ 1 - 15,000/68,400 ] }
= SQRT { [ (21,816.54) / 68,400 + 1.454436 ] / [ 0.780701755 ] }
= SQRT{[1.773391263][0.780701755]}= SQRT{2.271534874 } = 1.508” Min. Dia.
Step 4 - Select the Cavity Insert O.D. that will be used. Min. O.D. = 1.917”
Step 5 - between = 1.917 - 1.206 = 0.711”, if cavity inserts, use 2” Dia. Bar = 2 - 1.206 = .794
Step 6 - Minimum Cavity Spacing = 2” Cavity Insert + 1/8” clearance = 2.125” spacing
D. CALCULATING THE UNSCREWING TORQUE FOR ONE CAVITY

D. 1) Enter the Torque in Inch-Pounds (in-lbs) required to unscrew the threaded core.

Note: These figures should only be used as a guideline as many other factors will affect the calculation. (Material variation of dimensions, material shrinkage, core surface area, temperature, lubricant/friction, etc.)

Approach 1 - DME Appendix B - Procedure 1 Calculation Method

f) \[ RP = \frac{A \cdot 5}{100} = \frac{15,000}{100} = 150 \text{ PSI residual pressure} \]

g) \[ SA = (A \cdot 2) \pi (A \cdot 4) \times 2 \]

\[ = 1.106 \times 3.14 \times 0.422 \times 2 \]

\[ = 2.931 \text{ Surface Area of threads} \]

h) \[ UT = RP \times SA \times \frac{A \cdot 2}{2} = 150 \times 2.931 \times 1.106 / 2 \]

\[ UT = \text{Unscrewing Torque} = 243.1 \text{ in-lbs} \]

We will use this value

Approach 2 - DME Appendix D - Procedure 2 Look Up Table Method

Using O.D. of Thread \[ A \cdot 2 = 1.106'' \] use Table value of 1-1/8''

Using Thread Length \[ A \cdot 4 = 0.422 \] use Table value of 7/16

Using Table with \[ A \cdot 5 = 15,000 \text{ PSI Cavity Pressure} \]

Unscrewing Torque = 260.9 in - lbs
E. SELECTING A MIN. DIAMETER DRIVE SHAFT FOR THE THREADED CORE IN INCHES

☐ 0.501" E. 1) Enter the Minimum shaft Diameter for the Threaded core in Inches.

Approach 1 - Appendix C - Procedure 2 - Lookup Table Method

We will decide to use an S-7 Shaft, Rc 39-40, with keyway
[ D. 1 ] from this example = 243.1 in-lbf
from the Table, use [ D. 1 ] = 300 in - lbf

Minimum Diameter = 0.501 " Diameter

☐ 17.135 lbf E. 2) Calculate the Static Thrust the shaft must support due to Max. Cavity Pressure

Max. Thrust = [ A. 1 ]² x [ A. 5 ] x 0.785398

= [ 1.206 ]² x [ 15,000 ] x 0.785398

= 1.454436 x 15,000 x 0.785398

= 17,135 lbf

☐ 0.750" E. 3) Enter the Minimum Shaft diameter size where the gear will be slide over.

lets assume that a step of 1/4" for the shaft diameter is needed to support the Static Thrust

= [ E. 1 ] + 1/4" = 0.501 + 0.250 = 0.750 " Diameter Shaft
F. Selecting The Pitch Diameter of the Drive Gear - Use 20 Degree Pressure Angle Gears Only

☐ 1.500" F. 1) Enter the Pitch Diameter for the Drive Gear to be used in Inches.

Using Appendix D - Table of Standard Gears, the following criteria must be met.

- gear revolutions for stroke length ≥ [B. 1] (3.2) required revolutions
- max. gear torque ≥ [D. 1] (243.1) unscrewing torque for one cavity
- Internal gear bore dia. ≥ [E. 3] (0.750) minimum shaft dia.

we will select a Pitch Diameter of 1.500 Inches using a .40 C Alloy Heat Treated Steel gear, also, a cylinder stroke of 11.81" is not usable.

☐ 12 F. 2) Record the Gear’s Diametral Pitch.

All DME SAE Racks at this time are 12 Diametral Pitch, 20 Degree Pressure Angle Teeth.

☐ 0.750" F. 3) Record the Gear’s Internal Bore Diameter

Using the value from [F. 1] use the table in Appendix D to find this value.

☐ 4.712" F. 4) Record the Gear’s Pitch Circle Perimeter.

