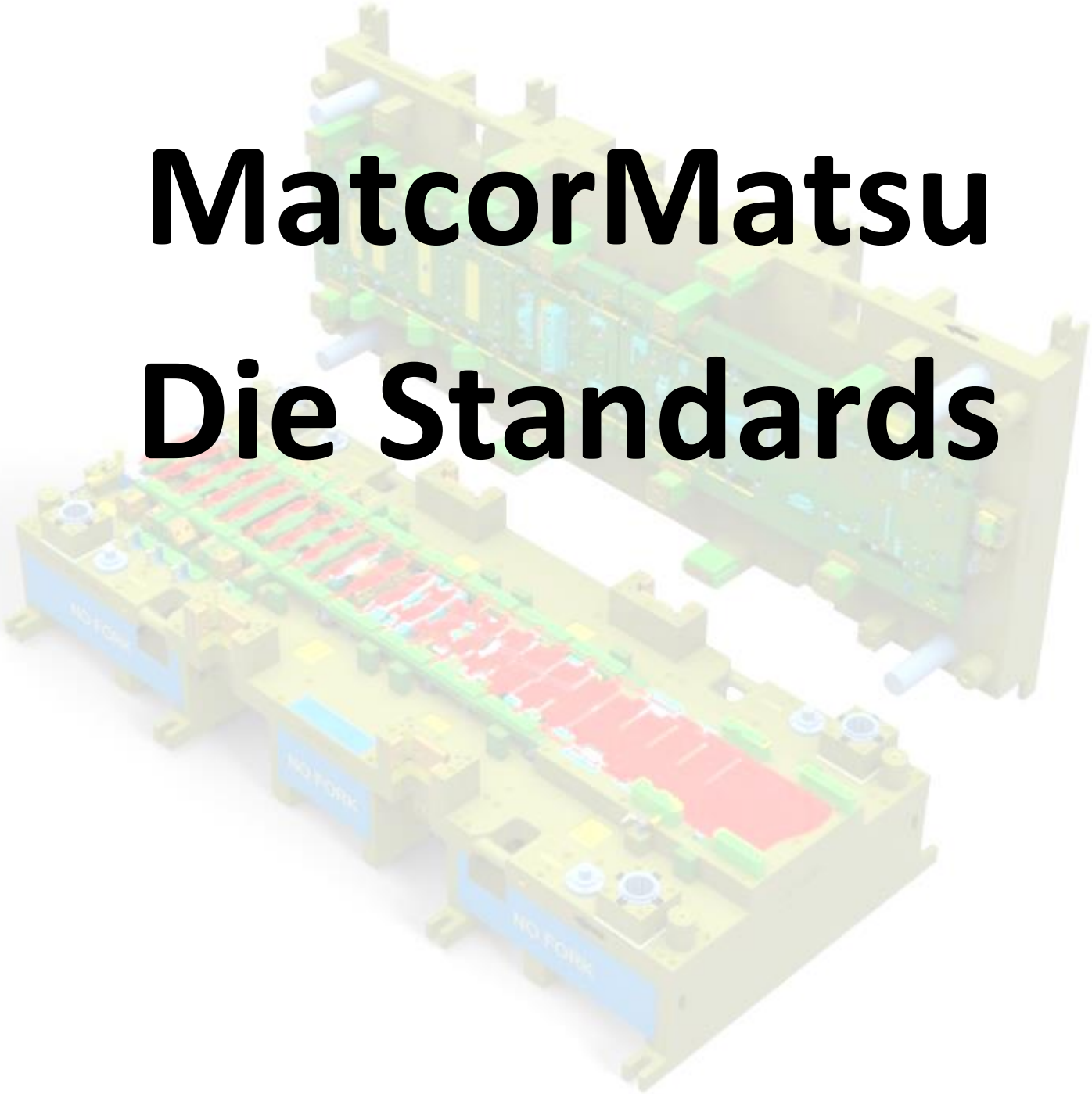
# MatcorMatsu
# Die Standards

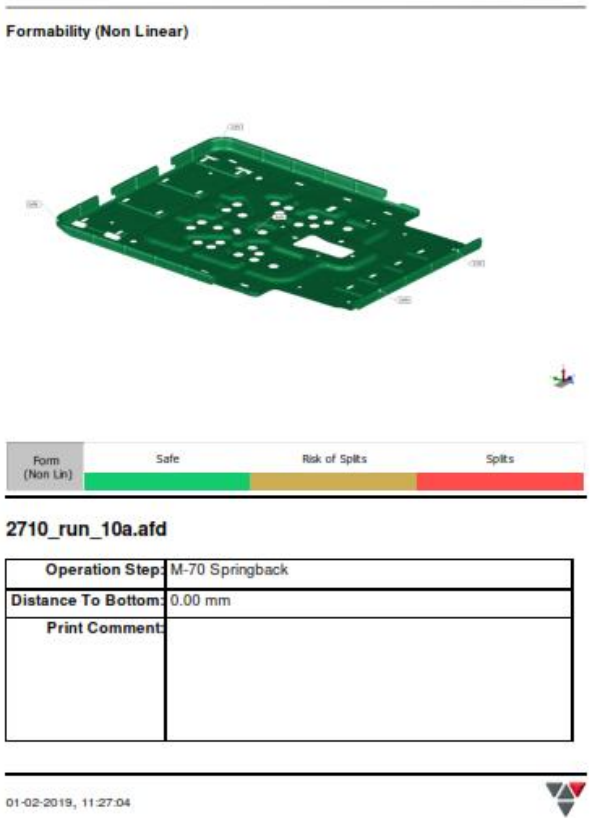


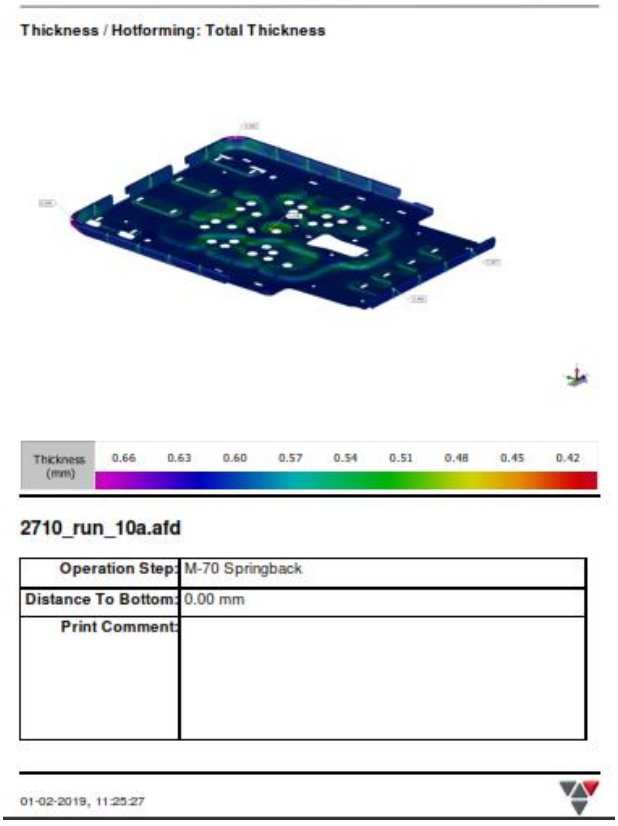
# Index

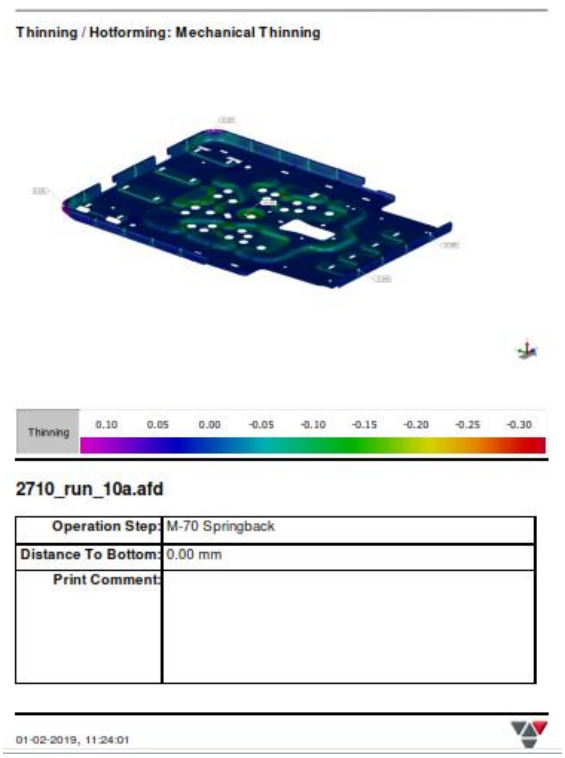
# 1. SIMULATION REPORT

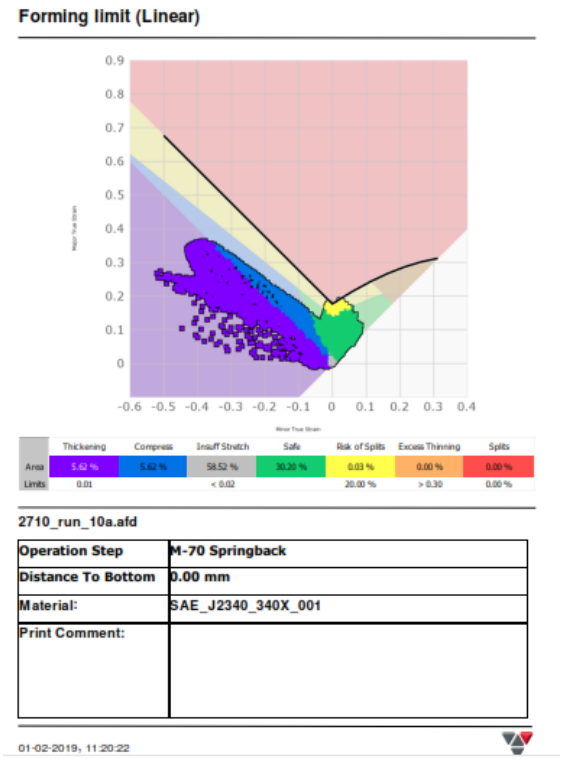
The Simulation report must include the following information:

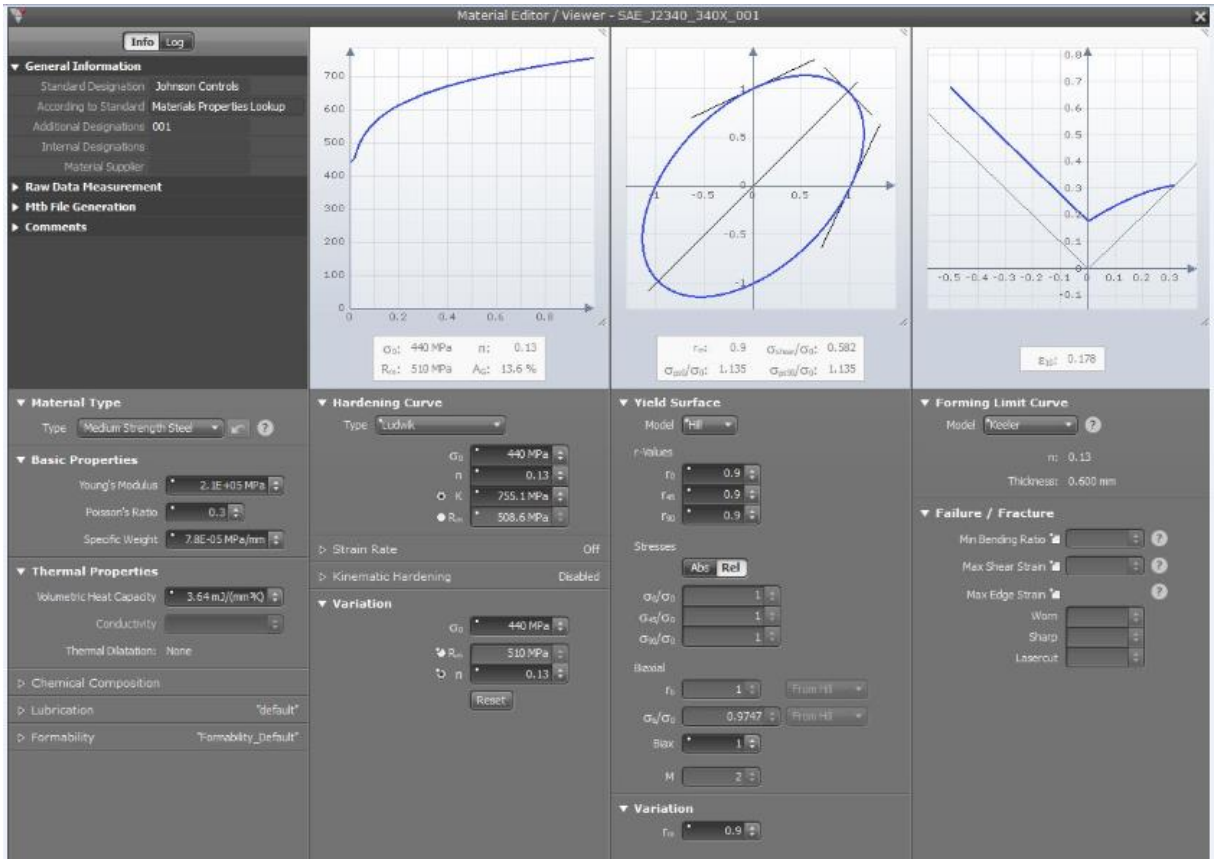
- Thinning, wrinkles, and spring back analysis,
- FLD diagrams.
- Die action sections
- Total tonnage per station.
- Blank size used on simulation report.
- Steel spec of the part.
- Engineering level of the part.
- If the part has thinning or wrinkles problems, write down proposal to Improve.
- Sim native File.



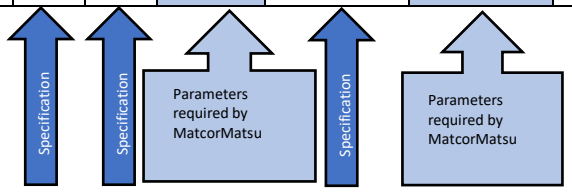

Thinning / Hotforming: Mechanical Thinning
Thinning
0.10 0.05 0.00 -0.05 -0.10 -0.15 -0.20 -0.25 -0.30
2710_run_10a.afd
Operation Step: M-70 Springback
Distance To Bottom: 0.00 mm
Print Comment:
01-02-2019, 11:24:01


Forming limit (Linear)
Thickening Compress Insuff Stretch Safe Risk of Splits Excess Thinning Splits
Area 5.62 % 5.62 % 58.52 % 30.20 % 0.03 % 0.00 % 0.00 %
Limits 0.01 < 0.02 20.00 % > 0.30 0.00 %
2710_run_10a.afd
Operation Step M-70 Springback
Distance To Bottom 0.00 mm
Material: SAE_J2340_340X_001
Print Comment:
01-02-2019, 11:20:22

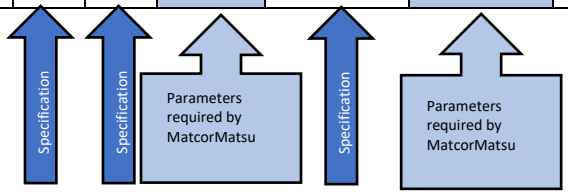

Material Editor / Viewer - SAE_J2340_340X_001
Info Log
General Information
Standard Designation Johnson Controls
According to Standard Materials Properties Lookup
Additional Designations 001
Internal Designations
Material Supplier
Raw Data Measurement
Mtb File Generation
Comments
Material Type
Type Medium Strength Steel
Basic Properties
Young's Modulus 2.1E+05 MPa
Poisson's Ratio 0.3
Specific Weight 7.8E-05 MPa/mm
Thermal Properties
Volumetric Heat Capacity 3.64 mJ/(mm³K)
Conductivity
Thermal Dilatation None
Chemical Composition
Lubrication "default"
Formability "Formability_Default"
Hardening Curve
Type Ludwik
440 MPa
0.13
755.1 MPa
508.6 MPa
Strain Rate Off
Kinematic Hardening Disabled
Variation
440 MPa
510 MPa
0.13
Reset
Yield Surface
Model Hill
r-Values
0.9
0.9
0.9
Stresses
Abs Rel
Biaxial
1
0.9747
1
2
Variation
0.9
Forming Limit Curve
Model Keeler
n: 0.13
Thickness: 0.600 mm
Failure / Fracture
Min Bending Ratio
Max Shear Strain
Max Edge Strain
Worn
Sharp
Lasercut

- Use Yield & Tensile Strength values indicated in the Table showed below.

| TABLE WITH REQUIREMENTS FOR SIMULATION | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Sheet Steel | Hot and C old Rolled High Strength Steel - Yield Strength Based | | | | | | | | | |
| GMW6409M Cold Rolled Steel | | | | | | | | | | |
| GMW-3032-M-STS Designation | Yield Strength MIN | Yield Strength MAX | Yield Strength MIN +75% | Tensile Strength (MPa) MIN | Tensile Strength MIN +75% | Total Elong in 50 mm % MIN | Total Elong in 80 mm % MIN | Total Elong in 50 mm (JIS No5) % MIN | $Rm^{567}$ MIN | n value[5] |
| CR 1 | 140 | | | | | | | | | |
| CR 2 | 140 | 260 | 230 | 270 | 360 | 34 | | | | 0.18 |
| CR 3 | 140 | 210 | 193 | 270 | 323 | 38 | | | 1.7 | 0.20 |
| CR 4 | 140 | 185 | 174 | 270 | 304 | 40 | | | 1.8 | 0.22 |
| CR 5 | 110 | 180 | 163 | 260 | 313 | 42 | | | 1.9 | 0.24 |
| GMW6409M Hot Rolled Steel | | | | | | | | | | |
| HR 1 | 180 | 290 | 263 | 270 | 353 | | | | | |
| HR 2 | 180 | 290 | 263 | 270 | 353 | 34 | | | | 0.18 |
| HR 3 | 180 | 290 | 263 | 270 | 353 | 38 | | | | 0.20 |
| GMW3032M Hot Rolled and Cold Rolled Steel | | | | | | | | | | |
| 180 P | 180 | 240 | 225 | 300 | 345 | 35 | 33 | 39 | 1.41 | 0.22 |
| 180 B2 | 180 | 240 | 225 | 300 | 345 | 35 | 33 | 39 | 1.41 | 0.21 |
| 180 B0 | 180 | 240 | 225 | 300 | 345 | 35 | 33 | 39 | 1.41 | 0.19 |
| 210 P | 210 | 270 | 255 | 320 | 365 | 33 | 31 | 37 | 1.41 | 0.21 |
| 210 B2 | 210 | 270 | 255 | 320 | 365 | 33 | 31 | 37 | 1.21 | 0.19 |
| 210 B0 | 210 | 270 | 255 | 320 | 365 | 33 | 31 | 37 | 1.21 | 0.18 |
| 240 B2 | 240 | 300 | 285 | 340 | 385 | 30 | 28 | 34 | 1.21 | 0.19 |
| 240 B0 | 240 | 300 | 285 | 340 | 385 | 30 | 28 | 34 | 1.21 | 0.18 |
| 270 B2 | 270 | 330 | 315 | 365 | 410 | 28 | 26 | 32 | 1.11 | 0.17 |
| 270 B0 | 270 | 330 | 315 | 365 | 410 | 28 | 26 | 32 | 1.11 | 0.17 |
| 300 B2 | 300 | 360 | 345 | 390 | 435 | 26 | 24 | 30 | 1.01 | 0.16 |
| 300 B0 | 300 | 360 | 345 | 390 | 435 | 26 | 24 | 30 | 1.01 | 0.16 |
| GMW3032M Cold Rolled High Strength Low Alloy - Mechanical Properties | | | | | | | | | | |
| CR270 | 270 | 350 | 330 | 330 | 390 | 26 | 24 | 30 | | 0.17 |
| CR300 | 300 | 380 | 360 | 370 | 430 | 24 | 22 | 28 | | 0.16 |
| CR340 | 340 | 420 | 400 | 410 | 470 | 22 | 20 | 26 | | 0.15 |
| CR380 | 380 | 460 | 440 | 450 | 510 | 20 | 18 | 24 | | 0.14 |
| CR420 | 420 | 520 | 495 | 480 | 555 | 18 | 16 | 22 | | 0.13[4] |
| CR500 | 500 | 600 | 575 | 560 | 635 | 16 | 14 | 20 | | 0.11[4] |
| CR550 | 550 | 650 | 625 | 610 | 685 | 14 | 12 | 18 | | 0.10[4] |



| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| GMW3032M Hot Rolled High Strength Low Alloy - Mechanical Properties | | | | | | | | | | |
| HR270 | 270 | 350 | 330 | 330 | 390 | 29 | 27 | | | 0.17 |
| HR300 | 300 | 380 | 360 | 370 | 430 | 27 | 25 | | | 0.16 |
| HR340 | 340 | 420 | 400 | 410 | 470 | 25 | 23 | | | 0.15 |
| HR380 | 380 | 460 | 440 | 450 | 510 | 23 | 22 | | | 0.14 |
| HR420 | 420 | 520 | 495 | 480 | 555 | 22 | 20 | | | 0.13 |
| HR500 | 500 | 600 | 575 | 560 | 635 | 20 | 18 | | | 0.11 |
| HR550 | 550 | 650 | 625 | 610 | 685 | 18 | 16 | | | 0.10 |
| GMW3399M Hot Rolled Dual Phase - Mechanical Properties | | | | | | | | | | |
| HR 490T / XXXY DP | To Be Determined | | | | | | | | | |
| HR 580T / 320Y DP | 300 | 450 | 412.5 | 580 | 692.5 | 21 | 22 | 19 | | 0.20 |
| HR 780T / 380Y DP | 380 | 610 | 552.5 | 780 | 952.5 | 15 | 16 | 14 | | 0.18 |
| GMW3032M Hot Rolled High Strength Low Alloy - Mechanical Properties | | | | | | | | | | |
| HR 450T / 310Y HE | 310 | 380 | 362.5 | 450 | 502.5 | | 25 | | | TBD |
| HR 590T / 440Y HE | 440 | 620 | 575 | 590 | 725 | | 14 | 17 | | 0.10 |
| HR 780T / 600Y HE | 600 | 800 | 750 | 780 | 930 | | 12 | 15 | | 0.09 |
| HR 980T / XXXY HE | To Be Determined | | | | | | | | | |
| GMW3399M Cold Rolled Dual Phase- Mechanical Properties | | | | | | | | | | |
| CR 450T / 250Y DP | 250 | 330 | 310 | 450 | 510 | | 27 | 30 | | 0.18 |
| CR 490T / 290Y DP | 290 | 390 | 365 | 490 | 565 | | 24 | 27 | | 0.17 |
| CR 590T / 340Y DP | 340 | 440 | 415 | 590 | 665 | | 20 | 22 | | 0.16 |
| CR 780T / 420Y DP | 420 | 550 | 517.5 | 780 | 877.5 | | 15 | 17 | | 0.11 |
| CR 980T / 550Y DP | 550 | 730 | 685 | 980 | 1115 | | 8 | 10 | | N/A |
| CR 1180T / 820Y DP | 820 | 1130 | 1052.5 | 1180 | 1412.5 | | 3 | 4 | | N/A |
| GMW3399M Cold Rolled TRIP - Mechanical Properties | | | | | | | | | | |
| CR 590T / 380Y TR | 380 | 480 | 455 | 590 | 665 | | 26 | 29 | | 0.21 |
| CR 690T / 400Y TR | 400 | 510 | 482.5 | 690 | 772.5 | | 24 | 27 | | 0.21 |
| CR 780T / 420Y TR | 440 | 560 | 530 | 780 | 870 | | 20 | 20 | | 0.19 |

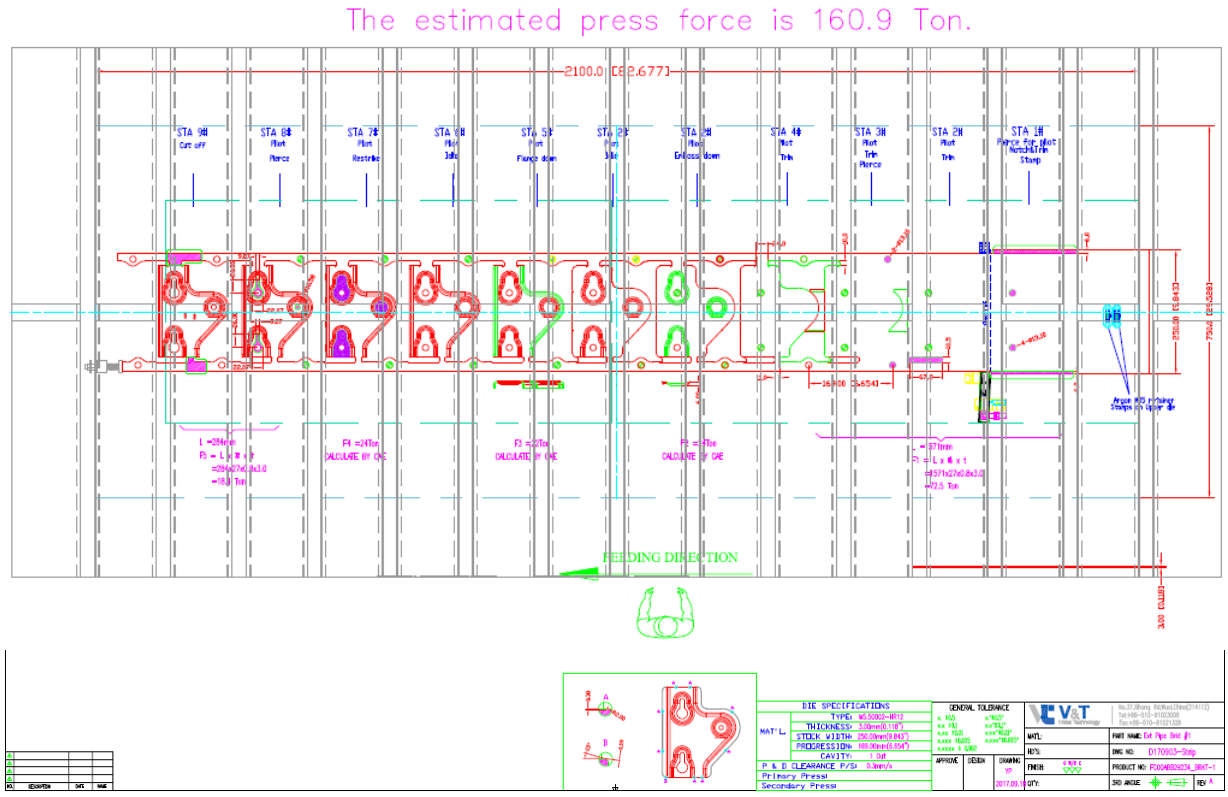


# 2. LAYOUT PROCESS

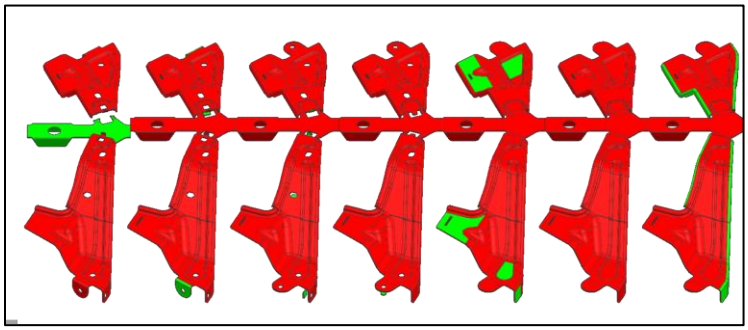
Strip layout or transfer process must be in 2D DWG, PDF and 3D STEP file.

