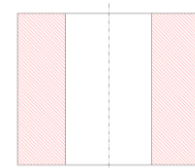


Introduction – ‘Die Press’ web application calculates the radial and tangential stresses in the inserts and casing in an interference-fit tool assembly. It determines the optimum interference between the insert(s) and the casing to withstand the forging pressure for the metal forging application. For a two or three ring die assembly, it can determine their dimensions that would allow the dies to take the maximum internal pressure. This web application has been developed for tool designers and engineers in the metal forming field including cold forging, hot forging, extrusion and press fitting applications.

Application - Cold and Hot forging tooling, Extrusion Tooling, Press fitting of components. Any application where the tool must withstand high internal pressure.

Analysis Included in the Software - The software uses the simple theory of thick cylinders to determine the following:

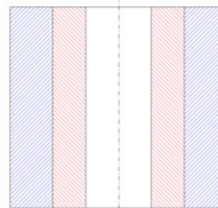
1. **Radial and tangential stresses** in one ring, two ring and three ring die assemblies with press fit and internal forging pressure
2. **Optimum Interference** to withstand internal pressure in a two and three ring die assembly
3. **Optimum Insert Outer Diameter** in Two ring assembly for given insert bore and outside diameter of casing
4. **Optimum Insert / Middle Sleeve Diameters** in a Three ring assembly for given insert bore and casing outside diameter
5. **Fatigue Plot** - This plot shows the stress amplitude and mean stress that determines life of a tool under fatigue conditions.
6. Calculation of **‘Set Back distance’** for taper insert – casing assembly
7. **Press Force** required to assemble two components under interference conditions.



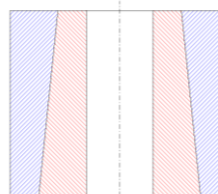
SINGLE CYLINDER



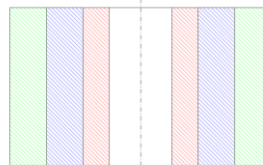
TAPER CYLINDER



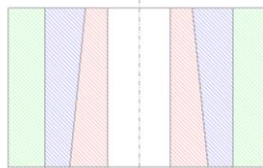
2-PIECE STRAIGHT PRESS FIT



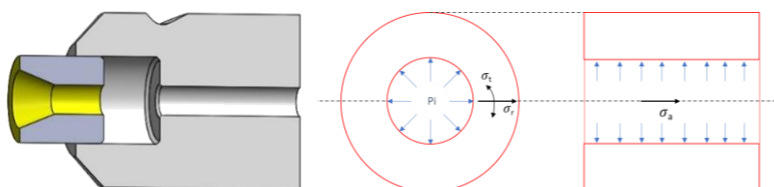
2 PIECE TAPER PRESS FIT



3 PIECE STRAIGHT PRESS FIT



3 PIECE TAPER PRESS FIT



Benefits - Helps to Improve tool life. Allows die assembly to work under higher die pressure. Determines the inserts and casing dimension that optimizes tool material usage. Determine the best press fit amount quickly. Visual presentation of stress helps in understanding the effect of interference fit in tools.

Available Calculations -

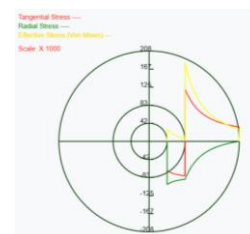
1. Single Ring – Internal & External Pressure
2. Two Ring Die Assembly – Stresses
3. Two Ring Die Assembly – Interference
4. Two Ring Die Assembly – Optimum Dimension
5. Three Ring Middle Slotted Assembly – Stresses
6. Three Ring Die Assembly 32-1 – Stresses
7. Three Ring Die Assembly 32-1 – Optimum Dimensions
8. Three Ring Die Assembly 123 Holistic – Stresses
9. Three Ring Die Assembly 123 Holistic – Interference
10. Three Ring Die Assembly 123 Holistic – Optimum Dimensions
11. Suggested Dimensions – Casing / Inserts
12. Interference Fit Press Force
13. Taper Setback Calculator