Using the value from [F. 1] use the table in Appendix D to find this value.

☐ 1.66" F. 5) Record the Gear’s Outside Diameter.

Using the value from [F. 1] use the table in Appendix D to find this value.
G. MAKE FINAL CAVITY SPACING DECISION

☐ 3.000" G. 1 ) Select Cavity Spacing in Inches.

The following criteria must be considered and met.

- Cavity Spacing must be ≥ [ A . 1 ] (1.206") O.D. of the Cap
- Cavity Spacing must be ≥ [ C . 1 ] (2.125") Cavity Center to Center to support Pressure if cavity/stripper inserts, use req. clearance
- Cavity Spacing must be ≥ [ F . 5 ] (1.66" + 1/8" = 1.785") O.D. of Gear plus clearance
- Cavity Spacing must be ≥ O.D. of Thrust Bearing Plus Clearance - Designer's Requirement lets assume 1" added to diameter of shaft minimum = [E . 3] + 1 or 0.750 + 1" = 1.750"
- Cavity Spacing must be ≥ Required Plastic Flow Channel Requirements.
  without cavity inserts minimum 1" spacing using DME Cool One this is not possible, actually Cap Dia. + 1/8" = 1.331"
  without cavity inserts using DME Hot Ones typical 1-1/2 to 2"
  water cooled inserts and Gatemate 4, about 3" (we will use this)

Cavity Spacing ≥ 1.206, 2.125, 1.785, 1.750, or 3" whichever is greatest

Cavity Spacing = 3"

DME Hydraulic Unscrewing Device "Engineering Design Guide" Mold Saver Cap Example 7 of 13
H. Maximum # of Cavities in ONE Straight Line for Hydraulic Cylinders Based on the Selected Gear

15.079° H. 2) Calculate the minimum stroke needed to unscrew the cap in Inches.

\[ \text{stroke} = (F \cdot 4) \times (B \cdot 1) = 4.712 \times 3.2 = 15.0784" \]

H.3 Calculate the Max. # of Cavities per Cylinder Length in one straight line. Note: [G.1] = 3.000"

- 6 H. 3.1) Enter the Max # of cavities for Cylinder # ZG-25-300 = Int \{ 13.85 / [G.1] \} + 1 = Int \{ 4.616 \} + 1 = 5. This value is 0 and unsuitable if [H.2] \geq 11.81" stroke.

- 6 H. 3.2) Enter the Max # of cavities for Cylinder # ZG-25-400 = Int \{ 17.79 / [G.1] \} + 1 = Int \{ 5.930 \} + 1 = 6. This value is 0 and unsuitable if [H.2] \geq 15.74" stroke.

- 8 H. 3.3) Enter the Max # of cavities for Cylinder # ZG-25-500 = Int \{ 21.73 / [G.1] \} + 1 = Int \{ 7.243 \} + 1 = 8. This value is 0 and unsuitable if [H.2] \geq 19.68" stroke.

- 6 H. 3.4) Enter the Max # of cavities for Cylinder # ZG-40-300 = Int \{ 13.85 / [G.1] \} + 1 = Int \{ 4.616 \} + 1 = 5. This value is 0 and unsuitable if [H.2] \geq 11.81" stroke.

- 6 H. 3.5) Enter the Max # of cavities for Cylinder # ZG-40-400 = Int \{ 17.79 / [G.1] \} + 1 = Int \{ 5.930 \} + 1 = 6. This value is 0 and unsuitable if [H.2] \geq 15.74" stroke.

- 8 H. 3.6) Enter the Max # of cavities for Cylinder # ZG-40-500 = Int \{ 21.73 / [G.1] \} + 1 = Int \{ 7.243 \} + 1 = 8. This value is 0 and unsuitable if [H.2] \geq 19.68" stroke.

- 7 H. 3.7) Enter the Max # of cavities for Cylinder # ZG-63-400 = Int \{ 18.46 / [G.1] \} + 1 = Int \{ 6.153 \} + 1 = 7. This value is 0 and unsuitable if [H.2] \geq 15.74" stroke.