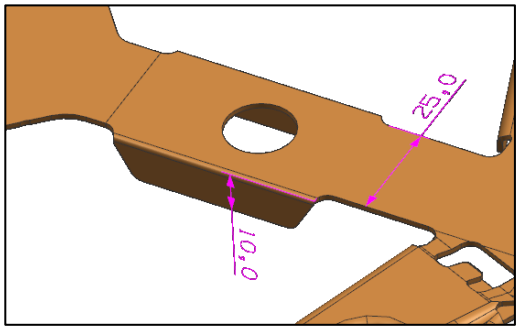
Layout must show:

1. All the Dimensions in METRIC SYSTEM.
2. Total tonnage and Tonnage by each single station.
3. Feed direction.
4. Date stamp location.
5. Sensors for pitch and cut-off.
6. Shut Height, feed height, Transfer pass line, width, pitch, material thickness, lifting, pilot hole Ø and critical dimensions as show.
7. Part Mismatch layout.
8. Forming, trim and pierce indicated with different colors.
9. Show Bolster of selected press.

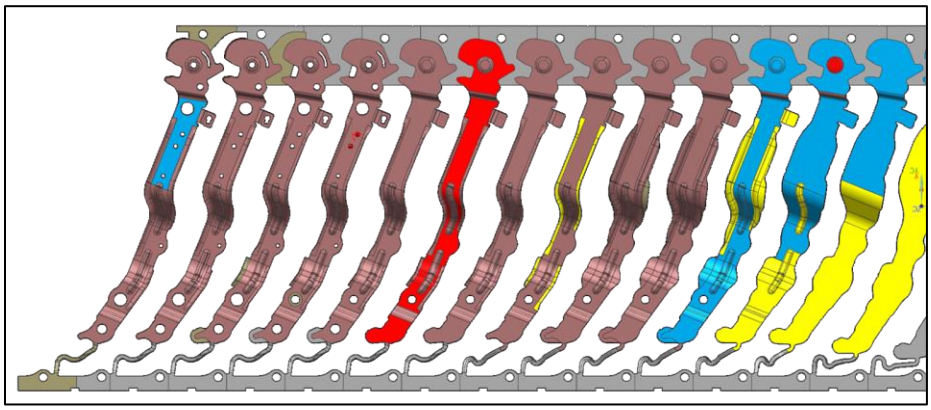


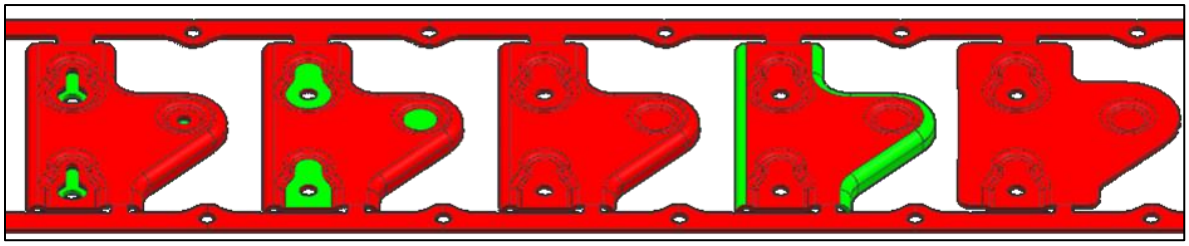
- Center Carrier must be strong adding a U flange 10mm height for stability.



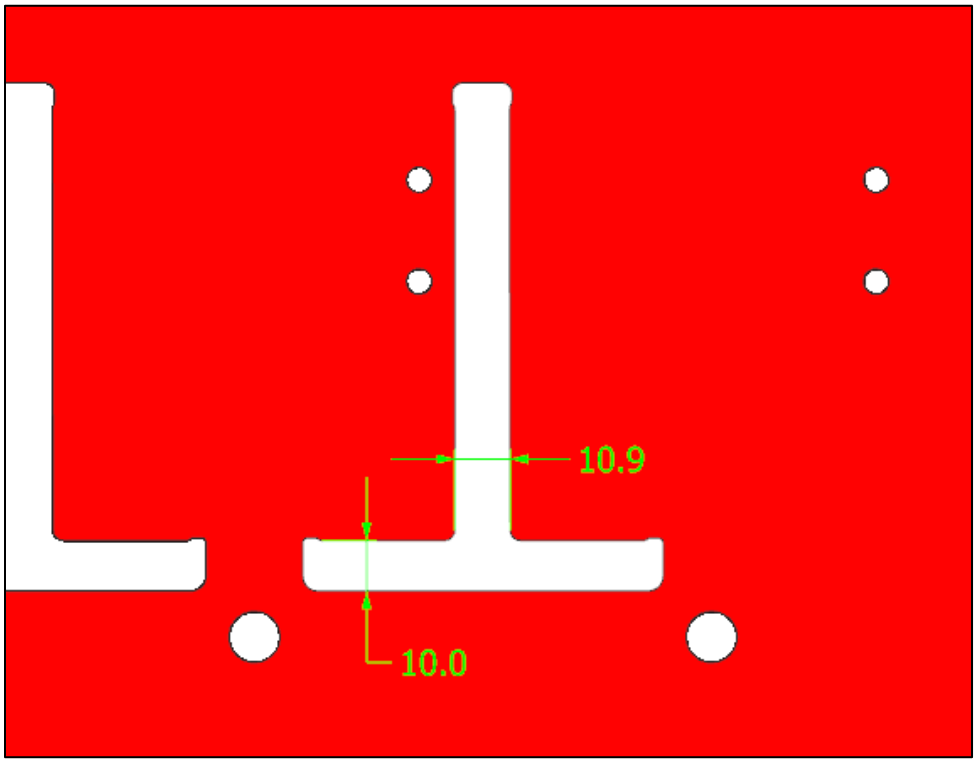


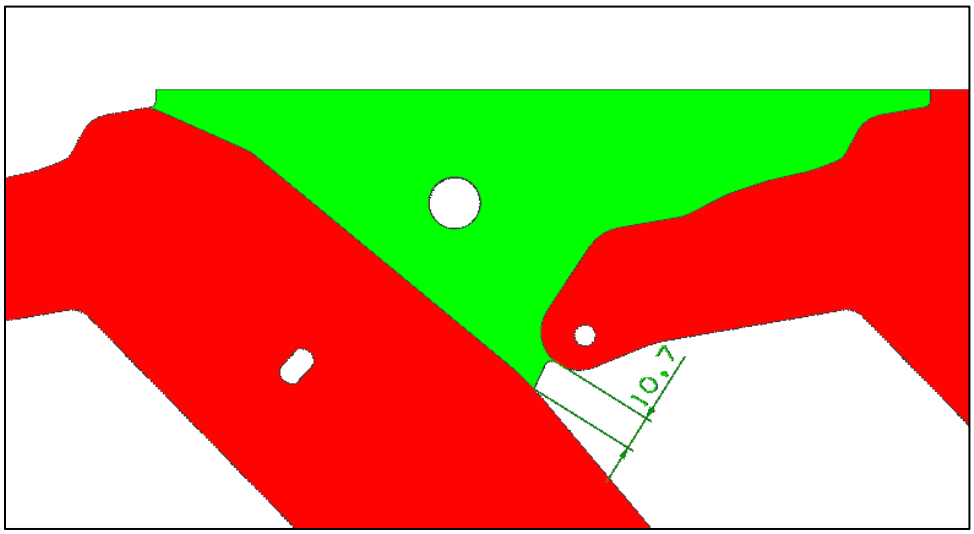

- Lat carrier must be strong and wide enough for stability.



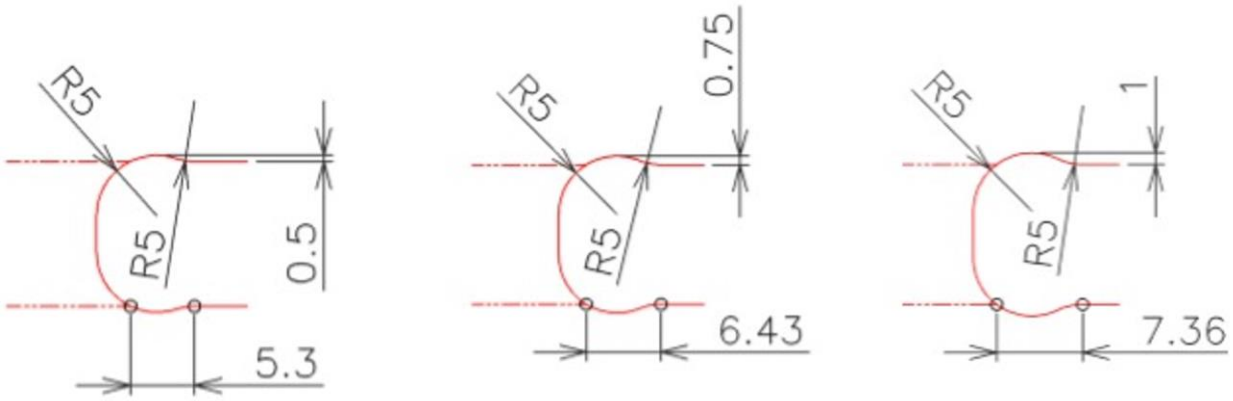


- Trim punches must be 10mm wide as minimum when material thickness is between 0.8 and 3.5mm, for thicker gauge use 3 times the material thickness as minimum width.



- By-pass notches to be designed to avoid double cutting condition. Follow below standard when trim tolerance is allowed.

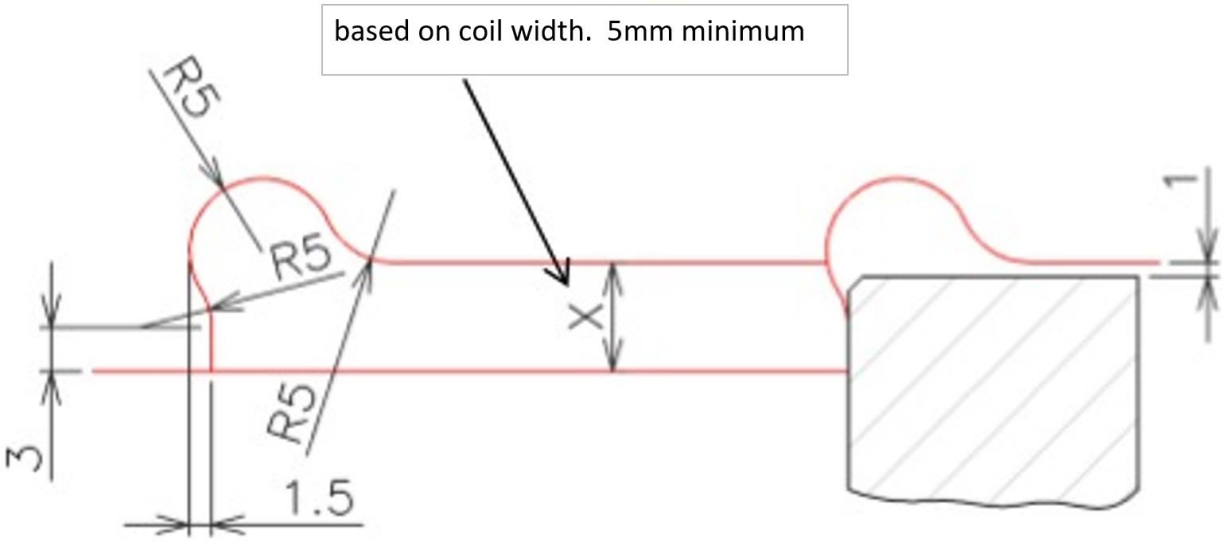



**Detailed notch**
0.5mm-2.5mm material thickness

**Detailed notch**
2.6mm-4mm material thickness

**Detailed notch**
> 4.1mm material T.

- Coil edge cut to follow below standard.



# 3. GENERAL DIE DESIGN

- All the Die designs, layout process, and simulations must be reviewed and authorized by the Tooling Engineer and Tool Room manager, before the kick off.

- Below are listed the materials to be use in **MatcorMatsu** dies:
  - Lower & Upper Shoes SAE 1018 / SAE 1020
  - Risers / Parallels / Keys SAE 1018 / SAE 1020
  - Lifters/Stock Guides/ Stripper AISI 4140
  - Special Punch-Retainer AISI 9840 / AISI 4140
  - Backing Plates 4140 Pre hard.
  - Trim Punches, blades & buttons AISI D2 or DC53 if need to stamp high strength material (58-62° HRC)
  - Forming Inserts AISI D2 or DC53 if need to stamp high strength material (58-62° HRC)**.**

- All Designs must be in 3D and **Metric System**.

- Designs shared with MatcorMatsu should be in STEP and Native Format.

- **Die Designs for parts with 1.5mm thickness or thicker must be made of steel plate (no casting).**

- **Pierce punches** 90.0mm length and ball lock heavy duty (M2 steel), use headed type when material thickness is thicker than 3mm or for high strength material 550MP or higher (DAYTON PS4 steel)

- Extruding punches use DAYTON PS4 coating by DAYTON XNP type.

- **Button die** 25.0mm height Dayton brand, made of highspeed Steel (M2).

- Nitrogen Gas Spring, DADCO brand:
  Small MICRO series/ Medium L series/ Large 90.10-90.8 series.

HYSON or KALLER brand can be used if tooling engineer ask for.

- Nitro cylinders should be charged to a max of 80% .75% is better for cylinder life
- Wear plates, guide blocks, keepers, Danly/Lamina brand, or equivalent according NAAMS Standards (Do not use special Sizes)

- For stripper pads and lifters use Standard Lifters or Dadco brand retainers according Tooling engineer (retainer size and styles are indicated in upper die Design section.)

- All progressive & blanking dies must be run off in a press with coil feeder, no strip feeding.

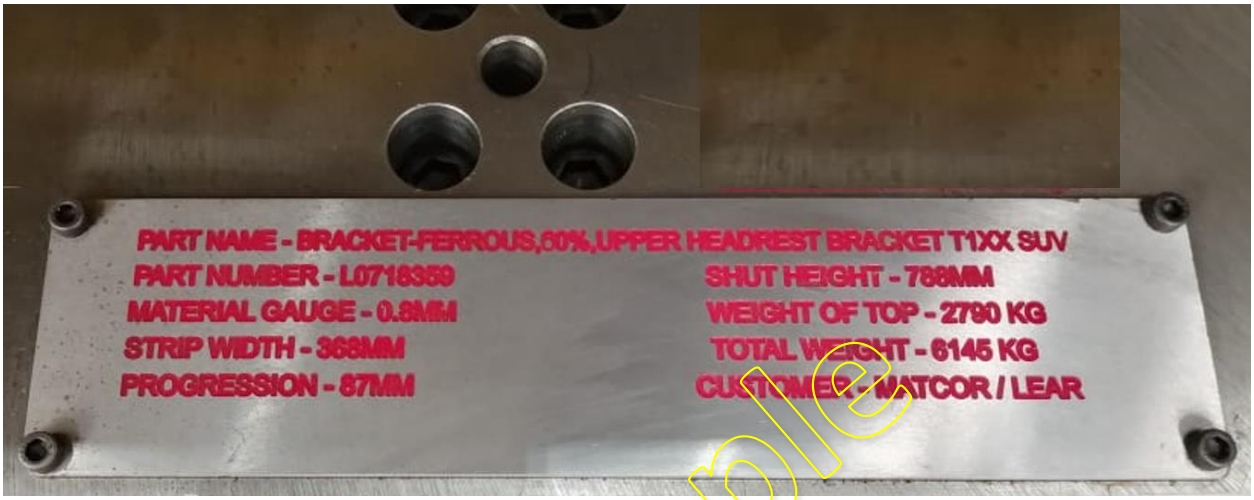
- Transfer Dies must be run off under one RAM (all sets at same time).

No exceptions will be made.

- All the Blanks Shape Must have Poka-yoke to avoid any mistake orientation when is loaded in the Blank Destaker and feed the blank to the Forming/Draw Station.

- Include this information marked in lower plate (progressive and blanking dies):

1. Part Name
2. Part Number
3. Shut Height
4. Pitch
5. Strip Width
6. Material thickness
7. Weight of Top half of die
8. Weight of Bottom half of die
9. Total Die Weight.
10. Property of



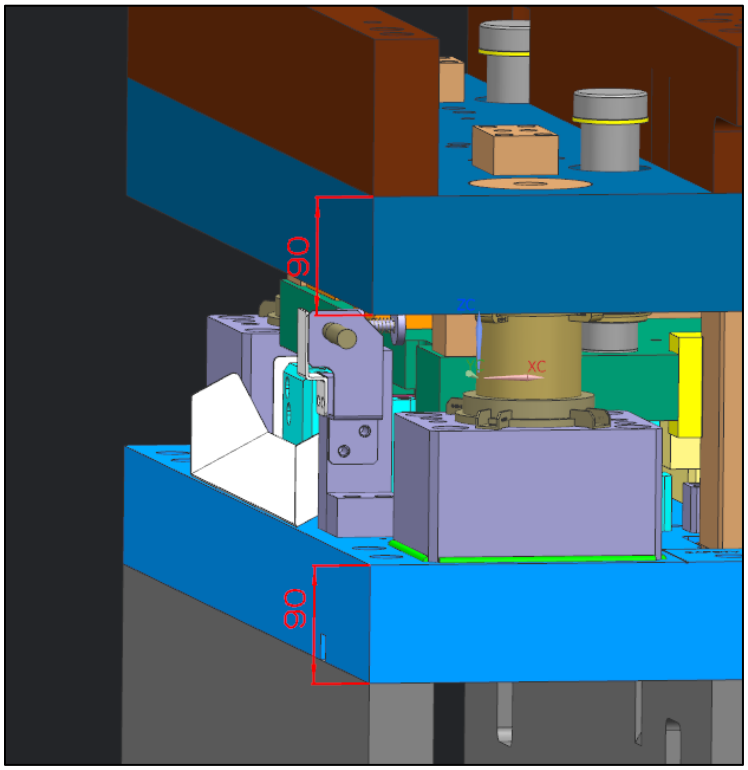




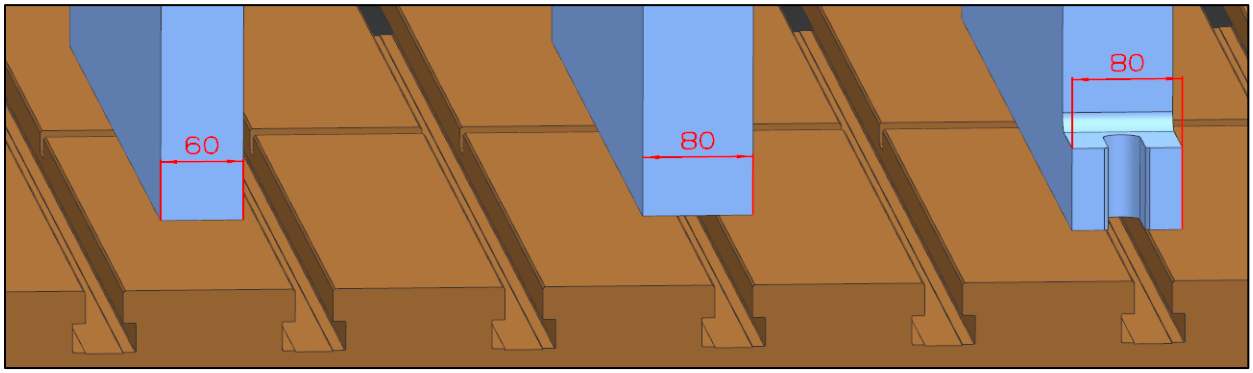
- For Sensors and connector, MatcorMatsu will share information at die design stage.
  Example:
  **Sensors NPN M12 X 1**
  **Balluf brand**
  **Code: BES 516-329-G-E5-C-S4**
  **Connector pin**
  **PHOENIX CONTACT Brand**
  **Code: HC-B 24-ESTS-1771749**
  **Mounting Box**
  **PHOENIX CONTACT Brand**
  **Code: HC-B 24-SMQ-67/M1M25-1586976**

Progressive dies require one mechanical stop at the rear side of the Die (to avoid over-progression), **sensor** for coil present (stop for pitch), and other at the end of die, in order to detect miss feed.

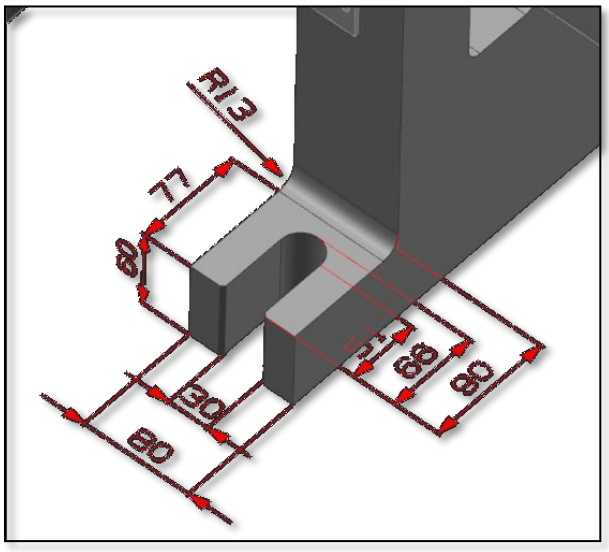
- Die shoe thickness must be 90mm (80mm can be used for small dies).