Cost - \$200 / Year. [Click to Purchase](#)

Contact – info@nagform.com

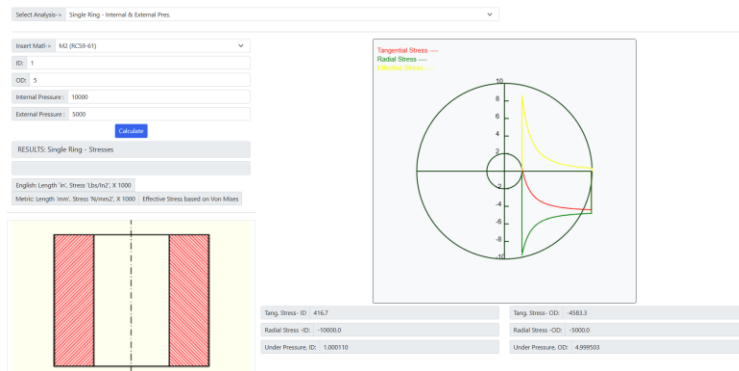
Company Information

Metal Forming Systems, Inc.
7974 N. Lilley Road
Canton MI – 48187
Ph. 734.6581716

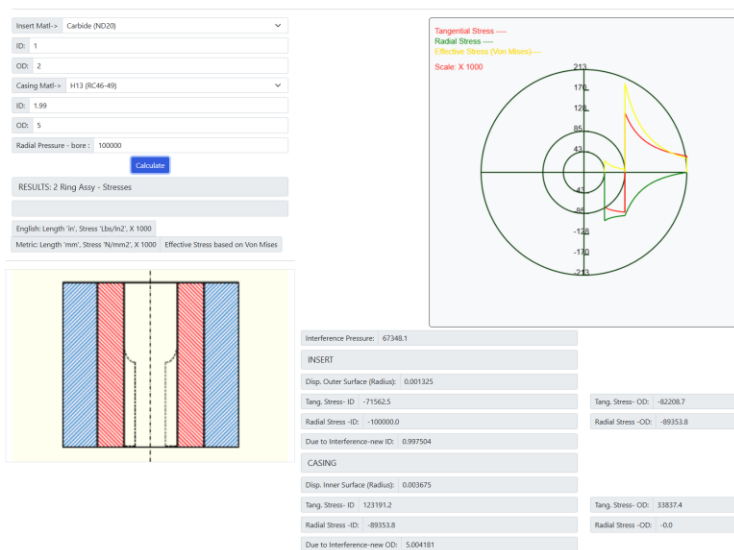


EXAMPLES

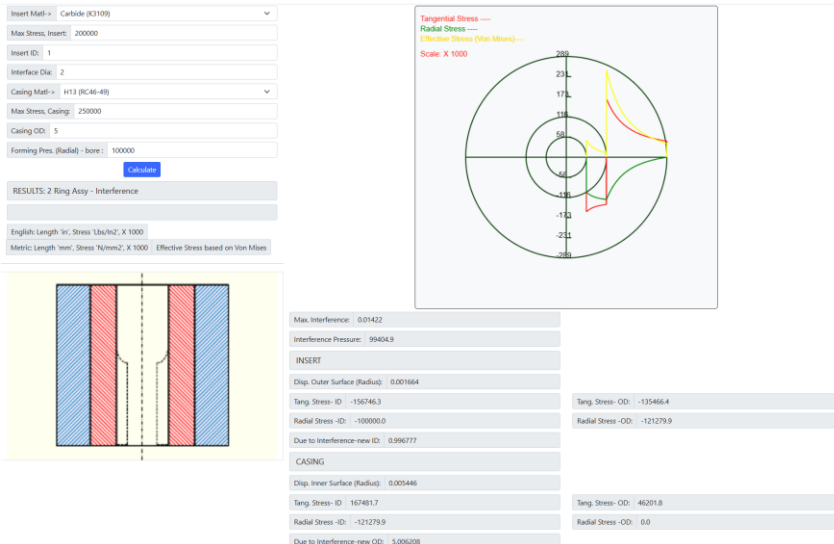
1. Single Ring – Internal & External Pressure