- 8 H. 3.8) Enter the Max # of cavities for Cylinder # ZG-63-500 = Int \{ 22.40 / [G.1] \} + 1 = Int \{ 7.466 \} + 1 = 8. This value is 0 and unsuitable if [H.2] \geq 19.68" stroke.
I. Max. # of Cavities for Hydraulic Cylinders Based on its Piston Diameter

☐ 486.2  I. 1) Calculate the Hydraulic Force Required per Cavity (lbf)

\[
\text{= } \left\{ \frac{\text{Unscrewing Torque}}{\text{Gear Pitch Radius}} \right\} \times 1.5
\]
\[
\text{= } \left\{ \frac{\text{Unscrewing Torque}}{\text{Gear Pitch Diameter}} \right\} \times 3.0
\]
\[
\text{= } \left\{ \frac{D}{1} \right\} / \left\{ F \right\} \times 3.0 = (243.1 / 1.500) \times 3.0 = 486.2 \text{ lbf}
\]

☐ 3  I. 2.1) Calculate Maximum Number of Cavities for Cylinders ZG - 25 - XXX

\[
= \text{Integer } \left\{ 0.760466 \times \left\{ A \cdot 6 \right\} / \left\{ I \cdot 1 \right\} \right\}
\]
\[
= \text{Integer } \left\{ 0.760466 \times 2000 / 486.2 \right\}
\]
\[
= \text{Integer } \left\{ 3.128 \right\}
\]
\[
= 3
\]

☐ 8  I. 2.2) Calculate Maximum Number of Cavities for Cylinders ZG - 40 - XXX

\[
= \text{Integer } \left\{ 1.9458051 \times \left\{ A \cdot 6 \right\} / \left\{ I \cdot 1 \right\} \right\}
\]
\[
= \text{Integer } \left\{ 1.9458051 \times 2000 / 486.2 \right\}
\]
\[
= \text{Integer } \left\{ 8.004 \right\}
\]
\[
= 8
\]

☐ 19  I. 2.3) Calculate Maximum Number of Cavities for Cylinders ZG - 63 - XXX

\[
= \text{Integer } \left\{ 4.8305128 \times \left\{ A \cdot 6 \right\} / \left\{ I \cdot 1 \right\} \right\}
\]
\[
= \text{Integer } \left\{ 4.8305128 \times 2000 / 486.2 \right\}
\]
\[
= \text{Integer } \left\{ 19.870 \right\}
\]
\[
= 19
\]
## J. MAKE A LIST OF CYLINDERS WHICH CAN BE USED

### J.1 For Single row of Cavities and One - Cylinder Applications, check box if conditions TRUE

Note: Max. = # of Cavities due to Force available from cylinder  
In - Between = # of Cavities due to cavity spacing & if enough stroke available for unscrewing  
Min. = Customer # of Cavities Required

<table>
<thead>
<tr>
<th>Conditions</th>
<th>Max.</th>
<th>In - Between</th>
<th>Min.</th>
</tr>
</thead>
<tbody>
<tr>
<td>For Cylinder # ZG-25-300 Conditions</td>
<td>$[I.2.1] \geq [H.3.1] \text{ or less} \geq [A.7]$</td>
<td>$3 \geq 0$</td>
<td>$0 \geq 8$</td>
</tr>
<tr>
<td>For Cylinder # ZG-25-400 Conditions</td>
<td>$[I.2.1] \geq [H.3.2] \text{ or less} \geq [A.7]$</td>
<td>$3 \geq 6$</td>
<td>$3 \geq 8$</td>
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<tr>
<td>For Cylinder # ZG-25-500 Conditions</td>
<td>$[I.2.1] \geq [H.3.3] \text{ or less} \geq [A.7]$</td>
<td>$3 \geq 8$</td>
<td>$3 \geq 8$</td>
</tr>
<tr>
<td>For Cylinder # ZG-40-300 Conditions</td>
<td>$[I.2.2] \geq [H.3.4] \text{ or less} \geq [A.7]$</td>
<td>$8 \geq 0$</td>
<td>$0 \geq 8$</td>
</tr>
<tr>
<td>For Cylinder # ZG-40-400 Conditions</td>
<td>$[I.2.2] \geq [H.3.5] \text{ or less} \geq [A.7]$</td>
<td>$8 \geq 6$</td>
<td>$6 \geq 8$</td>
</tr>
<tr>
<td>For Cylinder # ZG-40-500 Conditions</td>
<td>$[I.2.2] \geq [H.3.6] \text{ or less} \geq [A.7]$</td>
<td>$8 \geq 8$</td>
<td>$8 \geq 8$</td>
</tr>
<tr>
<td>For Cylinder # ZG-63-400 Conditions</td>
<td>$[I.2.3] \geq [H.3.7] \text{ or less} \geq [A.7]$</td>
<td>$19 \geq 7$</td>
<td>$7 \geq 8$</td>
</tr>
<tr>
<td>For Cylinder # ZG-63-500 Conditions</td>
<td>$[I.2.3] \geq [H.3.8] \text{ or less} \geq [A.7]$</td>
<td>$19 \geq 8$</td>
<td>$8 \geq 8$</td>
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</tbody>
</table>