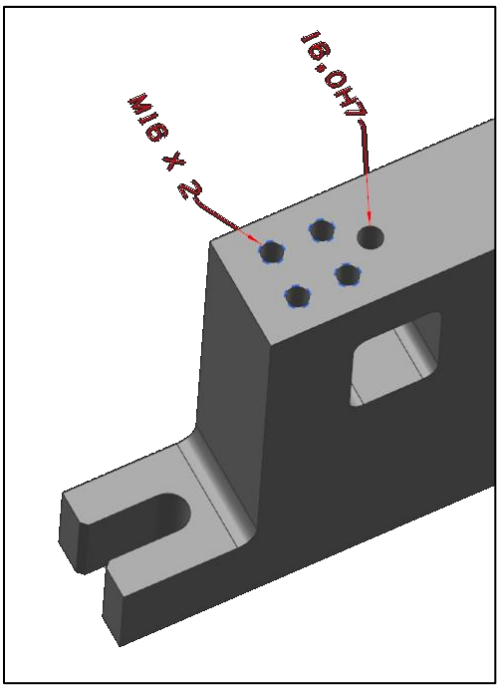

- Parallels:
  - Clamping parallel thickness must be 80mm,
  - for no clamping parallels 60mm to 80mm can be used (80mm wide must be if the parallel is over T-slot)



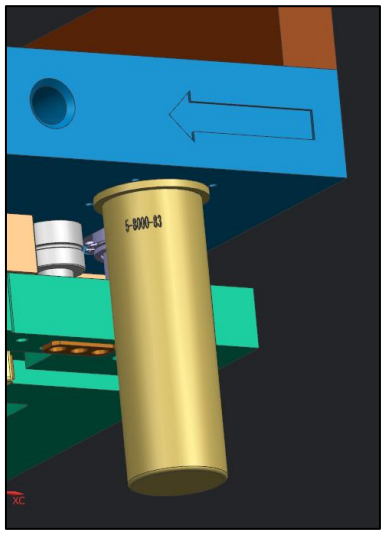
- Clamping feet dimensions will be provided by MatcorMatsu according to the presses and clamps.
  Example below:

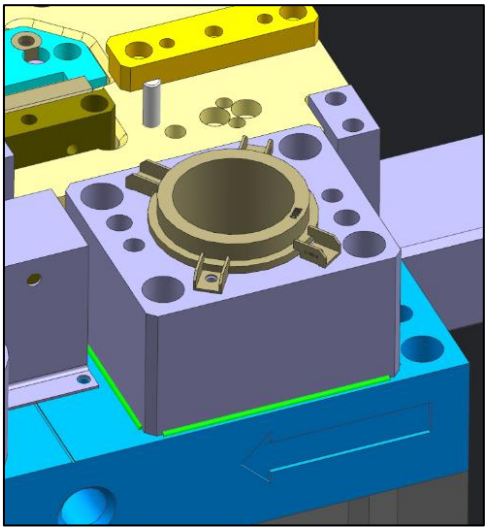



- Clamping parallel must be hold by 4 M16 screws and one Dowell pin each side.

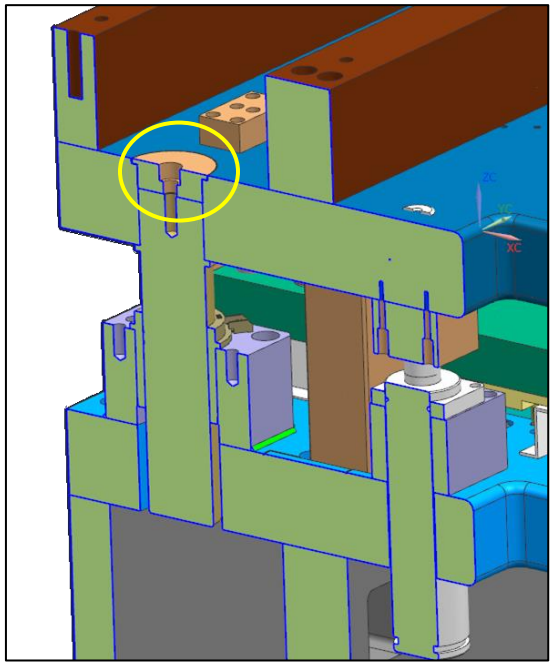


- Use bronze bushings and solid guide posts ⦰80mm for mid and large size dies, ⦰63mm for small dies:

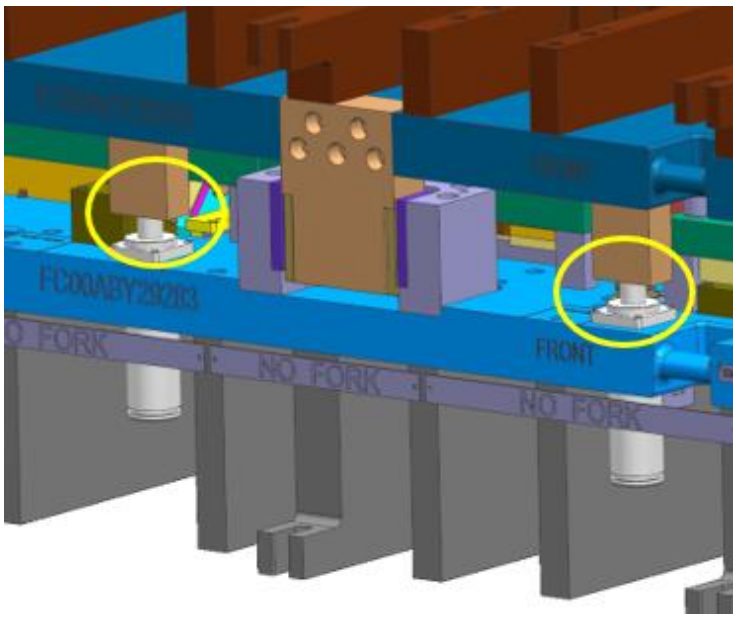




- Use safety keeper for guide post.

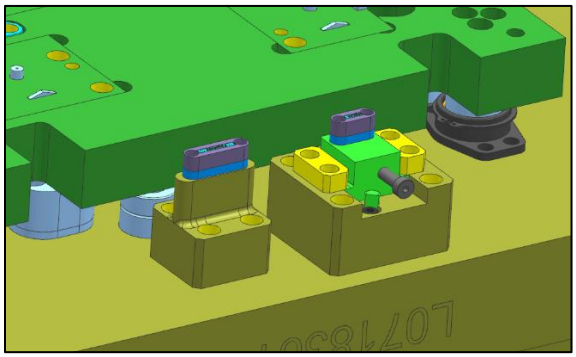


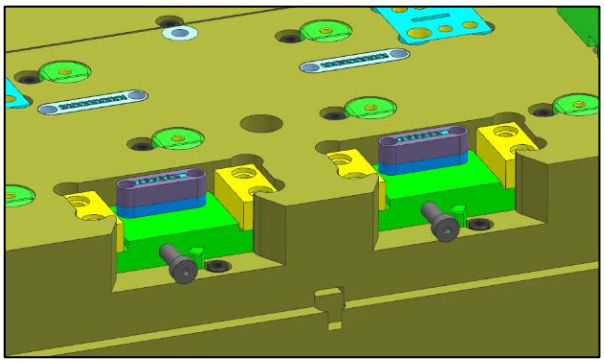
- Add storage cylinders.



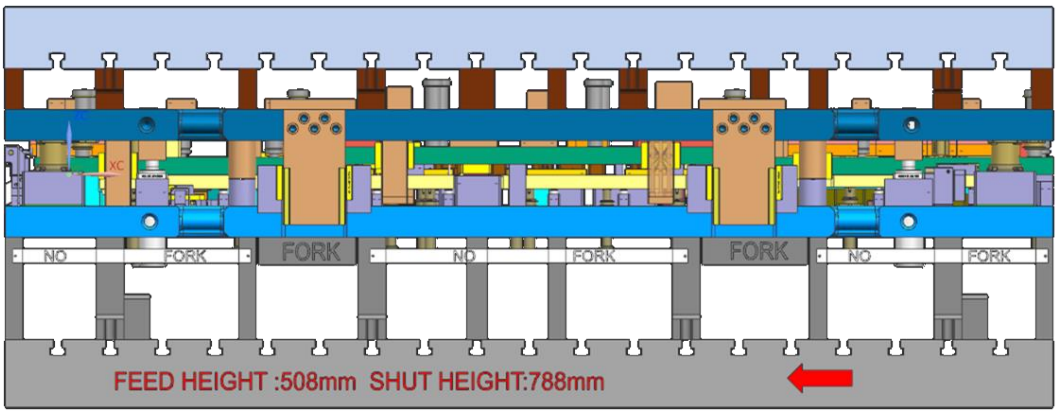

- Retainer for date stamp, Argon (brand) Spec RN1/8
  (Size depend of Customer requirement)
  http://www.argontool.com/standard_stamps1.htm

- Use quick change style holder for date stamp, and fixed stamp holder for part number (It can be in upper or lower die depending on customer requirements).

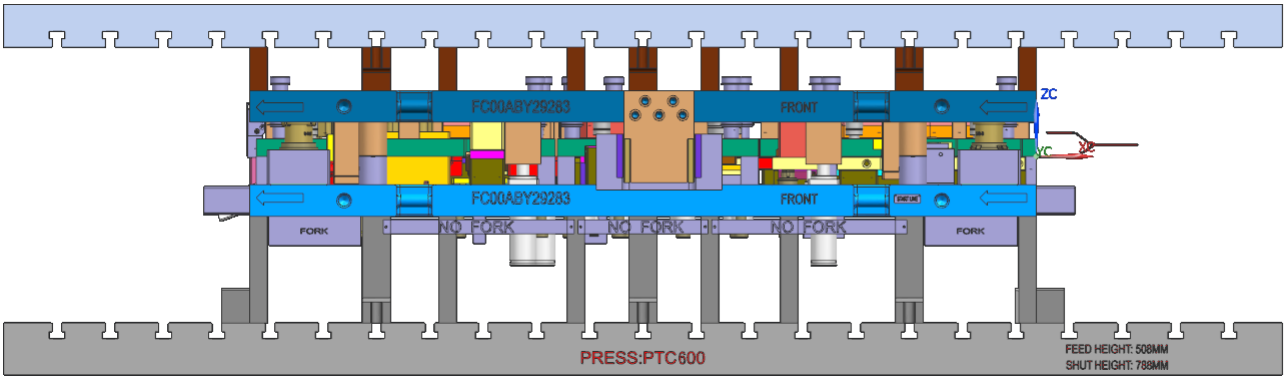




- Use 4 heel blocks for large dies.



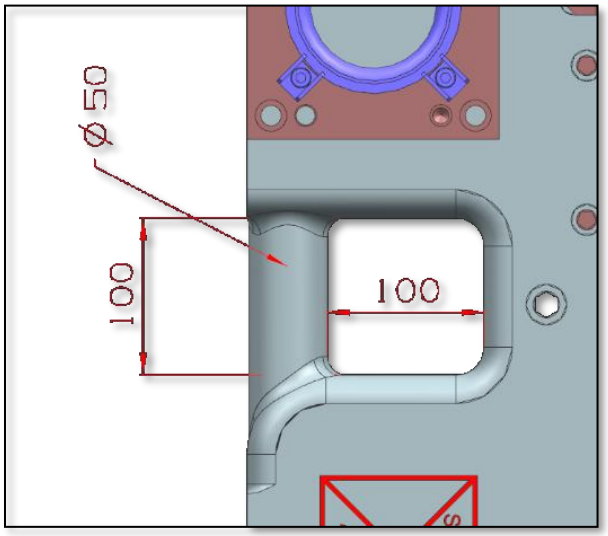

- Use 2 heel blocks for medium and small dies.



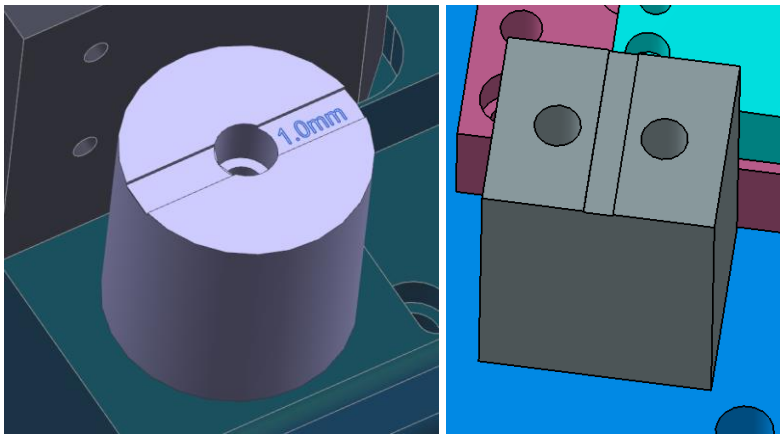
- All the Bolts used in MatcorMatsu DIES need to be GRADE 9.8 ~ 12.9
  Example HOLO-KROME, UNBRAKO, BRIGHTON BEST, MISUMI.


(No flat or low head allowed under any circumstances)

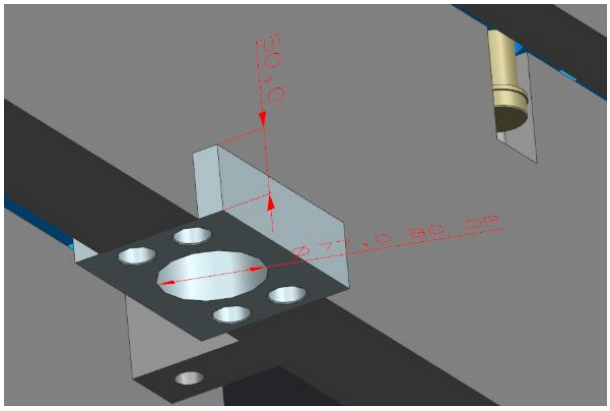
- Upper/Lower Parallel Bars must be Bolted using M16 Minimum.
- All inserts need to have enough lifting holes.
- All inserts have to be Identifying with Material Type, Detail Number, die number.
- All pocketed steels or doweled steels must have lifting holes.
- If lifting bars are required, they must be machined on die shoe.

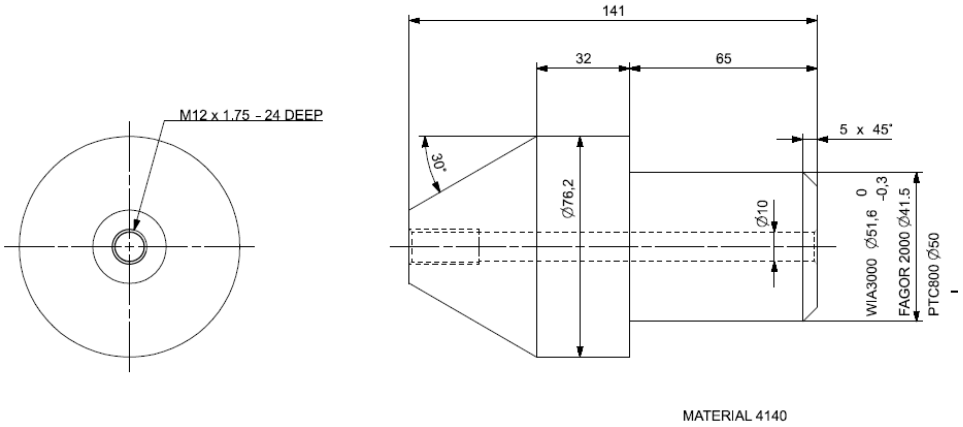


- Limit blocks must have **1mm lead check** for adjust and **bolted with M12,** and have to be placed over parallels.

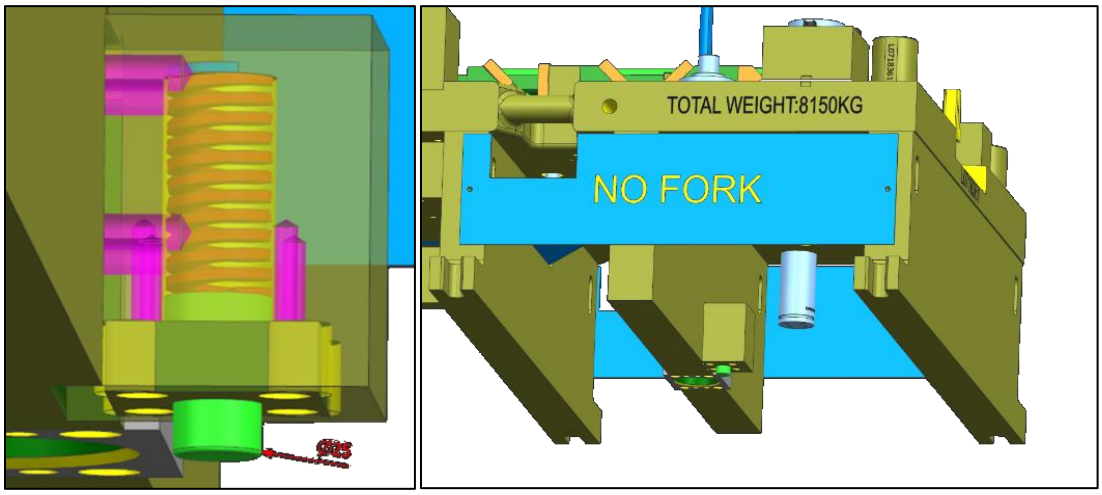



- For die location on the Bolster, MatcorMatsu will provide location system information according to the press.
  Example for moving bolster with pin locators below:



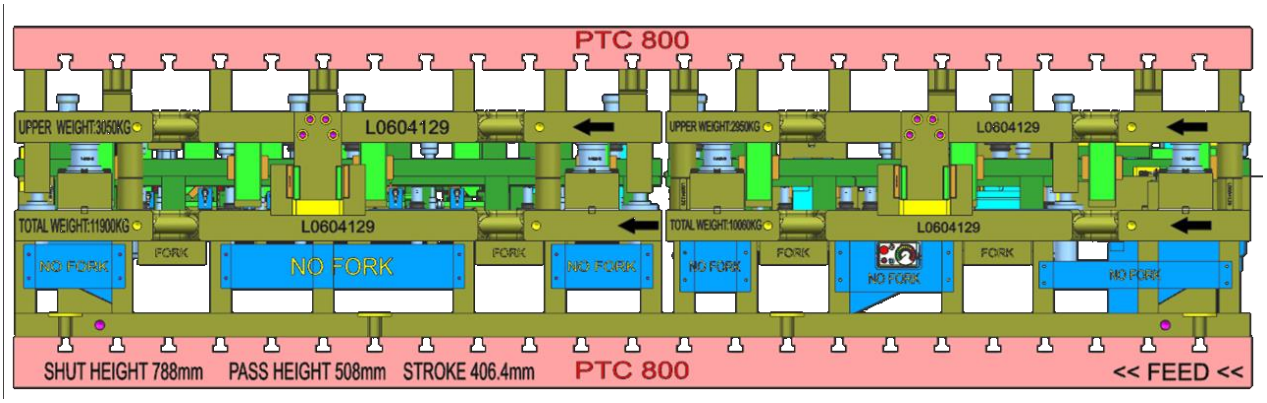


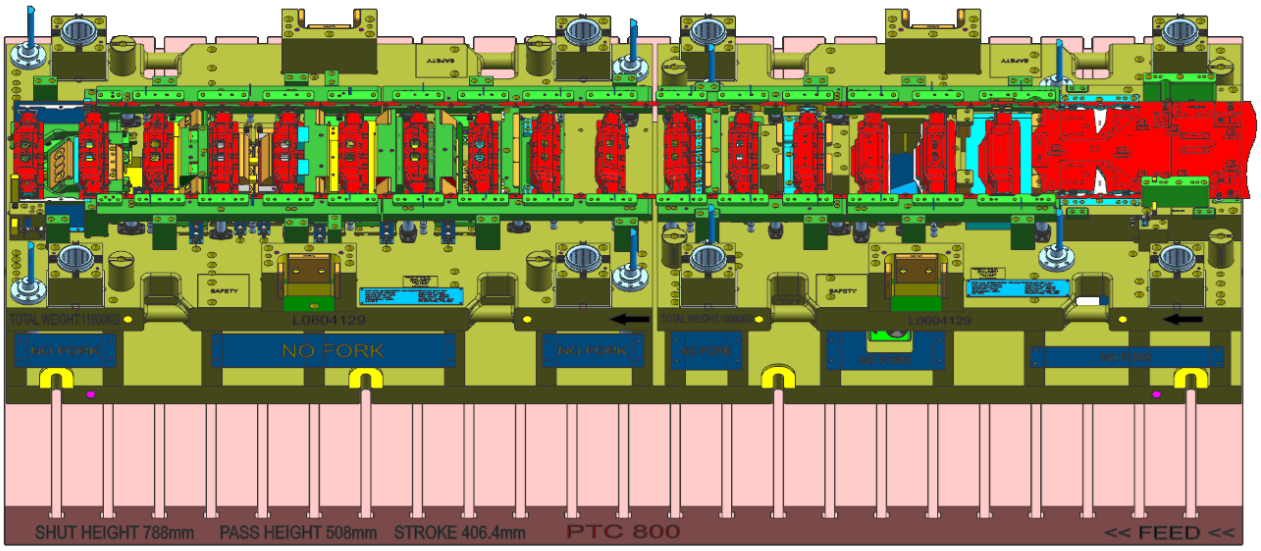
Example for fixed bolster below:




- Any insert over 250 x 250 mm or exceeding 15 kg weight must be split.
- **Heat treatment** certified is requested for each insert.
  For Critical Forming areas use **coating DUPLEX VARIANTIC,**
  any alternative coating process must be approved by Project Tooling Engineer.
- All components and inserts have to be free of welding, shims are allowed but only one shim by component and fixed by a screw.
- **All Die Guide**, as well as Symmetrical pads must have an Error Proof.
- Include Reference holes with coordinates in x-y-z on each Die Set.
- Never use Manifolds plates with Nitro Gas Spring integrated.
- Draw station where **Nitrogen gas springs** are used must have linked system with control panel, also when forming steels are mounted on stripper pad linked system and control panel must be used.

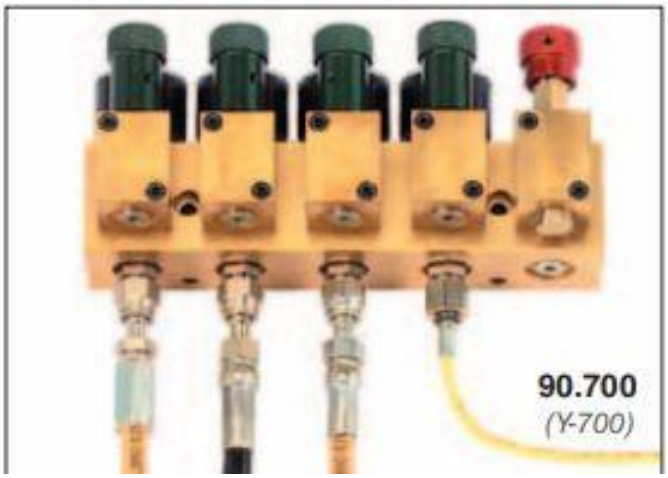
- **Die size:** dies longer than 3000mm, need to be separated, unless agreed by MatcorMatsu Tooling Engineer.




- **Die Weight:** dies weigh more than 15 Metric ton need to be separated, unless agreed by MatcorMatsu Tooling Engineer.

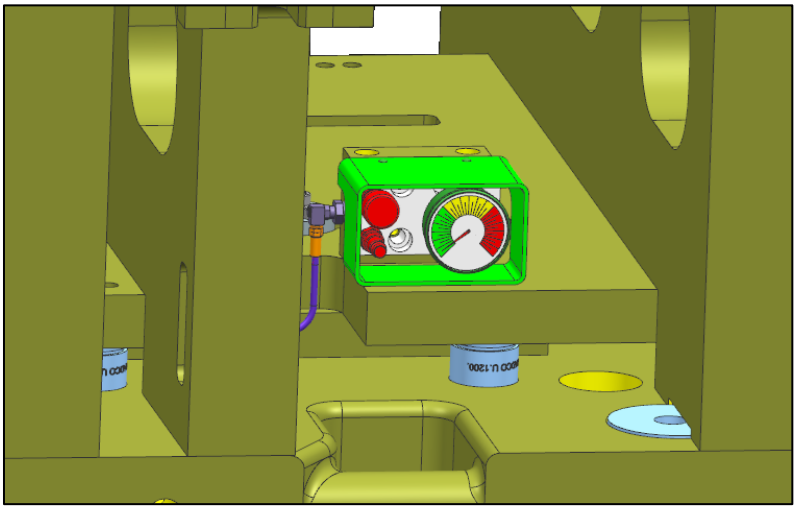
- Use control panel with 6.0 mm quick disconnect fitting. Place it in front and back of tool and use Y-700 Hose only.