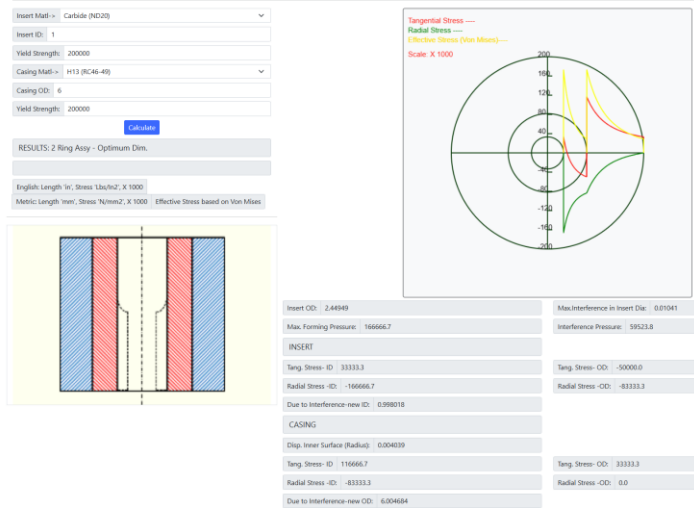
2. Two Ring Die Assembly – Stresses



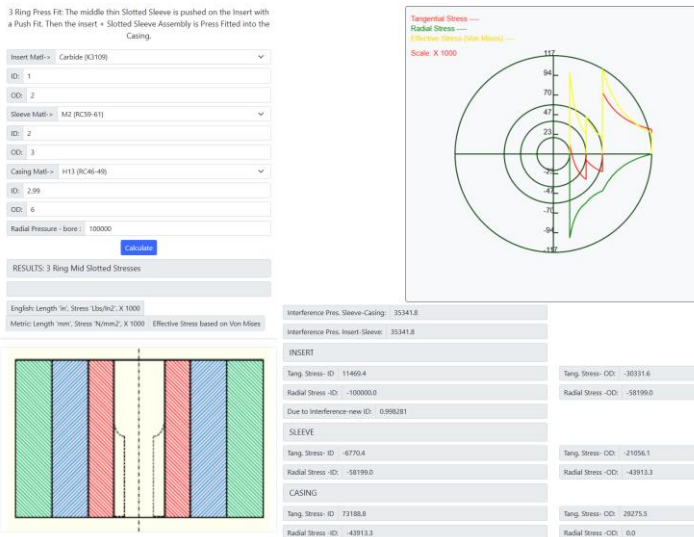
3. Two Ring Die Assembly – Interference



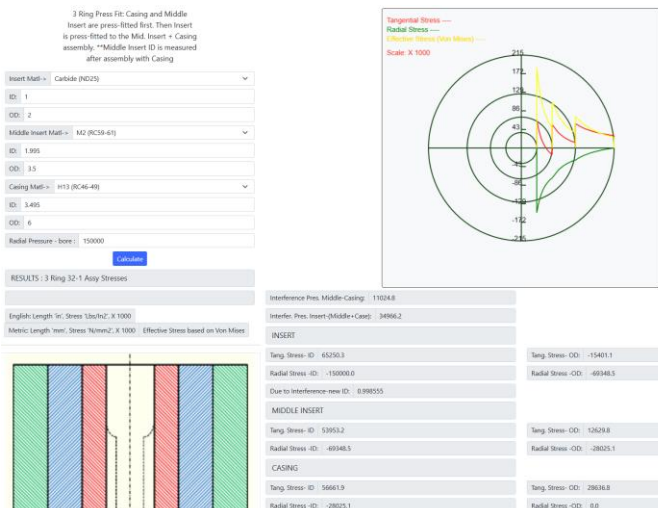
4. Two Ring Die Assembly – Optimum Dimension