### J.2 For two Rows of Cavities and One - Cylinder Applications, check box if conditions TRUE

<table>
<thead>
<tr>
<th>Conditions</th>
<th>Max.</th>
<th>In - Between</th>
<th>Min.</th>
</tr>
</thead>
<tbody>
<tr>
<td>For Cylinder # ZG-25-300 Conditions</td>
<td>$[I.2.1] \geq 2 \times [H.3.1] \text{ or less} \geq [A.7]$</td>
<td>$3 \geq 0$</td>
<td>$0 \geq 8$</td>
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<tr>
<td>For Cylinder # ZG-25-400 Conditions</td>
<td>$[I.2.1] \geq 2 \times [H.3.2] \text{ or less} \geq [A.7]$</td>
<td>$3 \geq 12$</td>
<td>$3 \geq 8$</td>
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<tr>
<td>For Cylinder # ZG-25-500 Conditions</td>
<td>$[I.2.1] \geq 2 \times [H.3.3] \text{ or less} \geq [A.7]$</td>
<td>$3 \geq 16$</td>
<td>$3 \geq 8$</td>
</tr>
<tr>
<td>For Cylinder # ZG-40-300 Conditions</td>
<td>$[I.2.2] \geq 2 \times [H.3.4] \text{ or less} \geq [A.7]$</td>
<td>$8 \geq 0$</td>
<td>$0 \geq 8$</td>
</tr>
<tr>
<td>For Cylinder # ZG-40-400 Conditions</td>
<td>$[I.2.2] \geq 2 \times [H.3.5] \text{ or less} \geq [A.7]$</td>
<td>$8 \geq 12$</td>
<td>$8 \geq 8$</td>
</tr>
<tr>
<td>For Cylinder # ZG-40-500 Conditions</td>
<td>$[I.2.2] \geq 2 \times [H.3.6] \text{ or less} \geq [A.7]$</td>
<td>$8 \geq 16$</td>
<td>$8 \geq 8$</td>
</tr>
<tr>
<td>For Cylinder # ZG-63-400 Conditions</td>
<td>$[I.2.3] \geq 2 \times [H.3.7] \text{ or less} \geq [A.7]$</td>
<td>$19 \geq 14$</td>
<td>$14 \geq 8$</td>
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<tr>
<td>For Cylinder # ZG-63-500 Conditions</td>
<td>$[I.2.3] \geq 2 \times [H.3.8] \text{ or less} \geq [A.7]$</td>
<td>$19 \geq 16$</td>
<td>$16 \geq 8$</td>
</tr>
</tbody>
</table>
K. SELECT THE HYDRAULIC CYLINDER WHICH WILL BE USED

☐ _ZG - 40 - 500_ K. 1 ) Enter the D-M-E Catalog Cylinder Number to be used

There are several options that can be chosen from section J. We will chose a two row application using Cylinder ZG-40-500. This will allow for a balanced 8 Cavity Runner System instead of a straight line. It will use the smaller diameter, lighter and more manageable cylinder. It will allow extra travel for use with the stripper plate. If we can avoid using full cylinder travel, we will get better life from the cylinder seals.

☐ _8_ K. 2 ) Enter the Total Number of Cavities that will be used

☐ _2_ K. 3 ) Enter the number of rows of cavities to be used (either 1 or 2)

☐ _3.745.6_ K. 4 ) Calculate the minimum Hydraulic Unscrewing Force Needed (lbf)

\[ \text{Hydraulic Force required per Cavity} \times \text{# of Cavities} = [I.1] \times [K.2] \]
\[ = 486.2 \times 8 = 3,745.6 \text{ lbf} \]

☐ _1925_ K. 5 ) Calculate the min. Hydraulic Pressure to supply the Cylinder (max. = 2175 PSI)

Max. available was [A.6]

For Cat # ZG-25-XXX = [K.4] / (0.760466 in$^2$)
For Cat # ZG-40-XXX = [K.4] / (1.9458051 in$^2$)
\[ = 3,745.6 / 1.9458051 = 1924.96 \approx 1925 \text{ PSI} \]
Note that this is less than [A.6] of 2000 PSI
For Cat # ZG-63-XXX = [K.4] / (4.8305128 in$^2$)