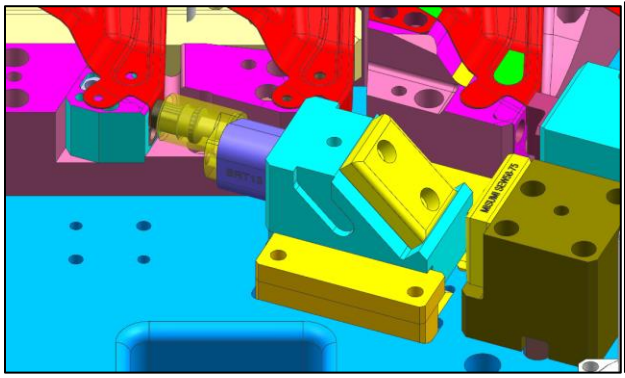

*MINIFLEX®*
**90.700** *(Y-700)* **Hose**
+ Offers the smallest possible bend radius available for flexible hose
+ Compatible with mini-fittings for the *MINILink®* System and DADCO Zip-fittings.
– Only permanent crimped adapters available
– Cannot be linked with a surge tank

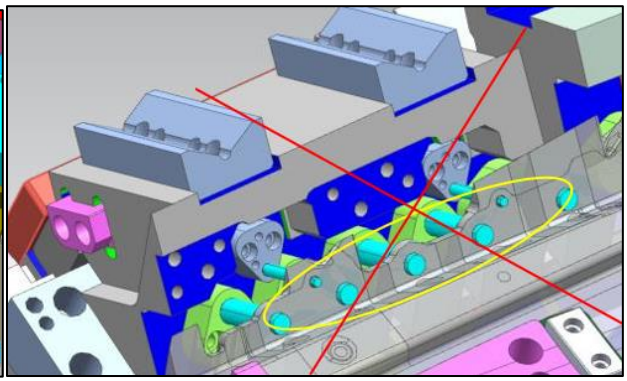
- For transfer dies All Shut Heights tolerances of die sets have to be common +/- 0.5 mm. (T)
  For **Die Set Location** 2 pin locators **per station are needed**;
  1 to the front &, 1 more to the rear of die.

- The Control Panel Must Be Protected between parallels and add a safety guard.



- Use true strip MOELLER or DAYTON brand strippers for cam piercing

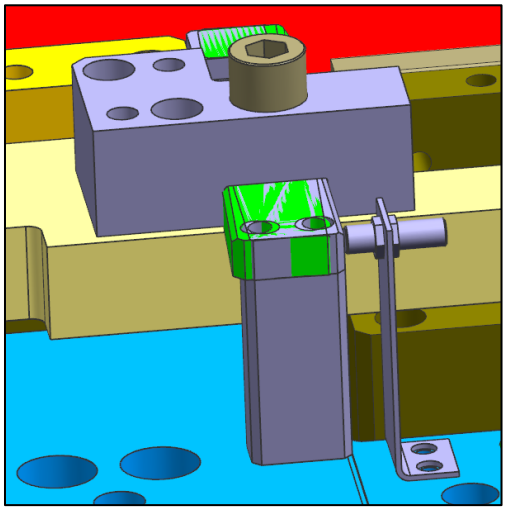


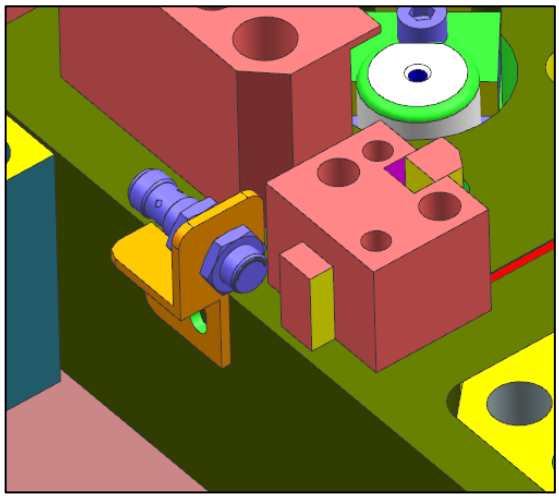


- For material thicker than 2.5mm Nitro Strip can be used according to tooling engineer requirement.

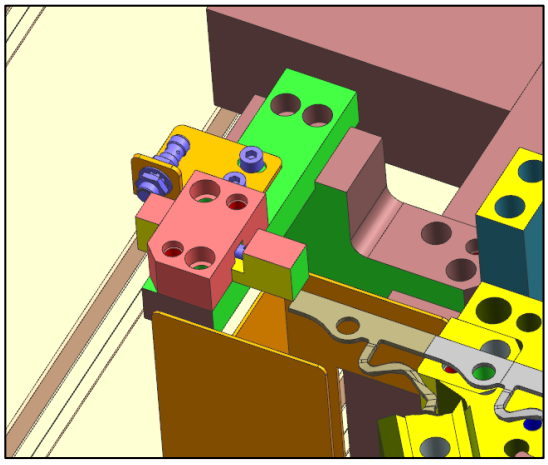
# LOWER DIE

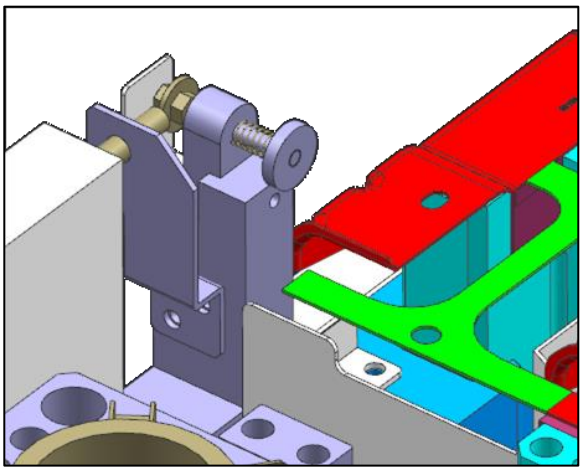
- Add sensor and finger according to the process.





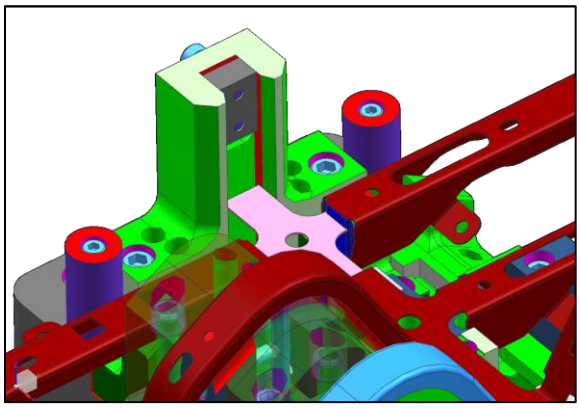
- For lateral carrier use this type of sensor fingers.



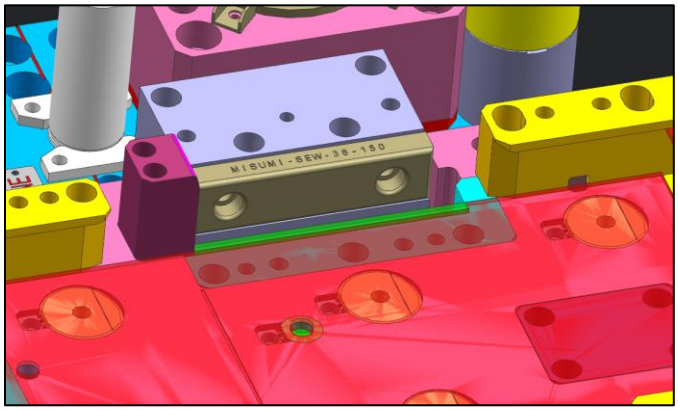


- Add sensor covers and pipes to protect the sensor cables

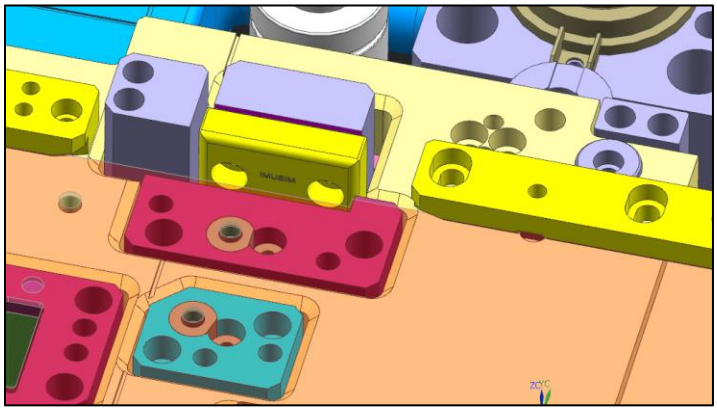
- For center carrier use this type of sensor finger with “V” guide block.



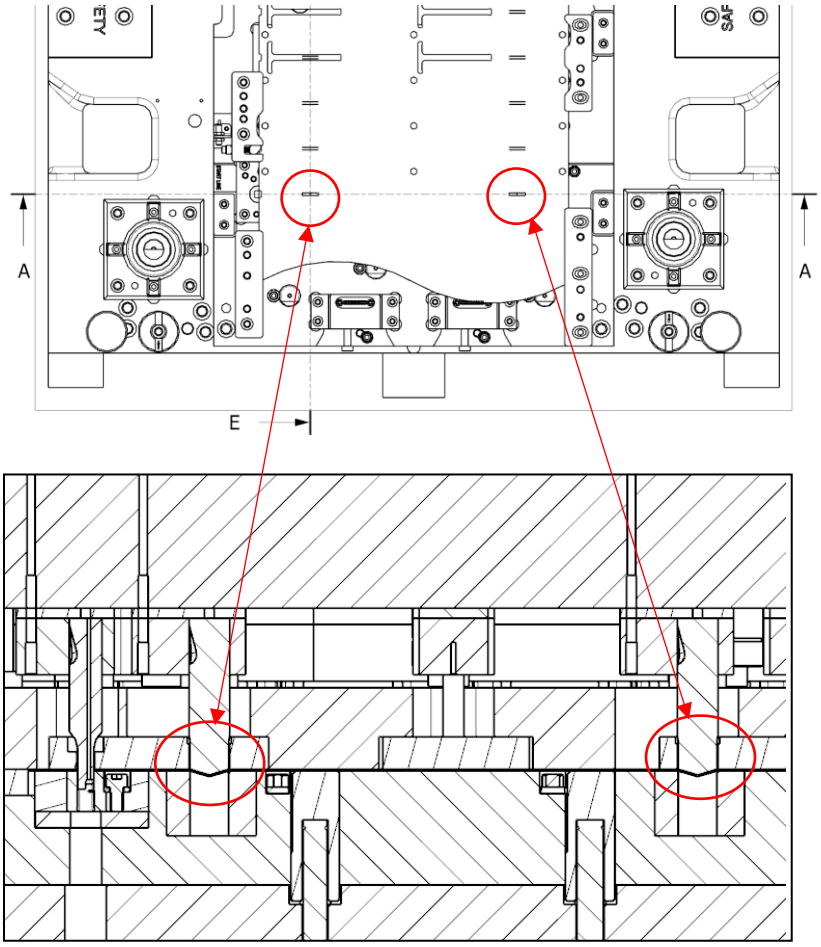
- Progressive dies require at least one solid stop block at the rear of the Die (to avoid over-progression).

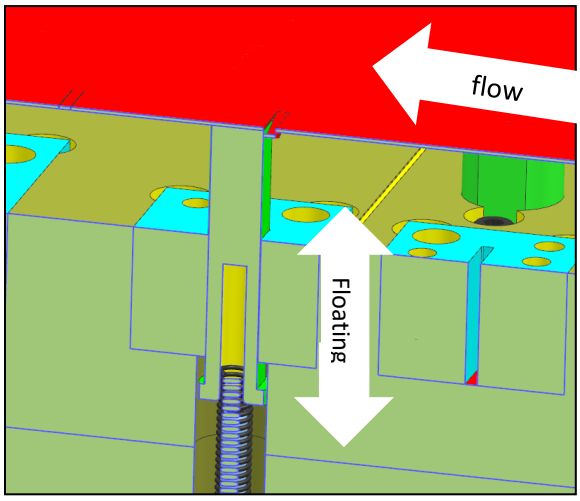


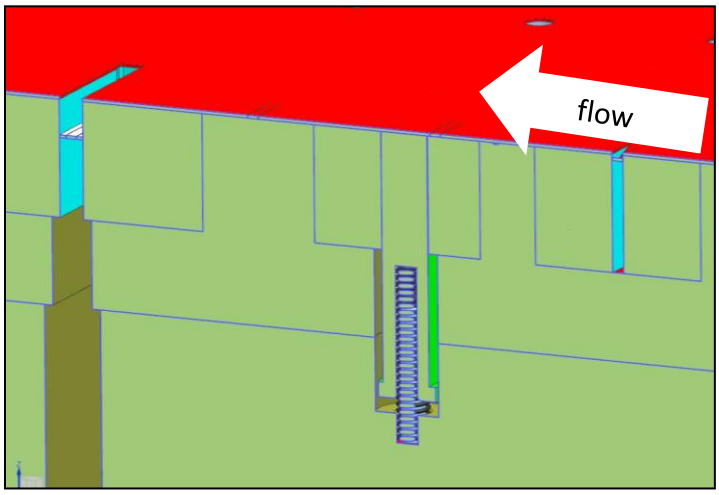

- If a single plate is used as lifter, stop block must be pocketed in die shoe never on the lifter.



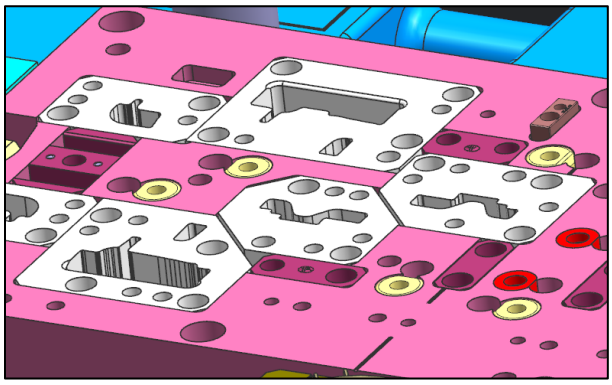
- Use FADE AWAY STOP when French stop is not feasible, as shown below.



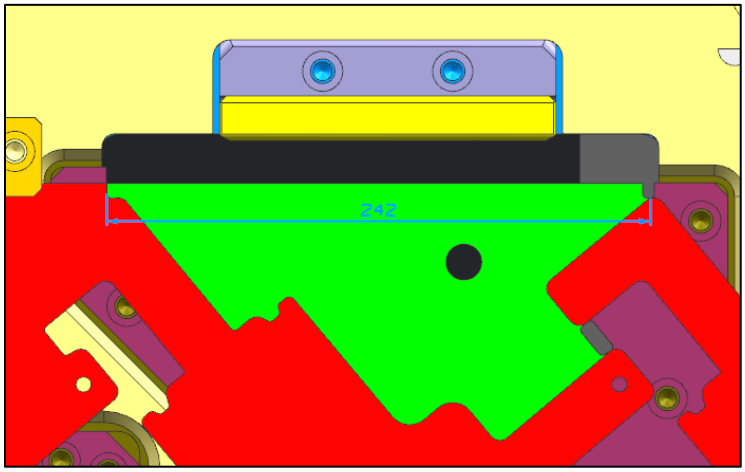



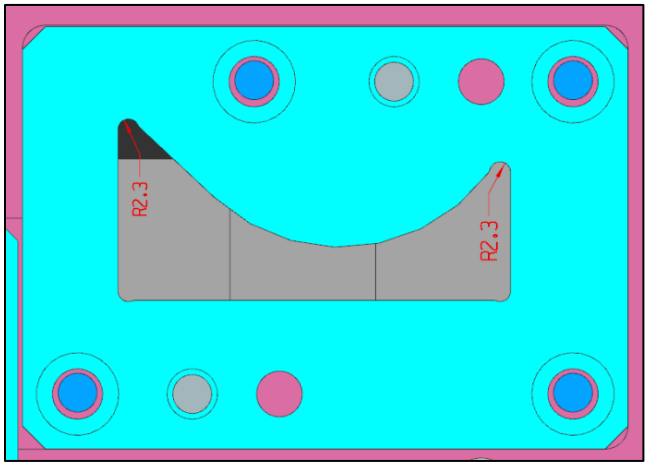
- Lower trim steels must be inserted in pocket.



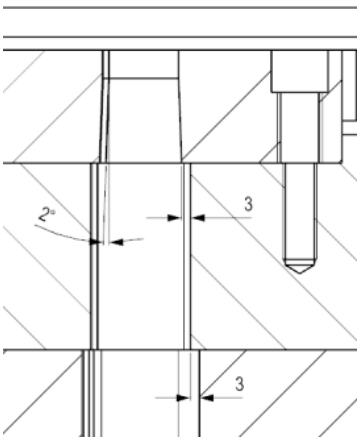
- Maximum Scrap length must be 300.0 mm.(T)



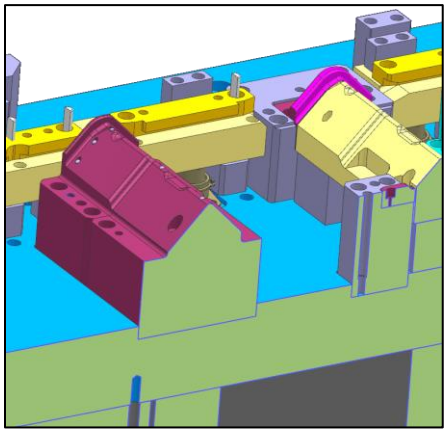

- For blades “Inner Sharp Corners are not allowed” use at least 2.0mm Radius.



- The Scrap falls for blades and button dies must be machined 2 Degrees and open 3mm gap to avoid Scrap Jam.

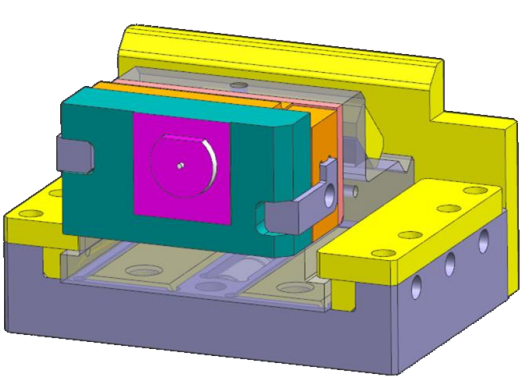


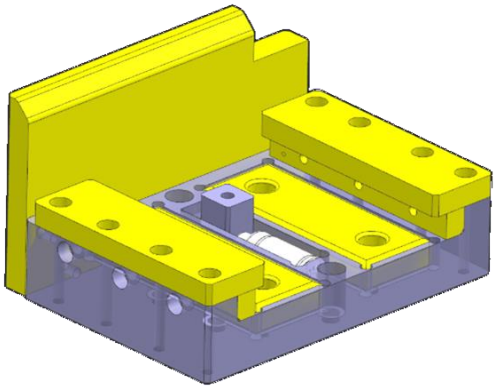

- Forming steels must be pocketed.



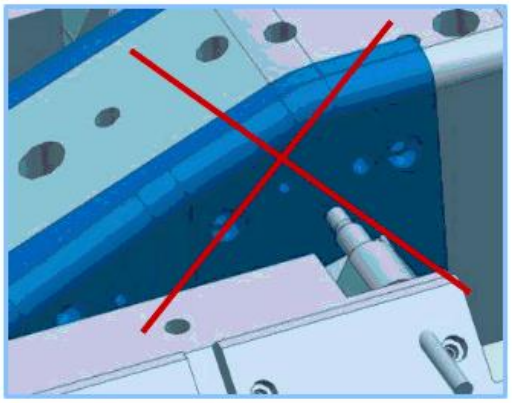
- Bottoming Marks to be installed in all draw & restrike section (argon brand).

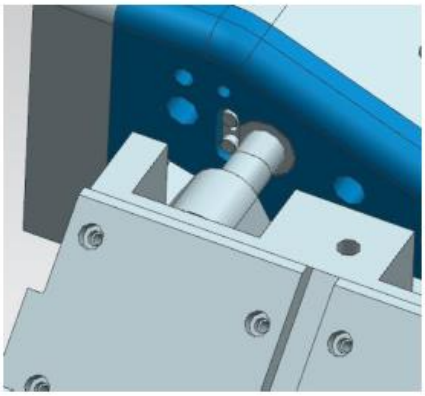
- All cam slide design must be adjustable for easy maintenance.



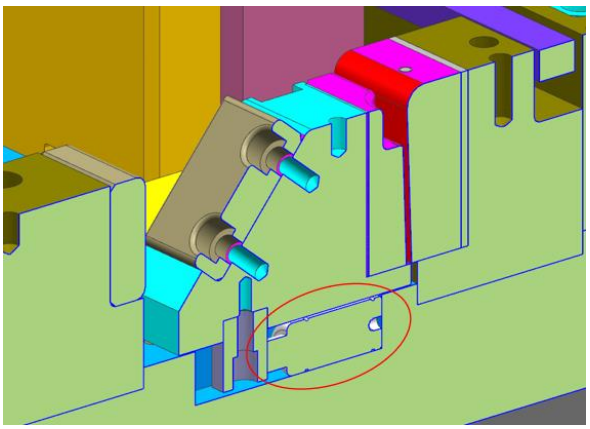


- If cam trim and piercing are made together, use standard button dies whenever is possible for easy maintenance.

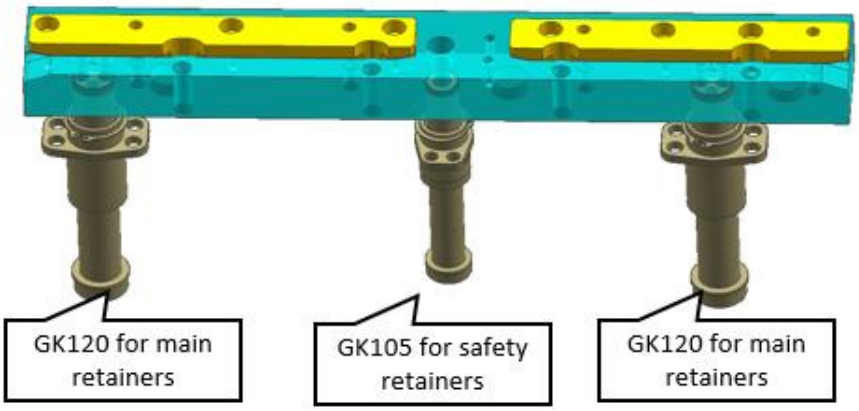




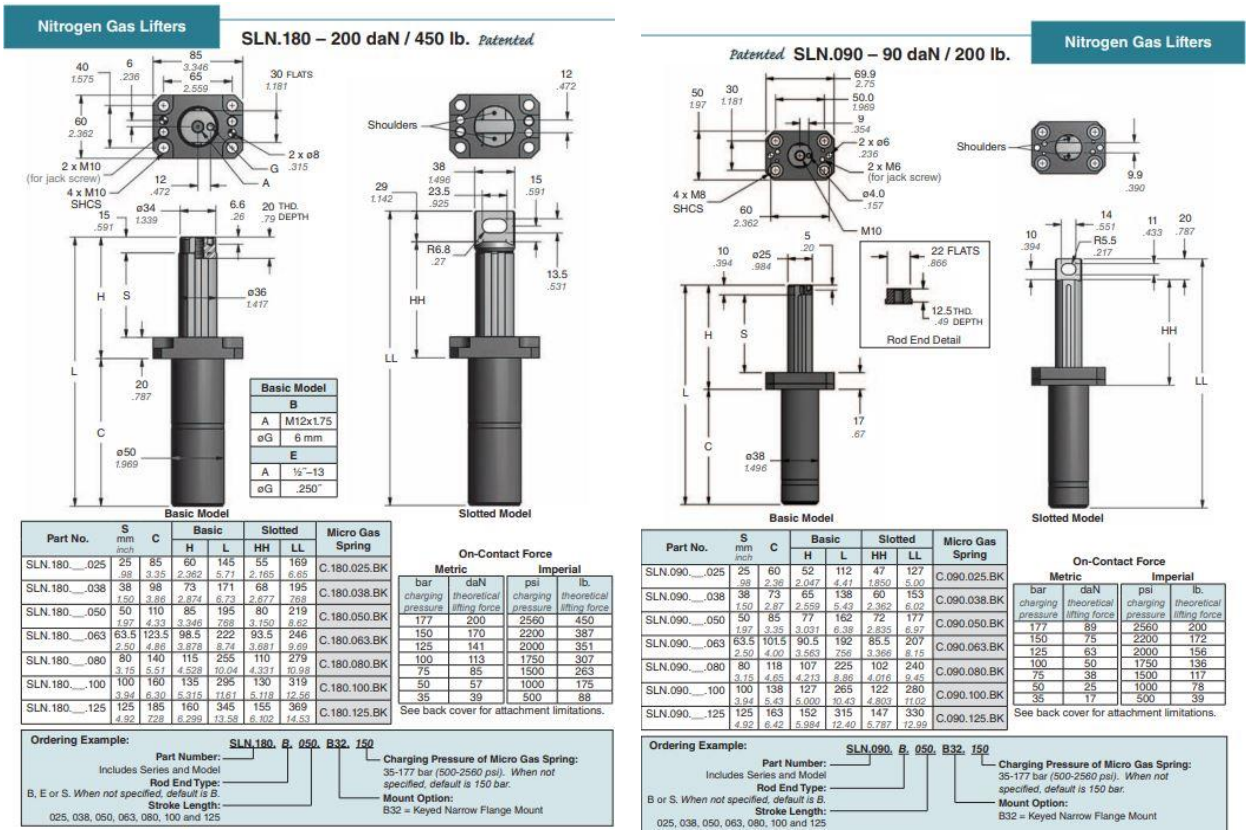
- Coil springs are not acceptable in any CAMs, nitro gas springs must be used.