5. Three Ring Middle Slotted Assembly – Stresses



6. Three Ring Die Assembly 32-1 – Stresses



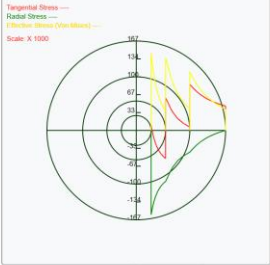
7. Three Ring Die Assembly 32-1 – Optimum Dimensions

Calculate Insert Dimensions: Based on Criterion that Insert, Middle Insert and Casing Yield Under Pressure at Same Time. Mid Insert and Casing assembled first, then Insert assembled

Insert Matl: Carbide (K3109)
 ID: 1
 Yield Strength: 175000
 Middle Insert Matl: M2 (RC39-61)
 Yield Strength: 150000
 Casing Matl: H13 (RC46-49)
 Yield Strength: 120000
 OD: 6

RESULTS: 3 Ring 32-1 Assy Opt. Dim.

English Length: In; Stress: lba/in²; X 1000 Metric Length: mm; Stress: N/mm²; X 1000
 Effective Stress based on Von-Mises



Insert OD: 1.57061	Middle Insert OD: 3.59355
Interference in Dia. Middle Casing: 0.00934	Interference in Dia. Insert-Middle: 0.00766
Interference Pres. Middle-Casing: 20090.8	Interference Pres. Insert-Middle: 55311.4
Max. Forming Pressure: 157454.8	
INSERT	
Tang. Stress-ID: 9666.2	Tang. Stress-OD: -12395.1
Radial Stress-ID: -117494.8	Radial Stress-OD: -95439.4
Due to Interference-new ID: 0.998188	
MIDDLE INSERT	
Tang. Stress-ID: 61089.7	Tang. Stress-OD: 6364.7
Radial Stress-ID: -95439.4	Radial Stress-OD: -60714.5
CASING	
Tang. Stress-ID: 86215.1	Tang. Stress-OD: 45660.6
Radial Stress-ID: -40714.5	Radial Stress-OD: 0.0

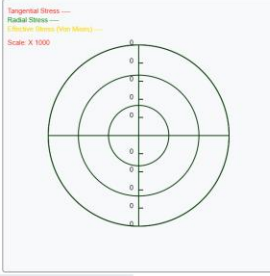
8. Three Ring Die Assembly 123 Holistic – Stresses

3 Ring Press Fit: Based on Holistic Coupling of 3 Rings Using Principle of Superposition

Insert: Carbide (K020)
 ID: 1
 OD: 2
 Middle Insert Matl: M2 (RC39-61)
 ID: 1.99
 OD: 3
 Casing Matl: H13 (RC46-49)
 ID: 2.995
 OD: 3
 Radial Pressure - Insert: 150000

RESULTS: 3 Ring Assy Stresses

English Length: In; Stress: lba/in²; X 1000 Metric Length: mm; Stress: N/mm²; X 1000
 Effective Stress based on Von-Mises



Interference Pres. Middle-Casing: 0.0	
Interference Pres. Insert-Middle: 0.0	
INSERT	
Tang. Stress-ID:	Tang. Stress-OD:
Radial Stress-ID:	Radial Stress-OD:
Due to Interference-new ID:	
MIDDLE INSERT	
Tang. Stress-ID:	Tang. Stress-OD:
Radial Stress-ID:	Radial Stress-OD:
CASING	
Tang. Stress-ID:	Tang. Stress-OD:
Radial Stress-ID:	Radial Stress-OD:

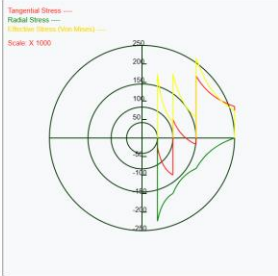
9. Three Ring Die Assembly 123 Holistic – Interference