☐ _15.079_ K. 6 ) Calculate the “Required Stroke” that the unscrewing Action will use in Inches

\[ \text{Gears Pitch Circle Perimeter} \times \text{# of revolutions} = [F.4] \times [B.1] = [H.2] \]
\[ = 15.079 \]

☐ _4.601”_ K. 7 ) Calculate the available “Stipper Stroke” for moving the Stripper Plate (Provides “Bump”)

For Cat # ZG-XX-300 the total available stroke = 11.81”
For Cat # ZG-XX-400 the total available stroke = 15.74”
For Cat # ZG-XX-500 the total available stroke = 19.68”

\[ \text{Total Available Stroke for Cat #} \{K.1\} - \text{Unscrewing Action Inches} = [K.6] \]
\[ = 19.68 - 15.079 = 4.601 \]
L. Control Cam Calculations - Angles that will be put on the Cam Riser in Degrees

☐ 1° 54’ 30.03” L. 1) Calculate the Moving Cam Angle (α) NOTE: Moves main Stripper Plate

*** Place Calculator in Degree Mode

\[ \alpha = \tan^{-1} \left\{ \left[ \frac{A}{F} \right] \right\} \text{ in Degrees} \]

\[ = \tan^{-1} \left\{ \left[ \frac{0.157}{4.712} \right] \right\} \text{ in Degrees} \]

\[ = \tan^{-1} \left\{ \frac{0.033319185}{0.033319185} \right\} \text{ in Degrees} \]

\[ = 1° 54’ 30.03” \text{ (Degrees Minutes Seconds) Angle} \]

☐ 0.2355 L. 2) Enter the Desired Stripper Height in Inches. NOTE: Provides “bump” or moves the anti-rotational stripper plate.

Typically about 1-1/2 times the Thread lead \([A\cdot3]\) minimum

\[ = [A\cdot3] \times 1.5 = 0.157 \times 1.5 = 0.2355 \]

☐ 5° 10’ 24.86” L. 3) Calculate Stripper Cam Angle (β)

*** Place calculator in Degree Mode

Note: \([K\cdot7]\) = Available “Stripper Stroke”

Try to leave at least 2” of unused stroke which will be stopped by a limit switch to increase internal hydraulic cylinder seals.

Stripper Stroke = \([K\cdot7]\) - unused stroke

we will try not to use 2” of stroke to prevent excessive seal wear

\[ = [K\cdot7] - 2 \]

\[ = 4.601 - 2 \]

Stripper Stroke = 2.601

\[ \beta = \tan^{-1} \left\{ \left[ \frac{L\cdot2}{\text{Stripper Stroke}} \right] \right\} \text{ in Degrees} \]

\[ = \tan^{-1} \left\{ \left[ \frac{0.2355}{2.601} \right] \right\} \]

\[ = \tan^{-1} \left\{ \frac{0.09054099}{0.09054099} \right\} \]

\[ = 5.173573495 \]

\[ = 5° 10’ 24.86” \text{ (Degrees Minutes Seconds)} \]
### M. RECORD FINAL DESIGN PARAMETERS WHICH WILL BE USED

<table>
<thead>
<tr>
<th>Values from this Engineering Guide</th>
<th>Values from the DME Catalog Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A.2</strong> 1.106&quot;</td>
<td><strong>Rack Length Q:</strong> 48&quot;</td>
</tr>
<tr>
<td><strong>A.3</strong> 0.157&quot;</td>
<td><strong>Distance from center of hydraulic cylinder to the racks pitch line</strong></td>
</tr>
<tr>
<td><strong>A.4</strong> 0.422&quot;</td>
<td><strong>U:</strong> 1.750&quot;</td>
</tr>
<tr>
<td><strong>E.1</strong> 0.501&quot;</td>
<td></td>
</tr>
<tr>
<td><strong>F.3</strong> 0.750&quot;</td>
<td></td>
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<tr>
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<tr>
<td><strong>K.1</strong> ZG - 40 - 500</td>
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</tr>
<tr>
<td><strong>L.1</strong> 1° 54' 30.03&quot;</td>
<td></td>
</tr>
<tr>
<td><strong>L.2</strong> 0.2355</td>
<td></td>
</tr>
<tr>
<td><strong>L.3</strong> 5° 10' 24.86&quot;</td>
<td></td>
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</tbody>
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