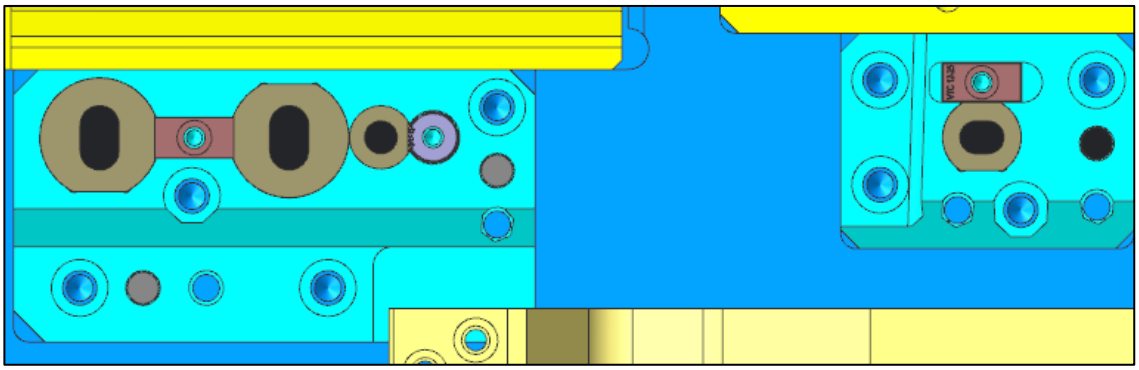
- For lifter bars use standard lifter as show below



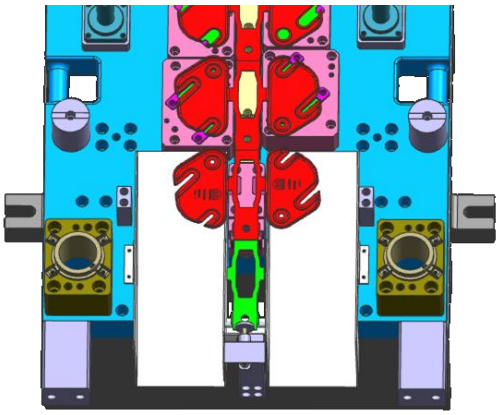

- DADCO brand can also be used for lifter bars.

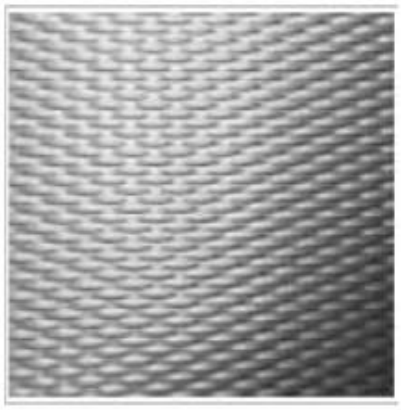


- For non-round holes (slot holes, square holes, etc..) use a flat face as error proof as show below.

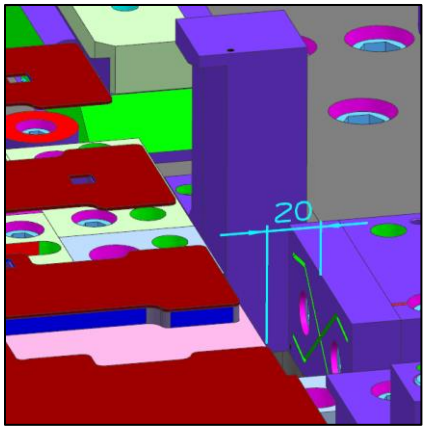


- Part chute thickness must be 3.0mm, also bubble sheet is required.

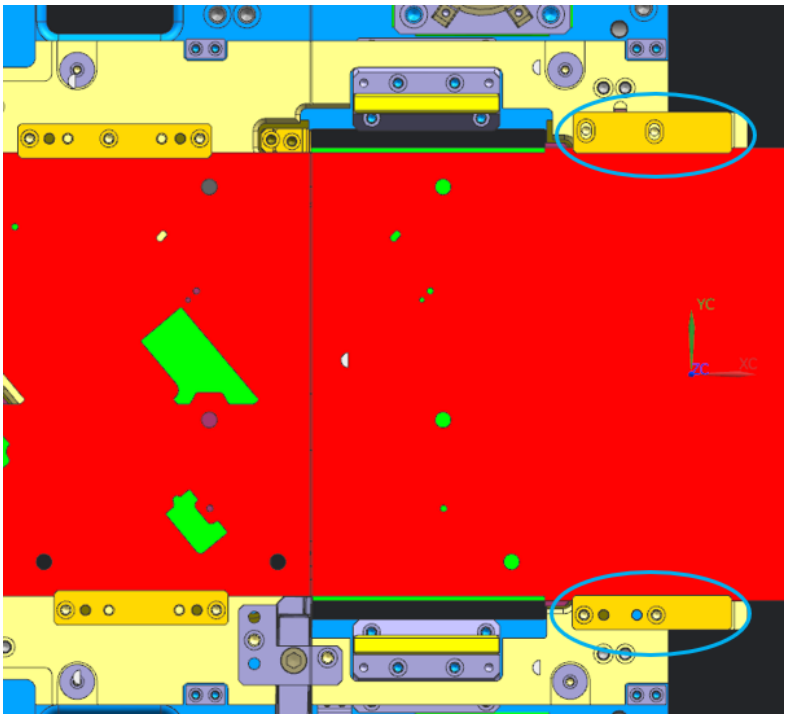




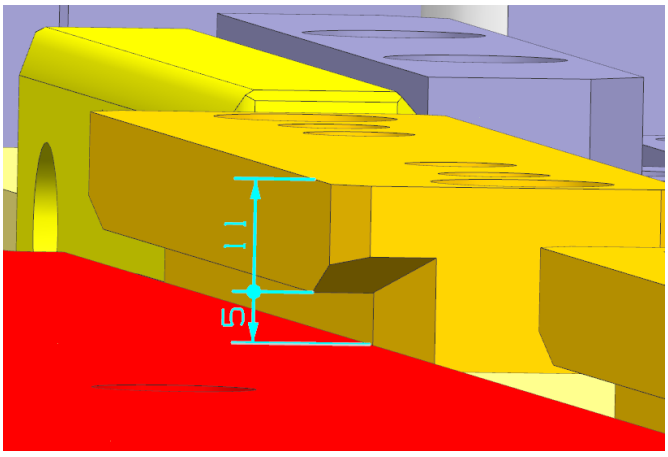
- Progressive and blank dies must be ready to run when coils arrived wider, consider (on trim just before French or solid stop) 20mm between original coil width edge and backing plate as show below.



- **Stock guides**
  - Adjustable guides (+/-8.0mm of nominal coil width) must be placed on rear side of the die, and fixed guides on front side of die.



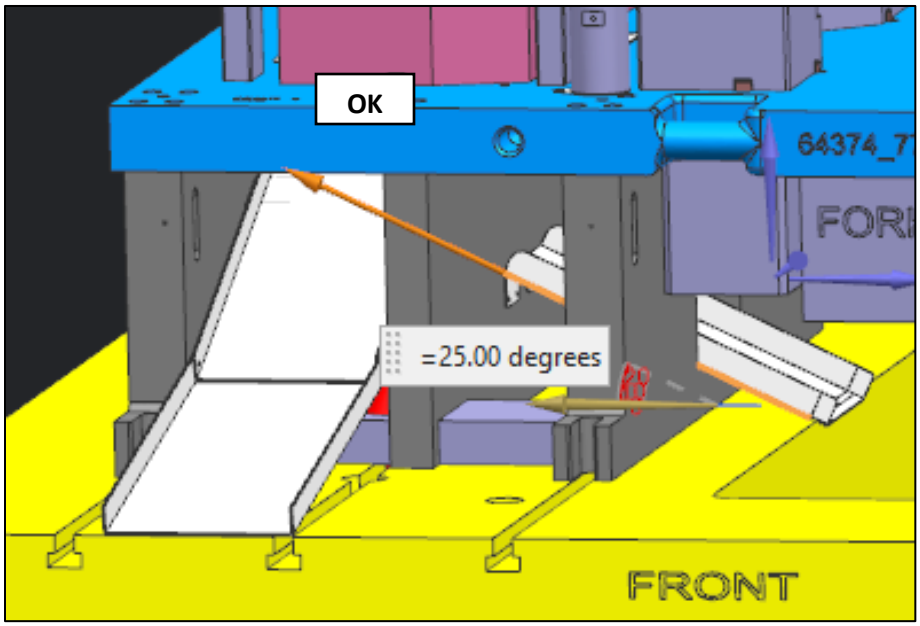
- Dimensions to be use for coil guides.

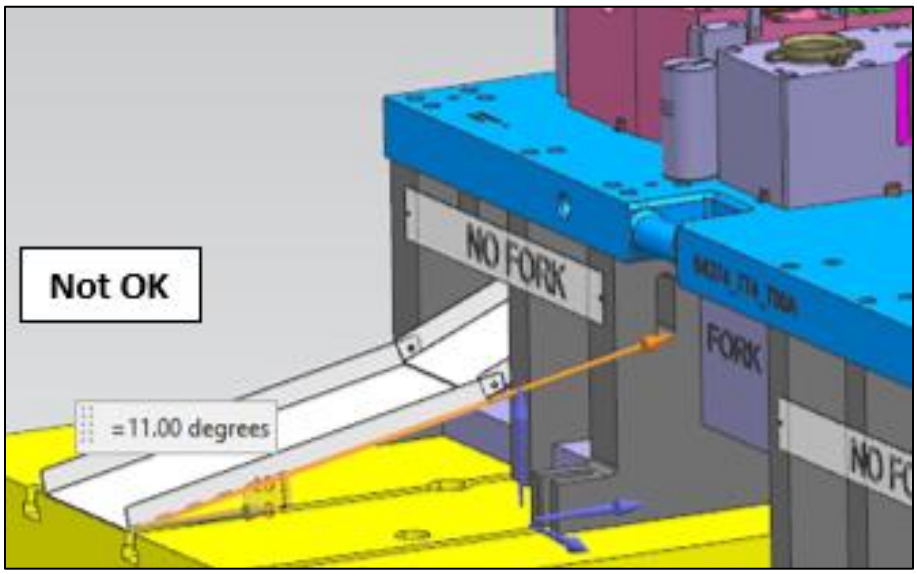


- **All the Scrap Chutes** must be strong enough 3.0mm thickness and need to be Bolted to the Parallel Bars
- Scrap to be directed to center bolster holes when available.

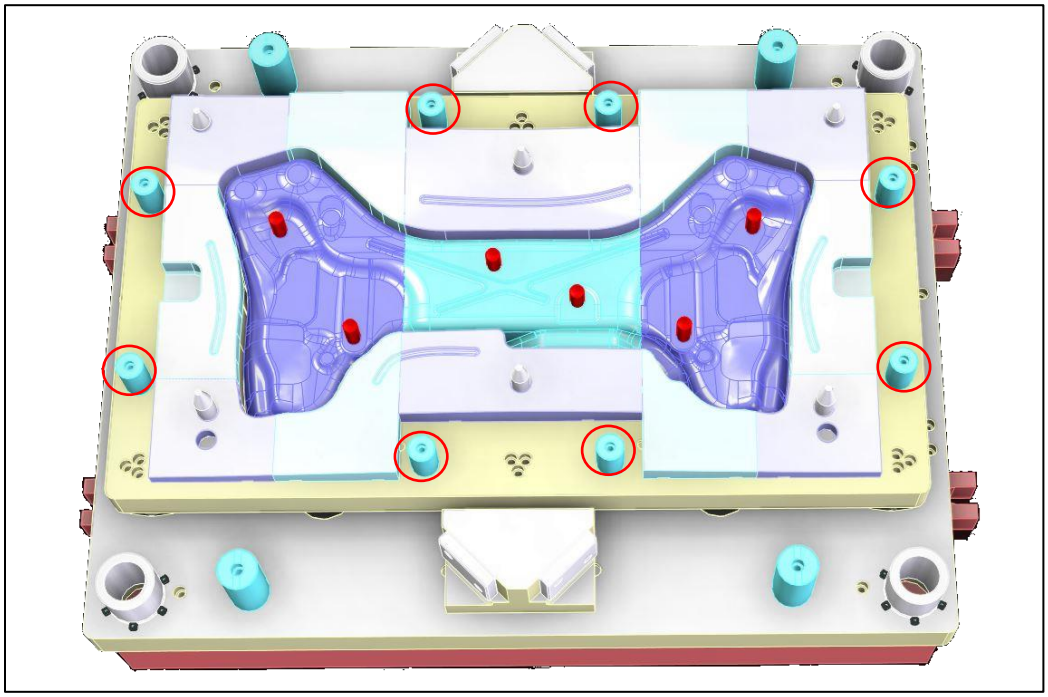
- Minimum angle accepted in scrap chutes is 25°.

- If 25° is not possible to achieve, tooling engineer needs to approve it.



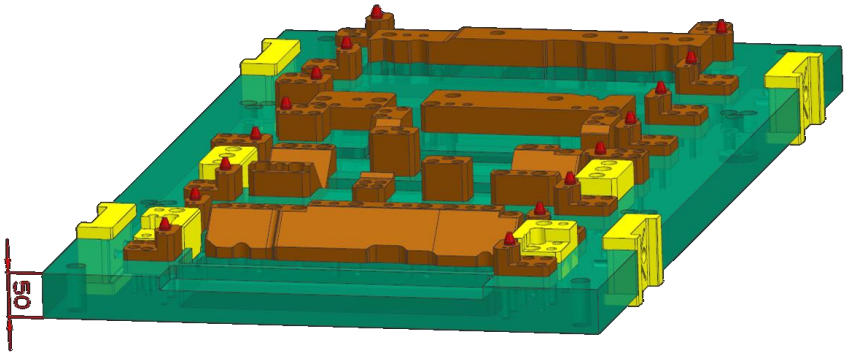
- All the Blank Holder must have equalizer Blocks.



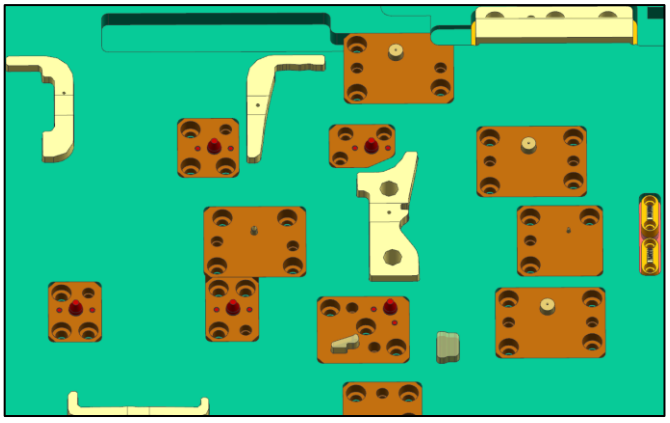
- In Transfer Die, Blank Holder must be Coated with **DUPLEX VARIANTIC,** any alternative coating must be approved by Project Tooling Engineer

# UPPER DIE

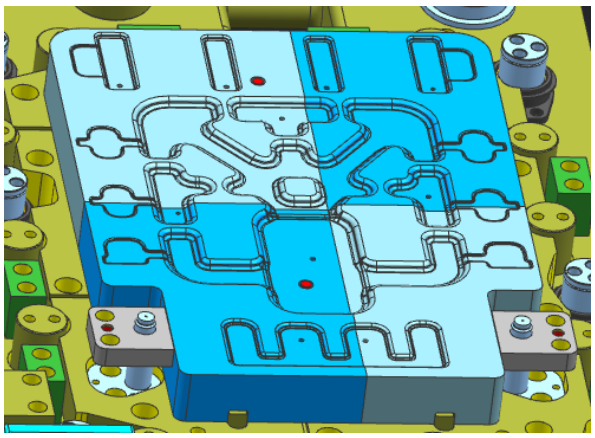
- Use at least 50mm thickness for stripper pads.




- Stripper pad windows plates must be pocketed with jack screws.

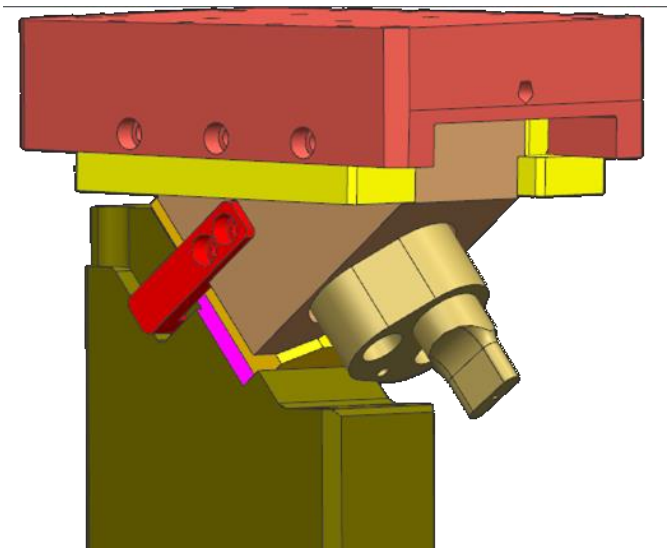


- All the Forming steels bigger than 300mm Should be split in parts for easy maintenance.

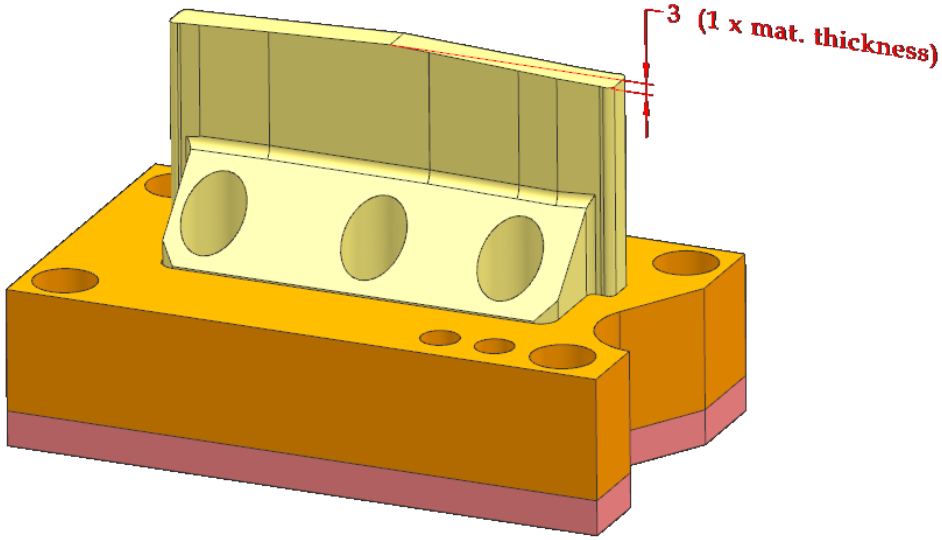


- **Lifting holes** for stripper pads and big components must be no smaller than M16.

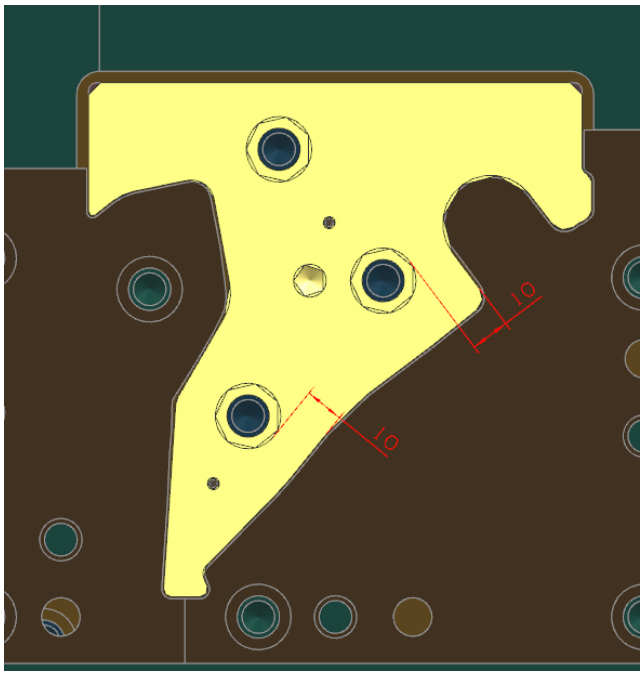
- Cam slides must have 2 positive pullbacks or Return Guides. Two bolts required for each one.



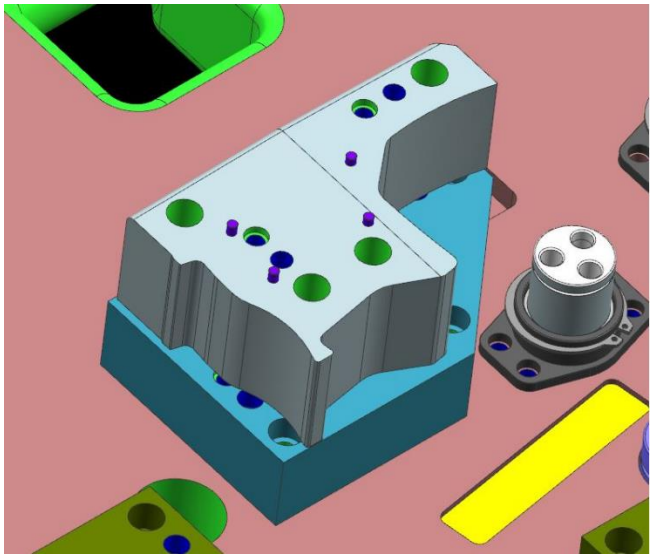
- Trim punches must be sharpened with scissors angle 1 material thickness height.



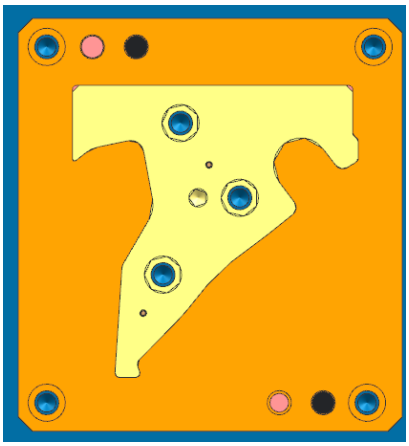
- Minimum distance allowed from trim edge to holes must be 10mm



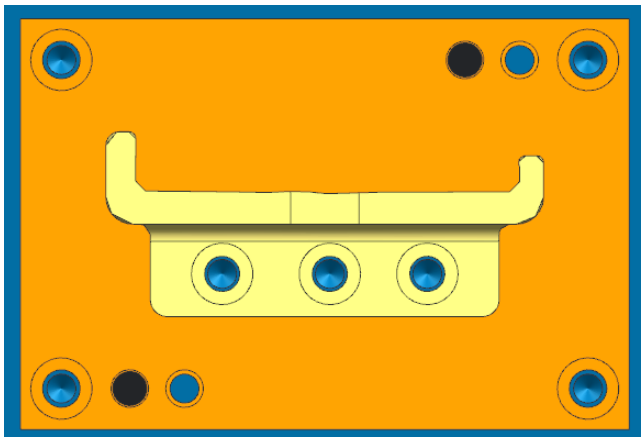

- All the Big and tall punches must be mounted on a base plate.