Calculate Interferences that result in Specified Max. Effective Stress (TRESCA) in Insert, Middle Insert and Casing

Insert Matl: Carbide (K020)
 Max Eff. Stress, Insert: 200000
 Insert ID: 1
 Insert OD: 2
 Middle Insert Matl: M2 (RC39-61)
 Max Eff. Stress, Middle Insert: 200000
 Middle Insert OD: 3.5
 Casing Matl: H13 (RC46-49)
 Max Eff. Stress, Casing: 200000
 Casing OD: 6

RESULTS: 3 Ring Assy - Interference

English Length: In; Stress: lba/in²; X 1000 Metric Length: mm; Stress: N/mm²; X 1000
 Effective Stress based on Von-Mises



Forging Pressure: 224612.21655	Max. Interference Middle-Casing: 0.02106	Max. Interference Insert-Middle: 0.00486
Interference Pres. Middle-Casing: 70912.1	Interference Pres. Insert-Middle: 95426.6	
INSERT		
Tang. Stress-ID: -24912.2	Tang. Stress-OD: -99612.2	
Radial Stress-ID: -224912.2	Radial Stress-OD: -149912.2	
Due to Interference-new ID: 0.996359		
MIDDLE INSERT		
Tang. Stress-ID: 50187.8	Tang. Stress-OD: -17193.2	
Radial Stress-ID: -149912.2	Radial Stress-OD: -82465.3	
CASING		
Tang. Stress-ID: 167534.7	Tang. Stress-OD: 85069.4	
Radial Stress-ID: -82465.3	Radial Stress-OD: 0.0	

10. Three Ring Die Assembly 123 Holistic – Optimum Dimensions

Calculate Insert Dimensions: Based on Criterion that Insert, Middle Insert and Casing Yield Under Pressure at Same Time. Insert, Middle Insert and Casing are assembled at same time

Insert Matl-> Carbide (WC2)

ID: 1

Yield Strength: 175000

Middle Insert Matl-> M2 (RC59-6T)

Yield Strength: 150000

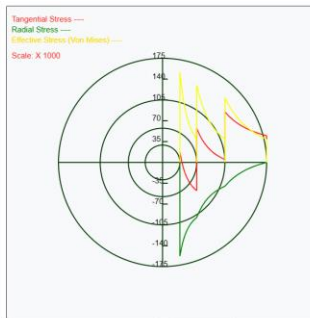
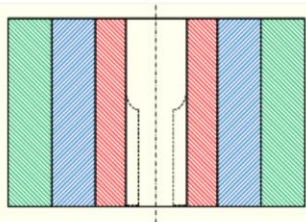
Casing Matl-> H13 (RC46-4B)

Yield Strength: 125000

OD: 6

RESULTS : 3 Ring Assy Opt. Dim.

English: Length 'in', Stress 'Lbs/In²', X 1000 Metric: Length 'mm', Stress 'N/mm²', X 1000
Effective Stress based on Von Mises



Insert OD: 1.37061	Middle Insert OD: 3.19585
Interference in Dia. Middle-Casing: 0.00938	Interference in Dia. Insert-Middle: 0.00418
Interference Pres. Middle-Casing: 53311.4	Interference Pres. Insert-Middle: 32023.2
Max. Forming Pressure: 157494.0	
INSERT	
Tang. Stress-ID: 17505.2	Tang. Stress-OD: -47462.5
Radial Stress-ID: -157494.0	Radial Stress-OD: -92527.0
Due to Interference-new ID: 0.997692	
MIDDLE INSERT	
Tang. Stress-ID: 57473.0	Tang. Stress-OD: 4997.8
Radial Stress-ID: -92527.0	Radial Stress-OD: -40051.8
CASING	
Tang. Stress-ID: 84948.2	Tang. Stress-OD: 44896.3
Radial Stress-ID: -40051.8	Radial Stress-OD: 0.0