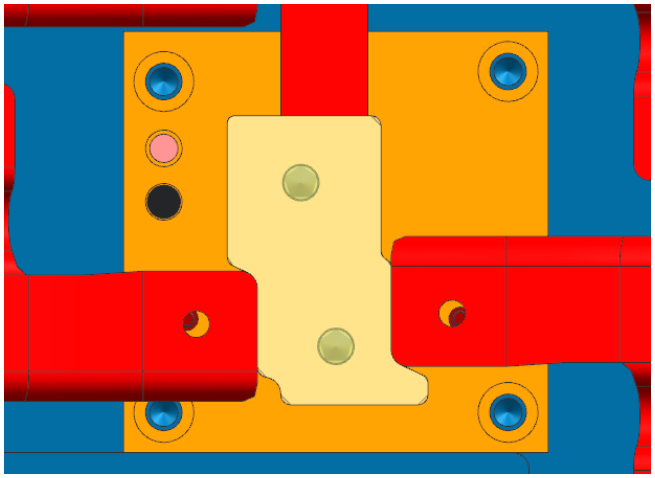
- Type of trim punches allowed.



Screw from top



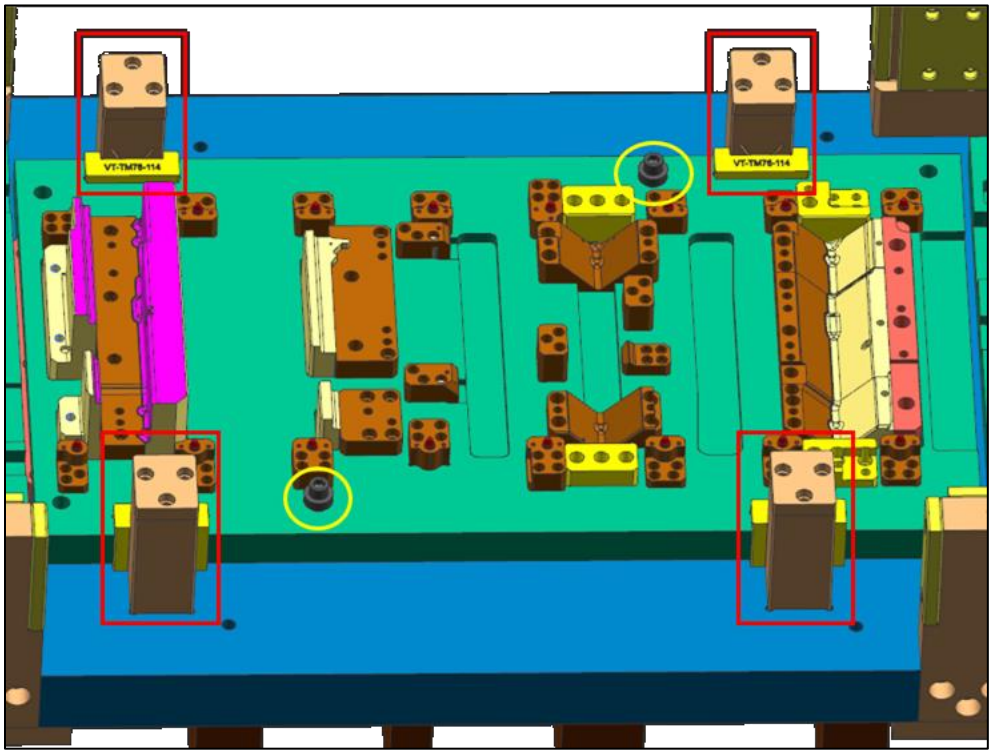
Screw from shank

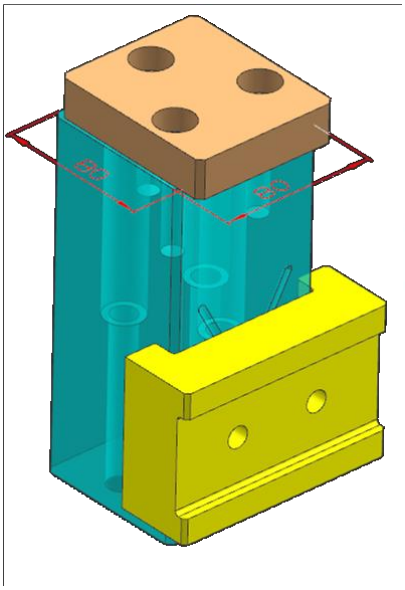


Screw from bottom

Allowed Only when screw from top or shank is not feasible.

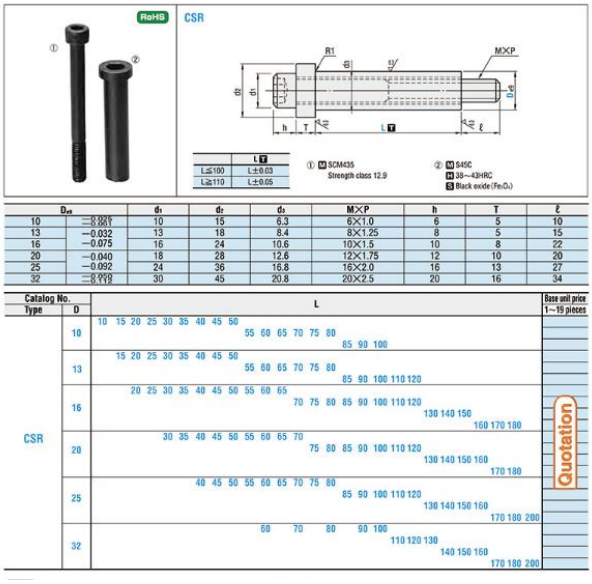
- Use guide blocks on stripper pads and 2 safety spool retainers when forming with pad.



**SPOOL RETAINERS**

RoHS CSR



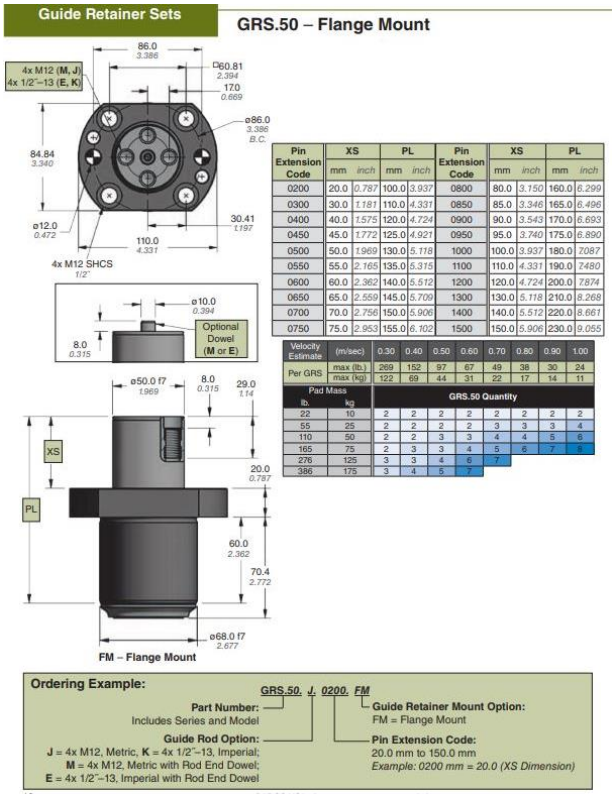
| $D_{e8}$ | | $d_1$ | $d_2$ | $d_3$ | M×P | h | T | ℓ |
|---|---|---|---|---|---|---|---|---|
| 10 | −0.021 −0.061 | 10 | 15 | 6.3 | 6×1.0 | 6 | 5 | 10 |
| 13 | −0.032 −0.075 | 13 | 18 | 8.4 | 8×1.25 | 8 | 5 | 15 |
| 16 | −0.040 −0.092 | 16 | 24 | 10.6 | 10×1.5 | 10 | 8 | 22 |
| 20 | −0.040 −0.092 | 18 | 28 | 12.6 | 12×1.75 | 12 | 10 | 20 |
| 25 | −0.092 −0.112 | 24 | 36 | 16.8 | 16×2.0 | 16 | 13 | 27 |
| 32 | −0.112 −0.148 | 30 | 45 | 20.8 | 20×2.5 | 20 | 16 | 34 |

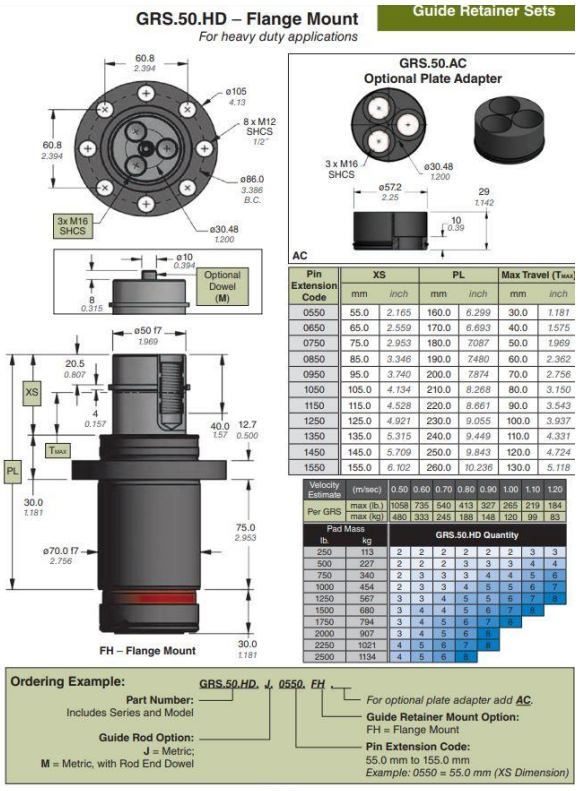
| Catalog No. Type | D | L | Base unit price 1~19 pieces |
|---|---|---|---|
| CSR | 10 | 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 100 | Quotation |
| | 13 | 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 100 110 120 | |
| | 16 | 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 100 110 120 130 140 150 160 170 180 | |
| | 20 | 30 35 40 45 50 55 60 65 70 75 80 85 90 100 110 120 130 140 150 160 170 180 | |
| | 25 | 40 45 50 55 60 65 70 75 80 85 90 100 110 120 130 140 150 160 170 180 200 | |
| | 32 | 60 70 80 90 100 110 120 130 140 150 160 170 180 200 | |

- **Retainers.**

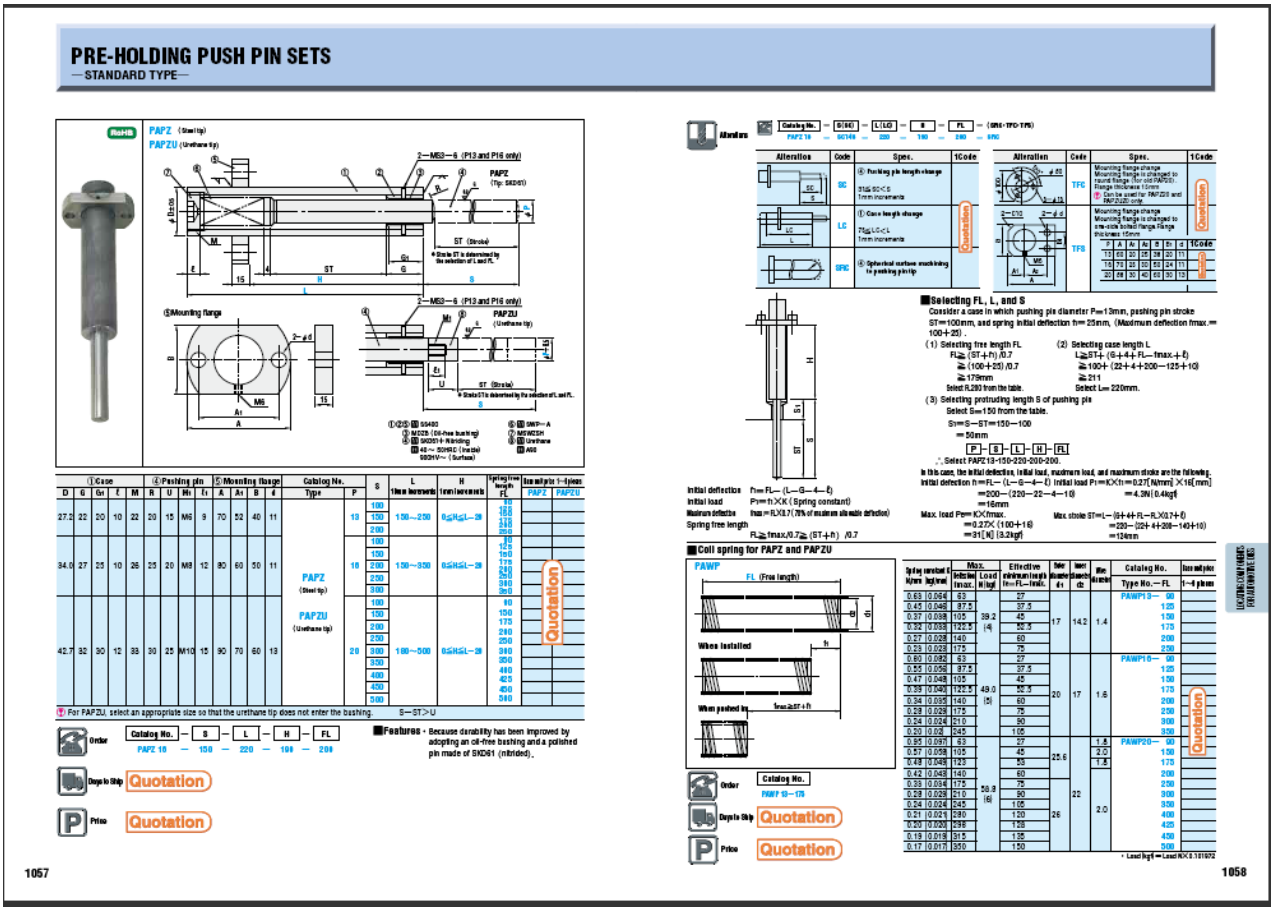
- Standard lifters GK180 or bigger can be use.

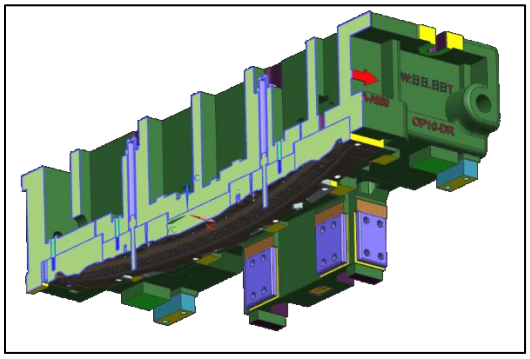
- For DADCO brand GRS.50 (light duty) and GRS.50HD (heavy duty) can be used.

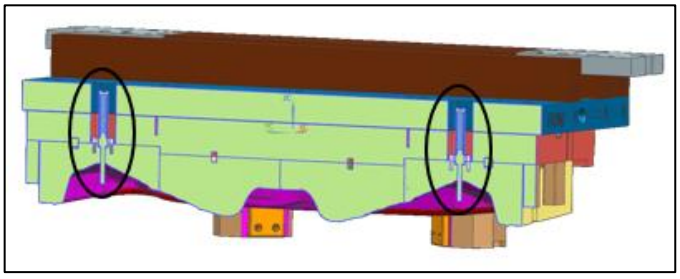


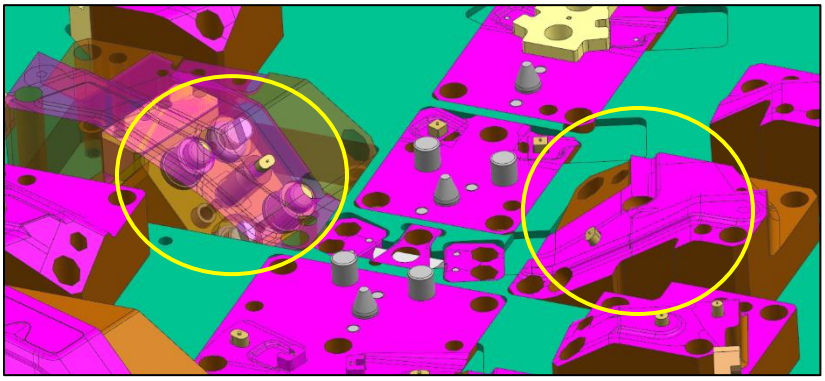
- Transfer dies use **2 Pre-Holding Push Pin** on each station. (Provided by Tool shop.)

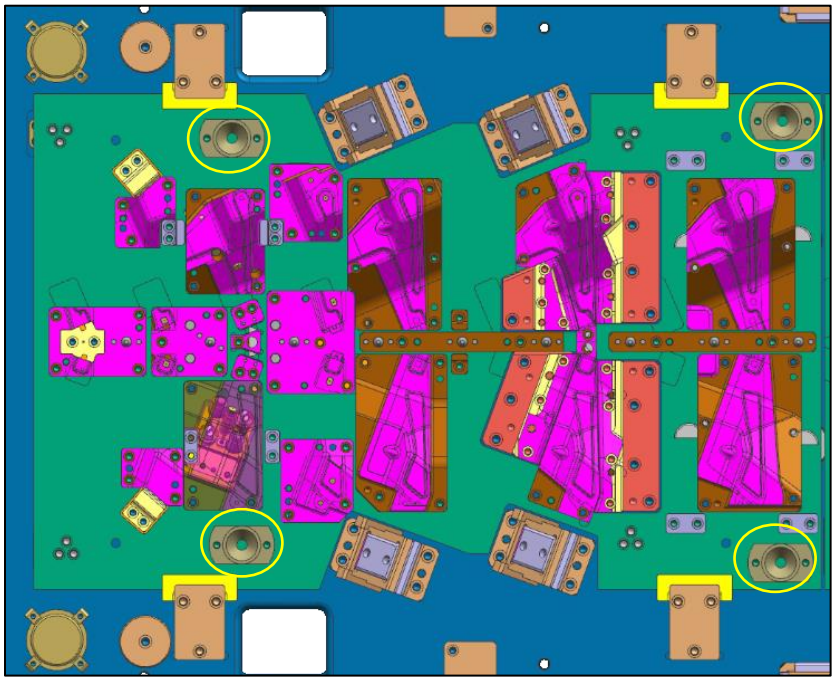


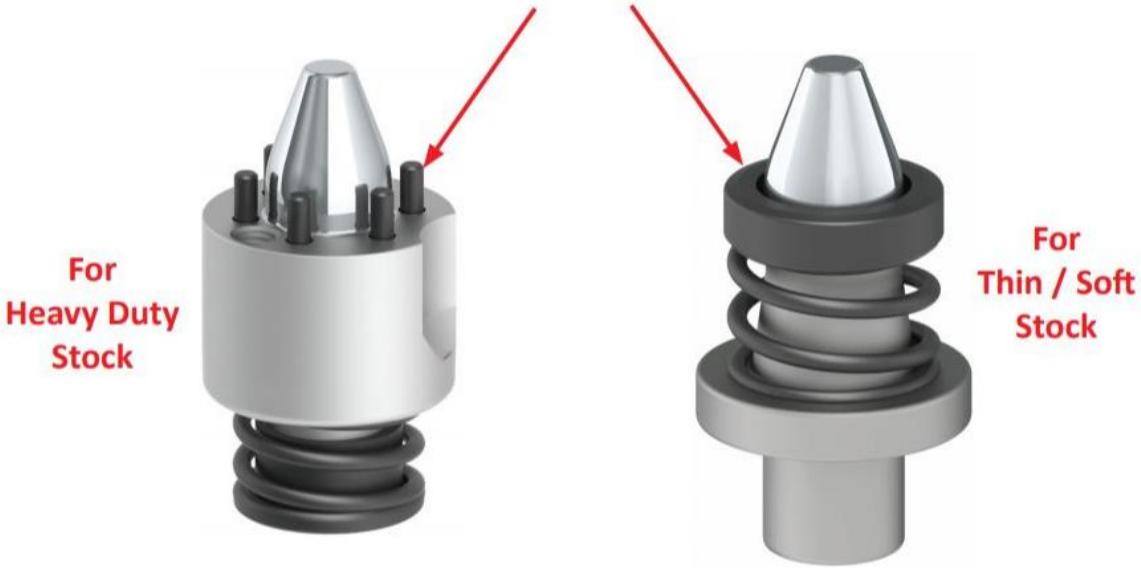


- If aerial cam mounted on stripper pad is needed, centering cones must be used.

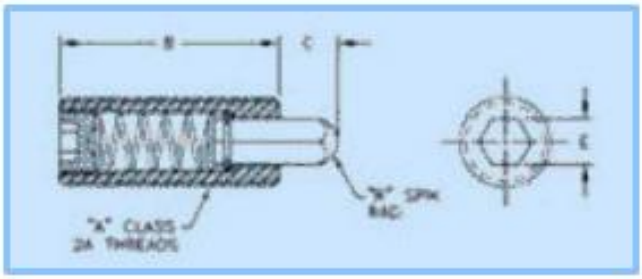




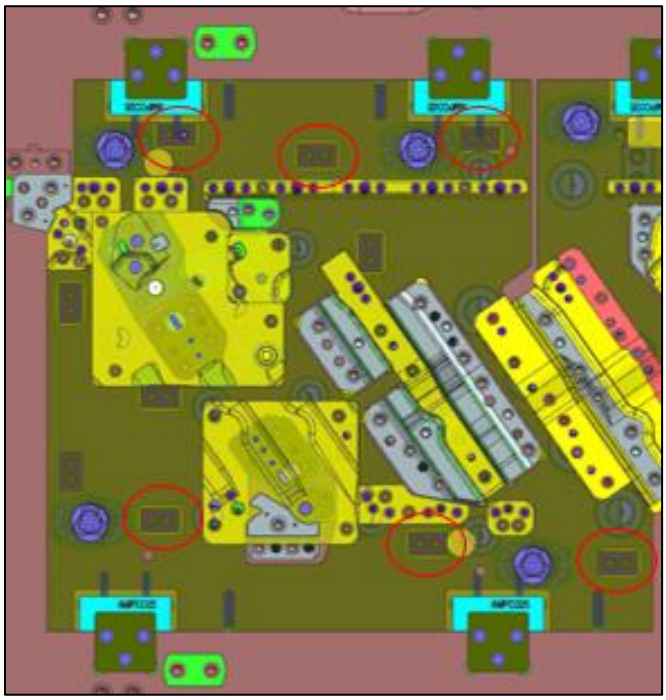
- Pilot pins with ejectors must be used.

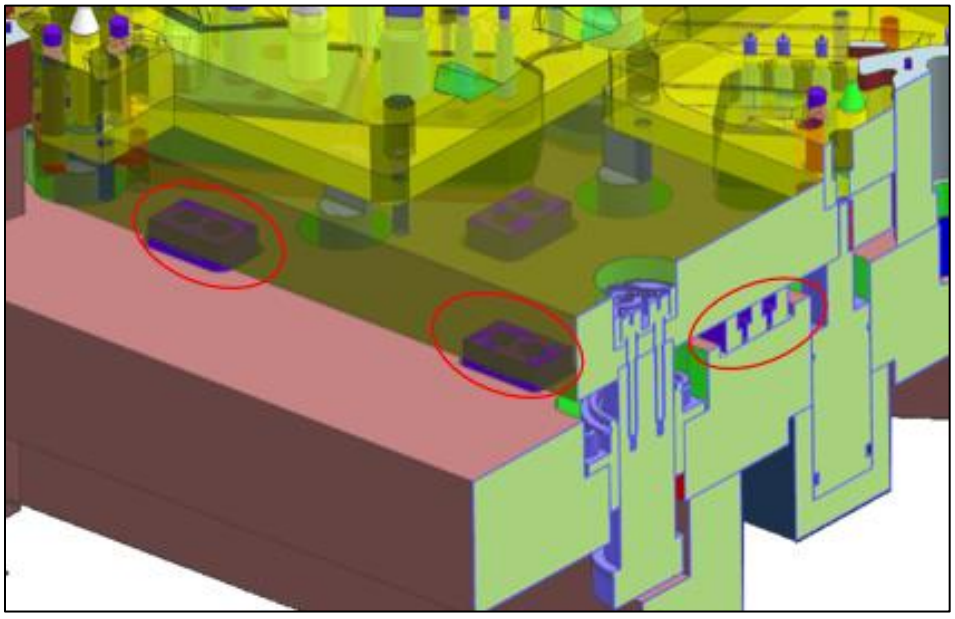



- If Spring plunger is needed (Must be hexagon Tip M10 minimum) Misumi brand.

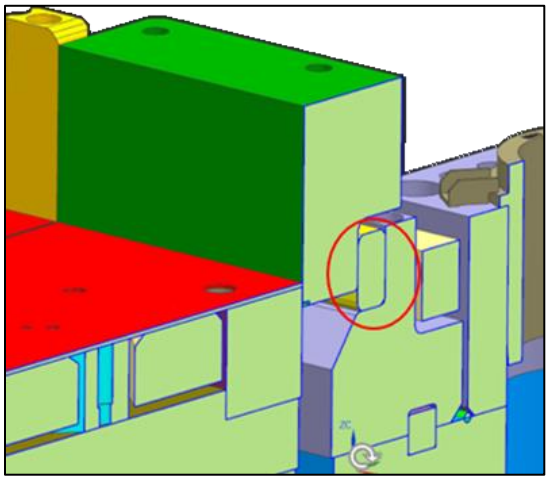


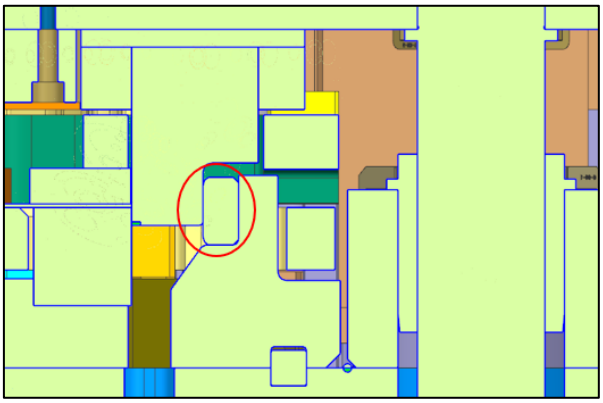
- Stripper pads must be backed up with limit blocks when forming with pad.



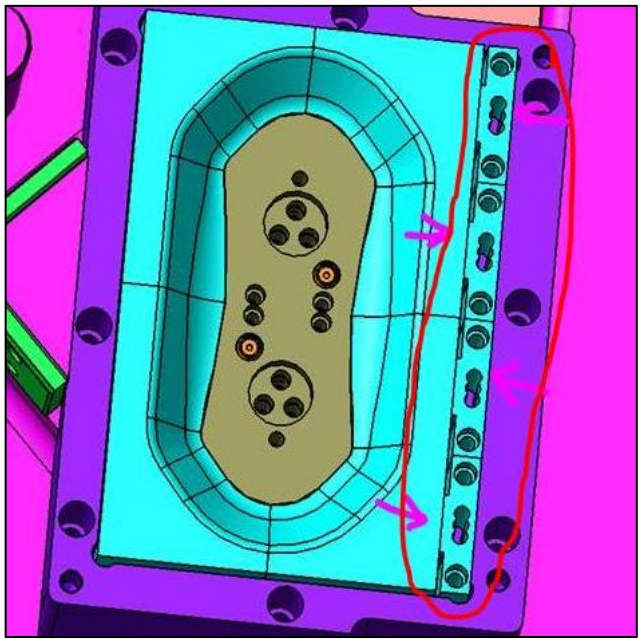


- All the trim Punch must have a Bronze Backing Plate 20mm size, and need to back up 10mm prior to cut.





- All the Forming Inserts Must Have a **"Fuse"** to avoid damages in case of double blank.
  (due to the slots on the keys if double blank is processed the forming steel doesn't break because the key is going to be compressed).



- All pockets for lifters or pilot holes on the base plate, must have a drainage hole.

- All the Forming & Restrike Operations must have a Lube Holes 8mm Diameter prepared and machined inside to use using Hose 6.35mm (1/4”) and Quick connection in Upper Shoe.

- Once the Die is ready and Buy Off is Complete, the Tool Shop Supplier **MUST** Scan and update die design all trim and forming steels.

- The Cost of Coating MUST BE considered into the Supplier Quotation.

- Early sample parts must be stamped by Forming Die Complete, trim and holes by Laser Cut, expected 80% Minimum vs. Checking Fixture or Dimensional Report.

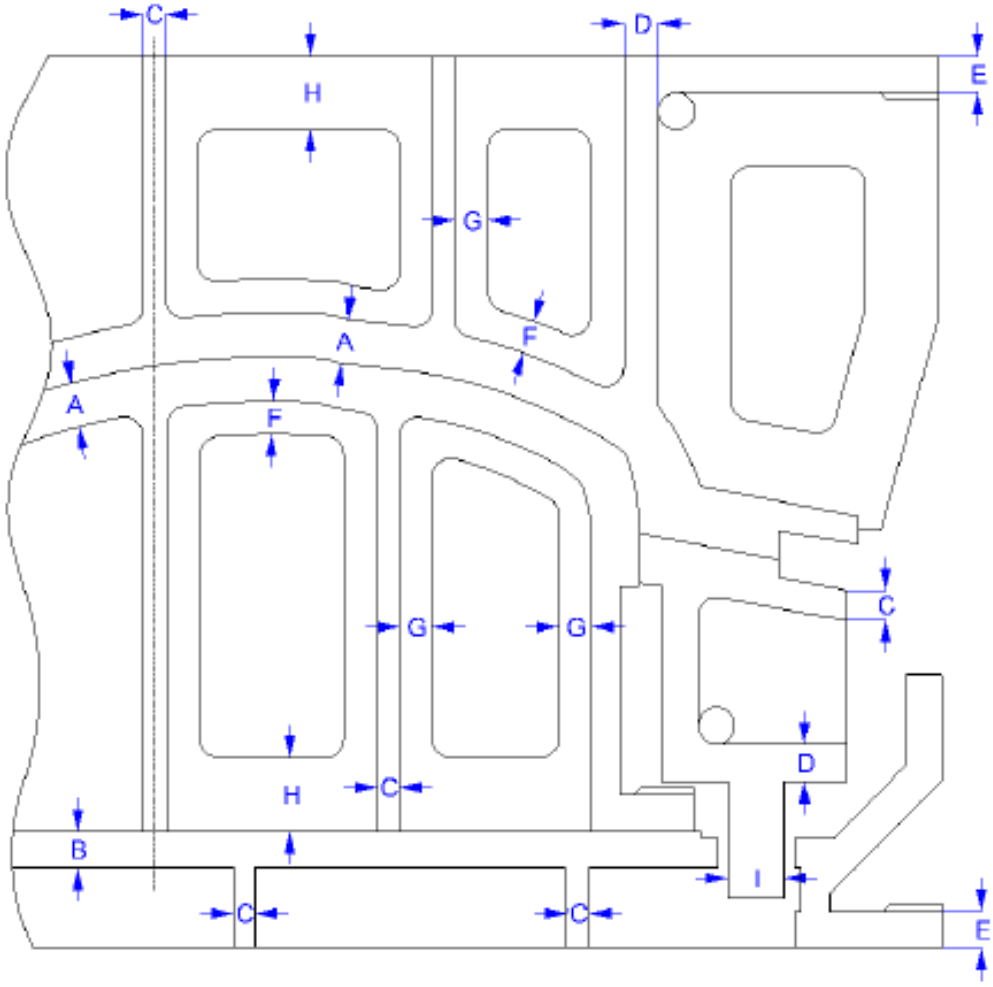
- Buy Off Sample Parts MUST BE at 100% vs. Checking Fixture and sit in all nets at Free State Method, before shipping.

- 300 pcs buy off sample parts need to be shipped with die; Cost should be included in die cost at time of quotation, unless otherwise instructed by MatcorMatsu.

# 4. CASTING DIE DESIGN.

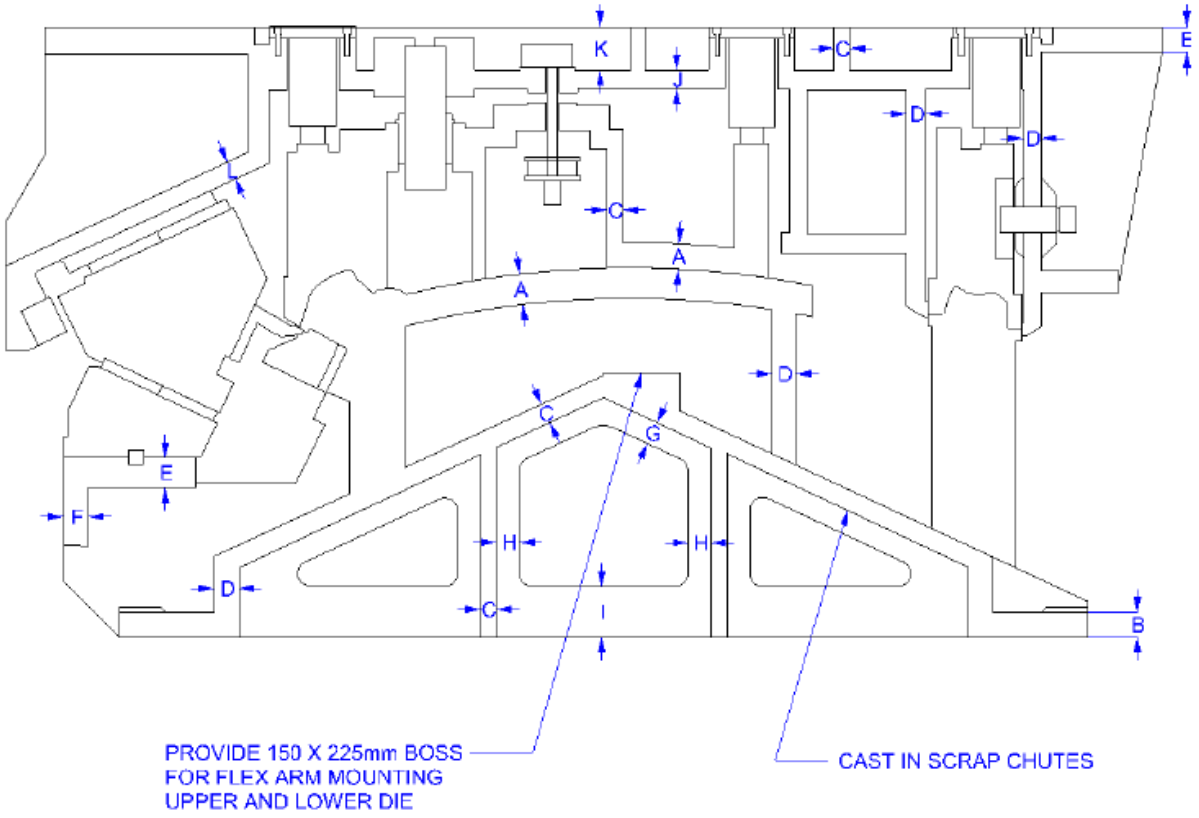
| | |
|---|---|
| DIE SHOES / RISERS | GM-238 |
| DRAW DIE PUNCHES | GM-241-M, GM-246-M, GM-190-M |
| BINDERS | GM-241-M / GM-246-M |
| FORM AND FLANGE | GM-190-M |
| PADS-FORM AND FLANGE | GM-238-M, GM-241-M, GM-246-M |
| PIERCE PUNCHES | M2 |
| BUTTONS | A2 |
| TRIM STEELS | D2 |
| CAM DRIVER | GM-238-M |
| CAM SILIDE INSERTED | GM-238-M, GM-245-M |
| CAM SLIDE NON-INSERTED | GM-241-M |

- **DRAW DIE CASTING CONSTRUCTION**



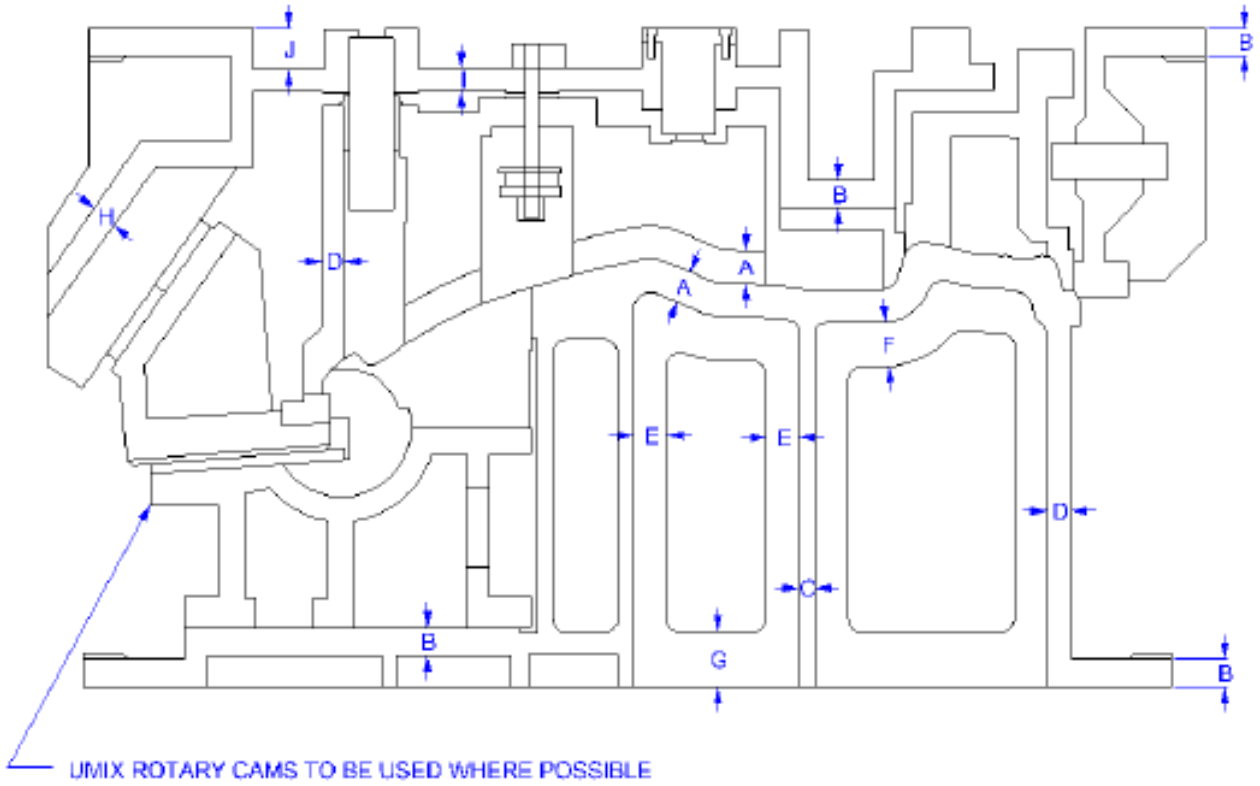

| | A | B | C | D | E | F | G | H | I |
|---|---|---|---|---|---|---|---|---|---|
| mm | 60 | 50 | 30 | 40 | 50 | 80 | 60 | 100 | 80 |

- **TRIM DIE CAST CONSTRUCTION**




| A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 60 | 50 | 30 | 40 | 60 | 50 | 80 | 60 | 100 | 40 | 20 | 40 |

- **FLANGE AND RE-STRIKE DIE CASTING CONSTRUCTION**

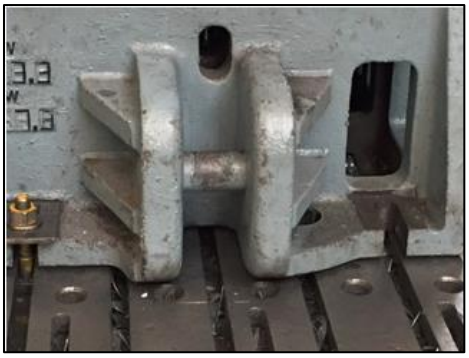


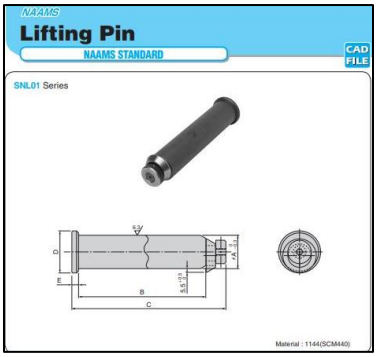

| A | B | C | D | E | F | G | H | I | J |
|---|---|---|---|---|---|---|---|---|---|
| 60 | 50 | 30 | 40 | 60 | 80 | 100 | 40 | 40 | 20 |

- **Lifting**

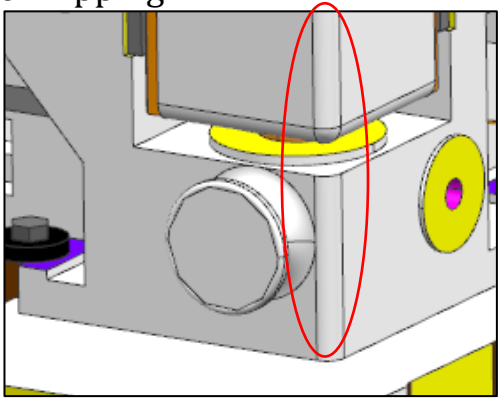
Tooling engineer will advise if the die use lift lugs with pin or lifting knobs.

- **Use Lifting Pin according NAAMS standard and keep 85.0 mm free all-around the pin** for crane hook access.

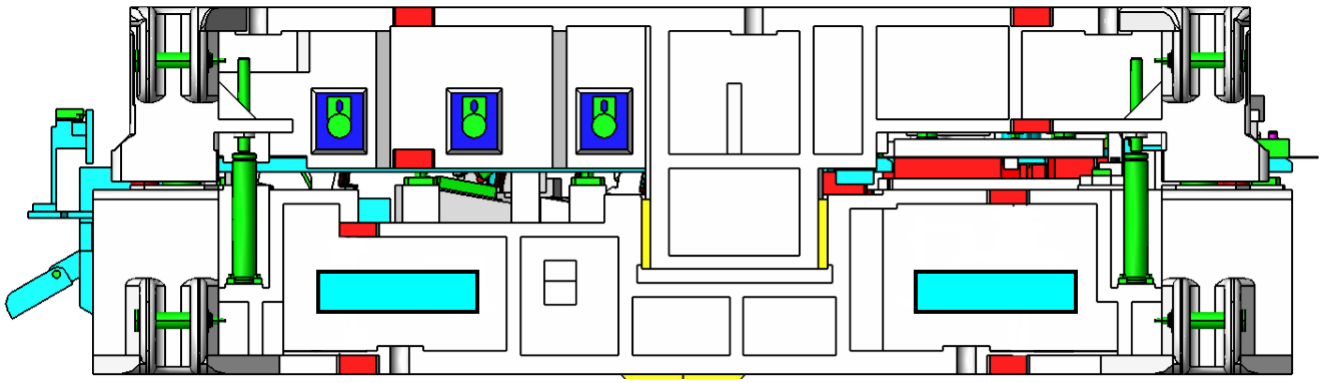


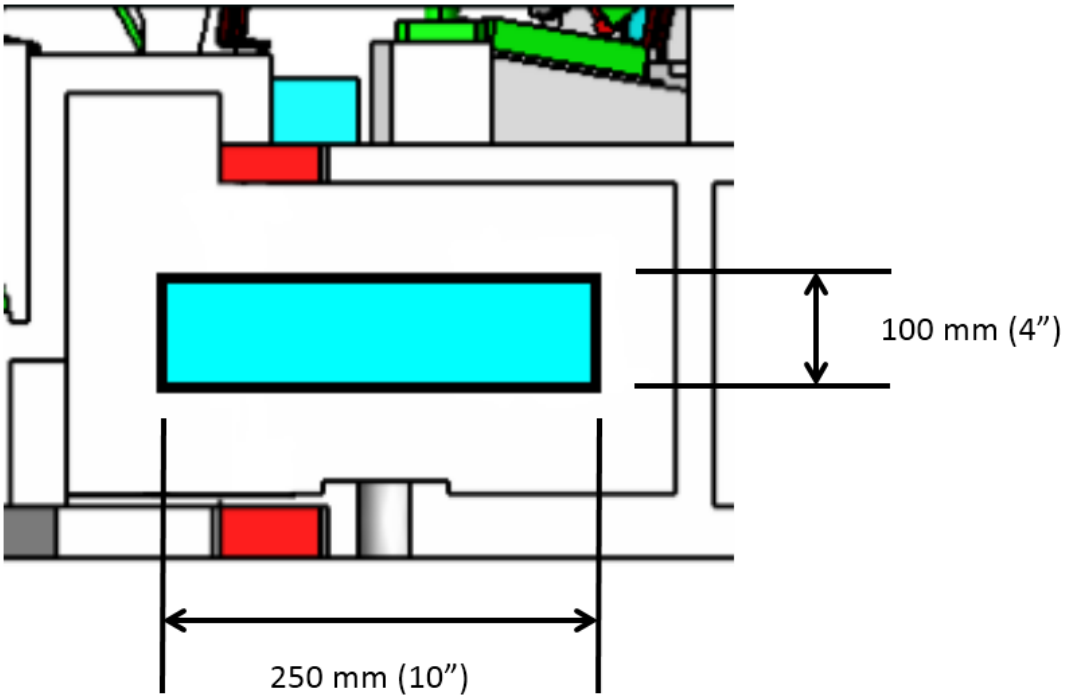



- Add a radius at edge where the Chain or cable is in contact when lifting or flipping.



- All the Casting Dies Must Have Access to use Shakers to recover all the Scrap generated in all the Trim and Pierce stations, with the minimum dimension shown in the drawing below**.**





# 5. AUTOMATION

1. Fingers or clamps Should be 65mm wide x 65 mm deep x 65mm Height of clearance all around, when die is closed, however during Design Review is necessary define the Cavity depending on the Part design.
2. Restrictions to transfer dies:
a) Different shut height, pass height & distance pitch, between stations is not acceptable.
b) Fingers entrance area should be considered (65mm minimum under the part).
c) Each station must have a fast positioning for the part (Guides, Pilots & Locators).
d) Eliminate any flip over during transference of the part and/or part angle changes between stations (any question ask the tooling engineer).
e) Keep the part always stable after being processed (without movement).
f) Heel blocks or guide post must not have interference with the part when is in transference to the next station?
g) Part out must be only over the conveyor, not possible to the front or back of press.
h) Do not use pneumatic lifters.
i) Die designer must Focus in Avoid lifters, in order to keep stable part and increase the SPM.

- **KINEMATICS SIMULATION must be Developed during the Design**
  - **Kinematics simulation report must be prepared as show below.**

---

## Transfer Motion Simulation Report

TOOL & DIE LTD

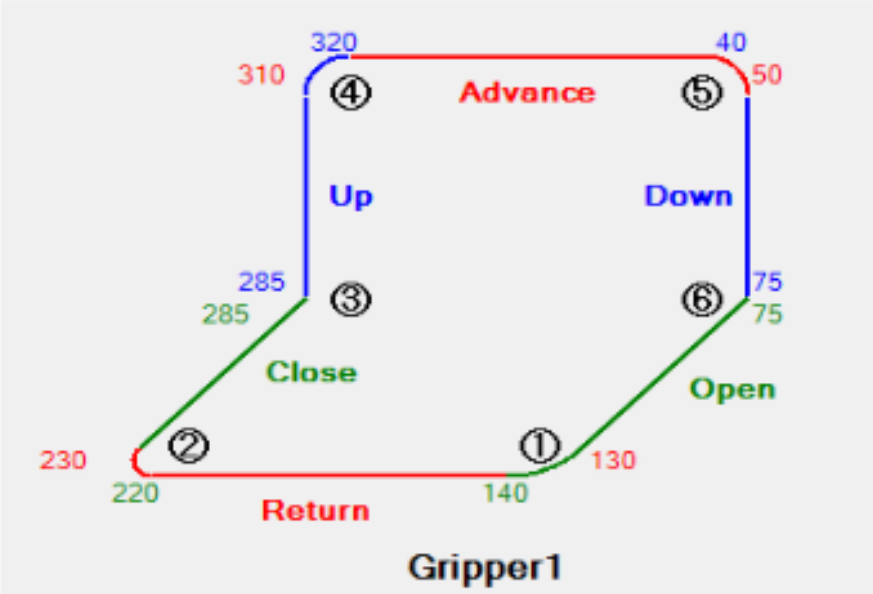
| | | | |
|---|---|---|---|
| ***Report Date*** | September 13, 2018 | ***Application Version*** | DYNMIK® Design for Die v1.2.12.0 |
| ***Dilast Job #*** | 2710 | | |
| ***Customer Job #*** | L0530739 | | |

### Transfer Travel Setting

| | |
|---|---|
| Transfer Pitch | 700mm |
| Retract Stroke | 290mm |
| Lift Stroke | 110mm |

### Angle Information

| | | Start | End | | Start | End |
|---|---|---|---|---|---|---|
| X | Gripper Moves Forward | 310 | 50 | Gripper Moves Backward | 130 | 230 |
| Y | Gripper Moves Out | 75 | 140 | Gripper Moves In | 220 | 285 |
| Z | Part Pick Up | 285 | 320 | Part Drop Off | 40 | 75 |

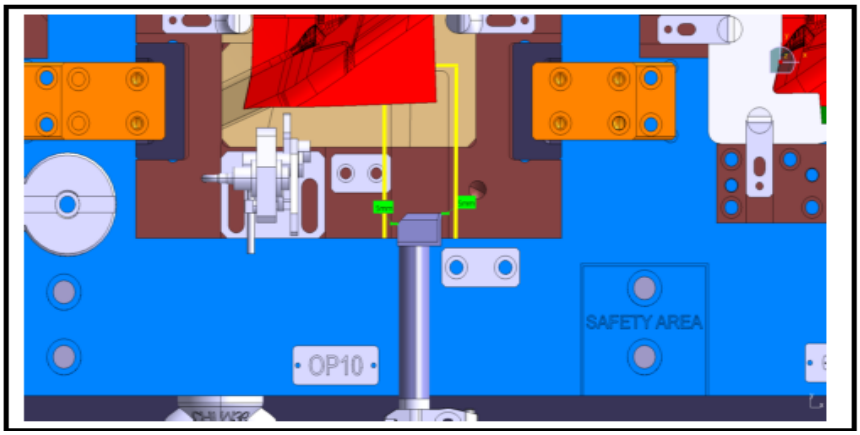


- **If there are interferences or any issue, proposals must be given by SIM supplier as show below.**

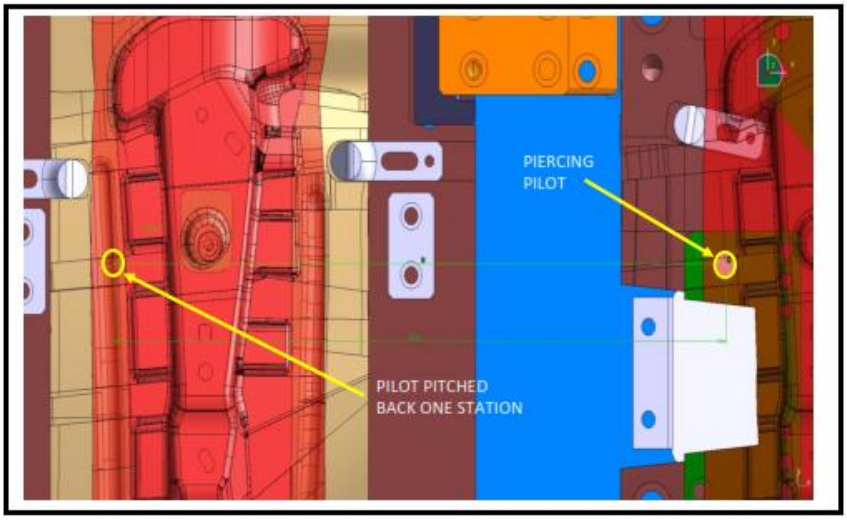
T-SIM SOLUTIONS

www.transfersimulation.com Job #: 60614-TGVA-A0( Op #: 10 Date: 06/16/16

Timing Chart: X:\jobs\1023_Matcor_trans_sim_60614-TGVA-A000\1023-Transfer Simula
Crank Angle: 246
Press Stroke: 170.153 Lift: 0 Clamp: 104.616 Pitch: 0
Violation Type: Clearance
Items Affected: Clearance: FS2/206-L.1 (5 mm)



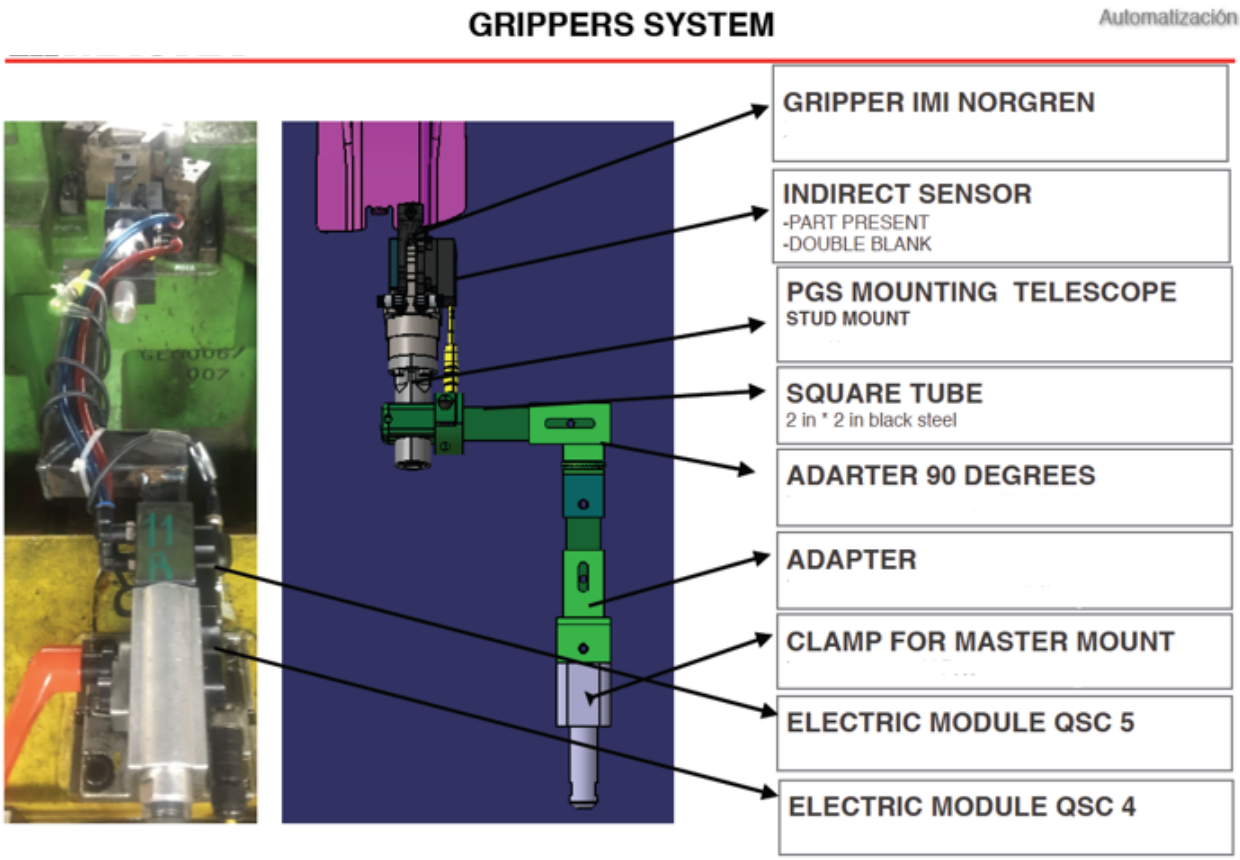

Timing Chart: No violation chart has been saved or imported.
Crank Angle: 180
Press Stroke: 0 Lift: 0 Clamp: 175 Pitch: 161.506
Violation Type:
Items Affected:




Comment(s):
The draw beads are not included in part variations. The pilot is going to end up in the draw bead. Piercing and piloting in the middle of a draw bead can be problematic and create poor die conditions. Also there isn't clearance in lower die for draw beads in the two trim stations. Please review.

- **GRIPPERS SYSTEM:**

**Complete gripper information and CAD 3D will be provided by MatcorMatsu for die design and 3D motion simulation.**



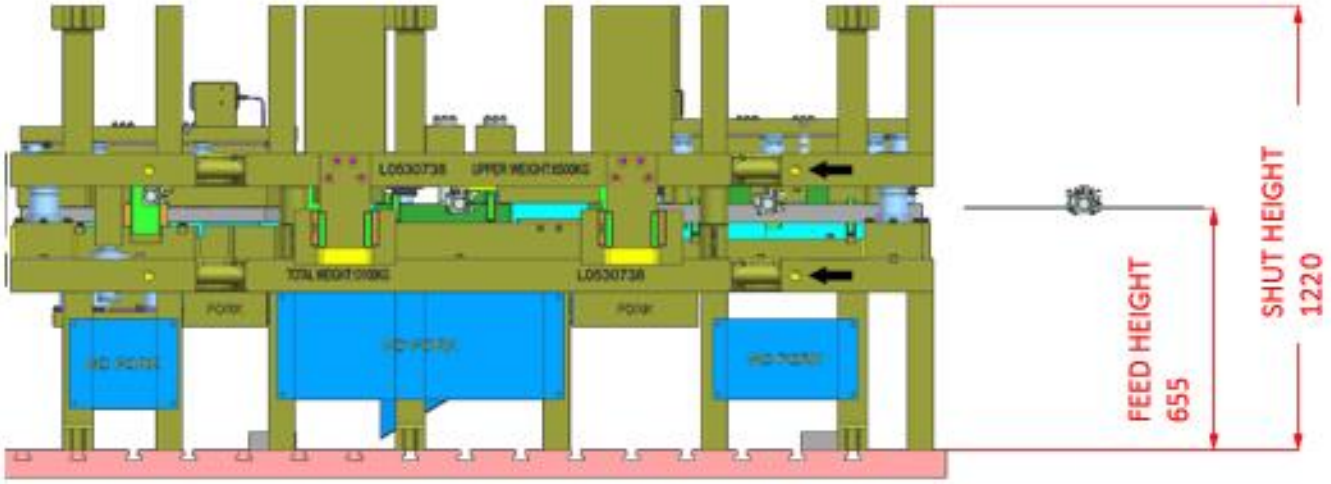
# 6. PRESS SPECIFICATION

MatcorMatsu will provide press information (3D file and all information needed for die design) as example below.

## WIA 3000 TON.

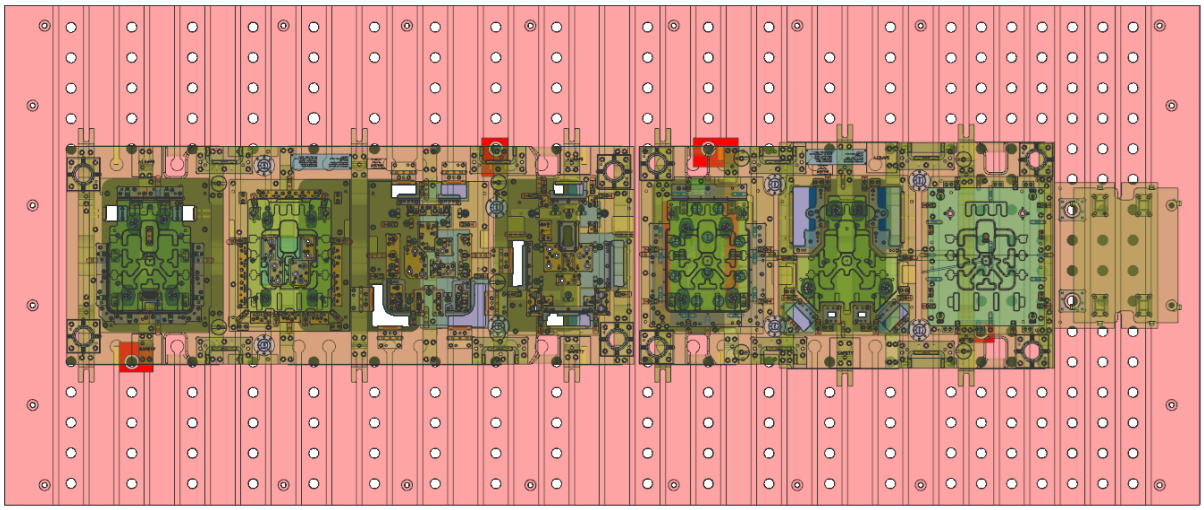
Press height information

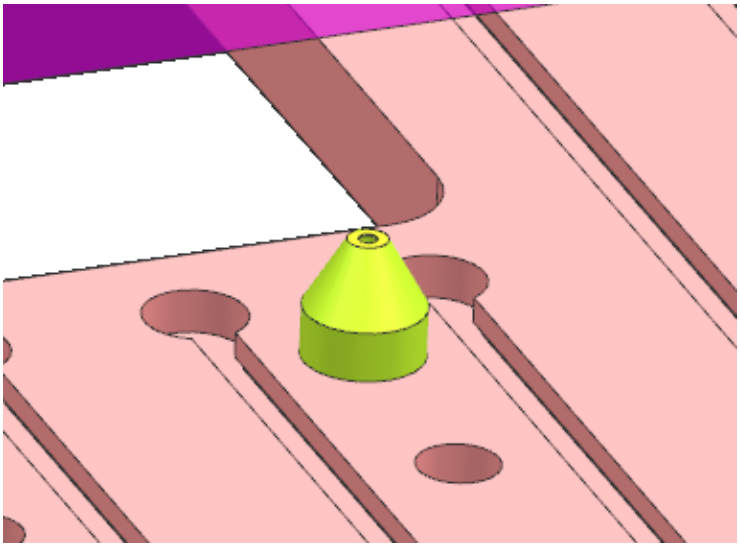
| | |
|---|---|
| SHUT HEIGHT | 1220 |
| FEED HEIGHT | 655 |
| STROKE | 762 |
| SLIDE ADJUSTMENT | 350 |

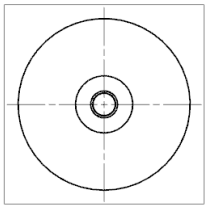


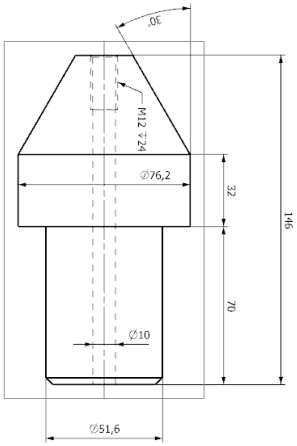
# WIA 3000 TON.

Die location information.



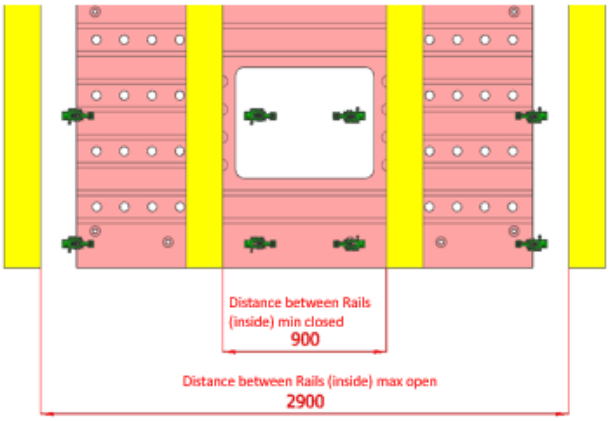


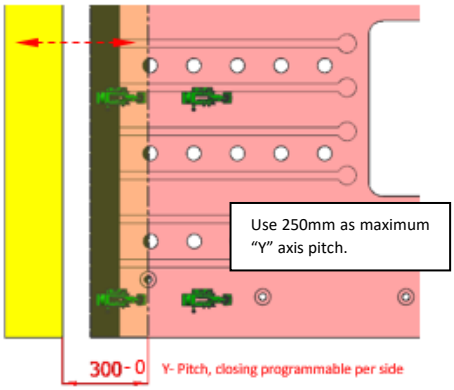


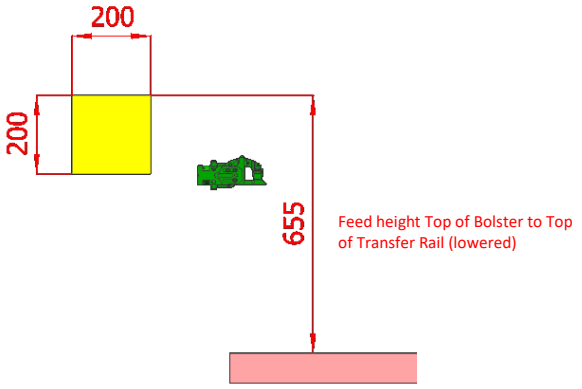


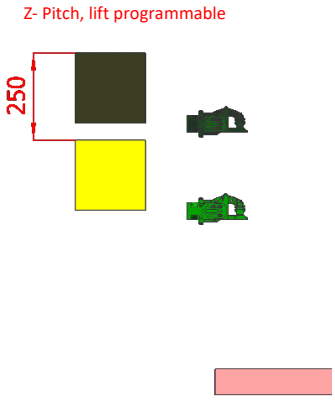
# WIA 3000 TON.

Transfer bar information.



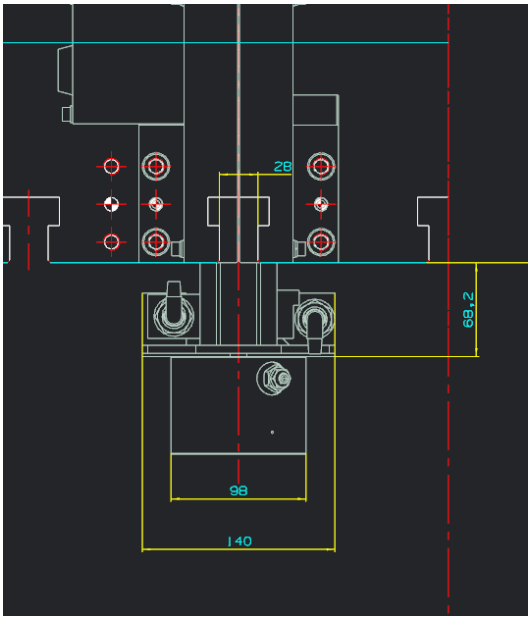



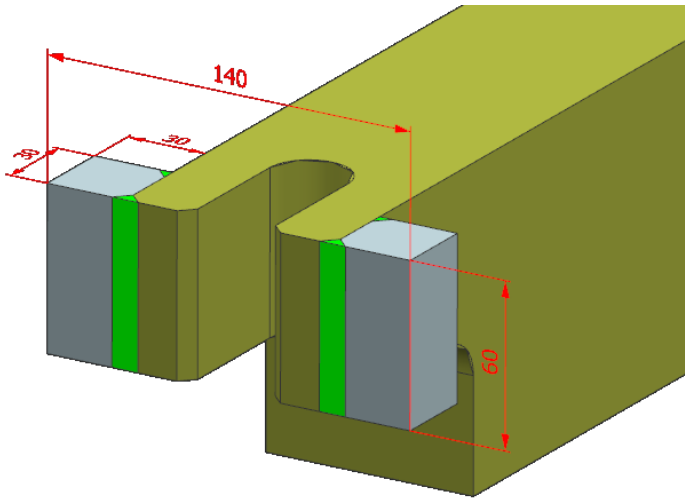



# WIA 3000 TON.

Automatic Clamp information.

| 4 | Die Clamp Specification | | |
|---|---|---|---|
| 1 | Automatic Upper Die travelling Clamps | | Included |
| 1 | Type | Type | Automatic |
| 2 | Brand | | Pascal |
| 2 | Qty. of Die Clamps | SET | 36 (18 per each side) |
| 3 | Capacity | Ton | 10 |
| 4 | Clamping Circuits | SET | 2 Hydraulic circuits |
| 5 | Clamping Stroke | mm | 8mm (4+4) |
| 6 | Travelling | Type | Electromecanic |
| 7 | Clamping Height for Upper Die | mm | 60 |
| 2 | Manual hydraulic Upper Die Clamps | | N/A |
| 1 | Q'ty. | Ton | |
| 2 | Capacity | Ton | |
| 3 | Maker | | |
| 3 | Manual hydraulic Lower Die Clamps | | N/A |



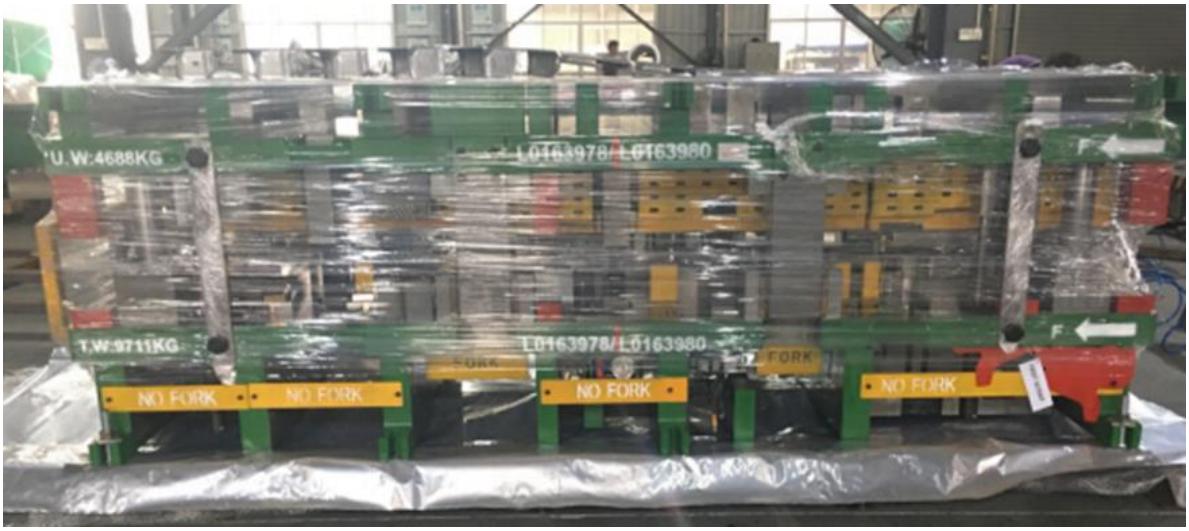



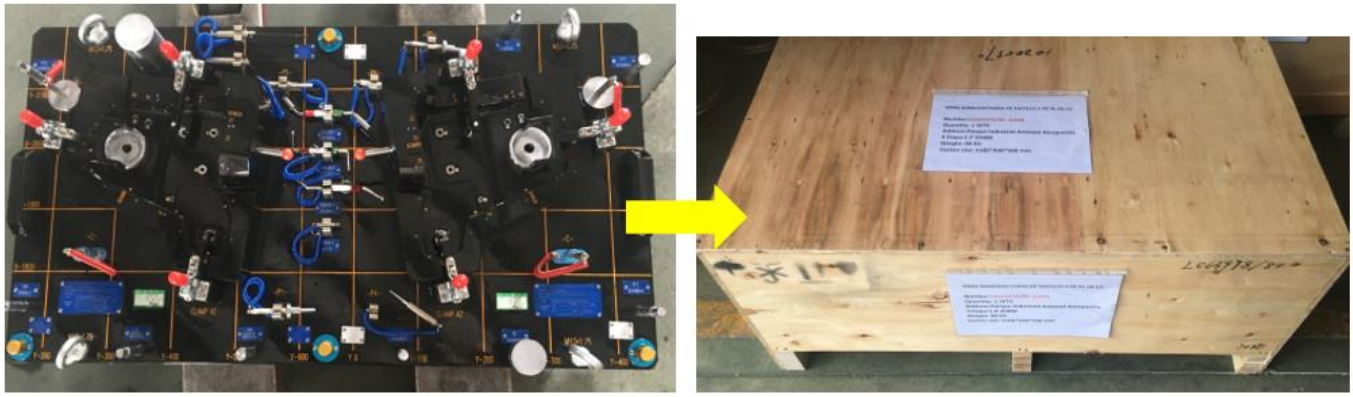
# 7. DIE PAINT & IDENTIFICATION

Color code will be provided by MatcorMatsu. PART NUMBER to be painted on 4 sides of die and Upper & Lower .


# 8. PACKAGING INFORMATION

All the Dies Must be packed according to the pictures below.

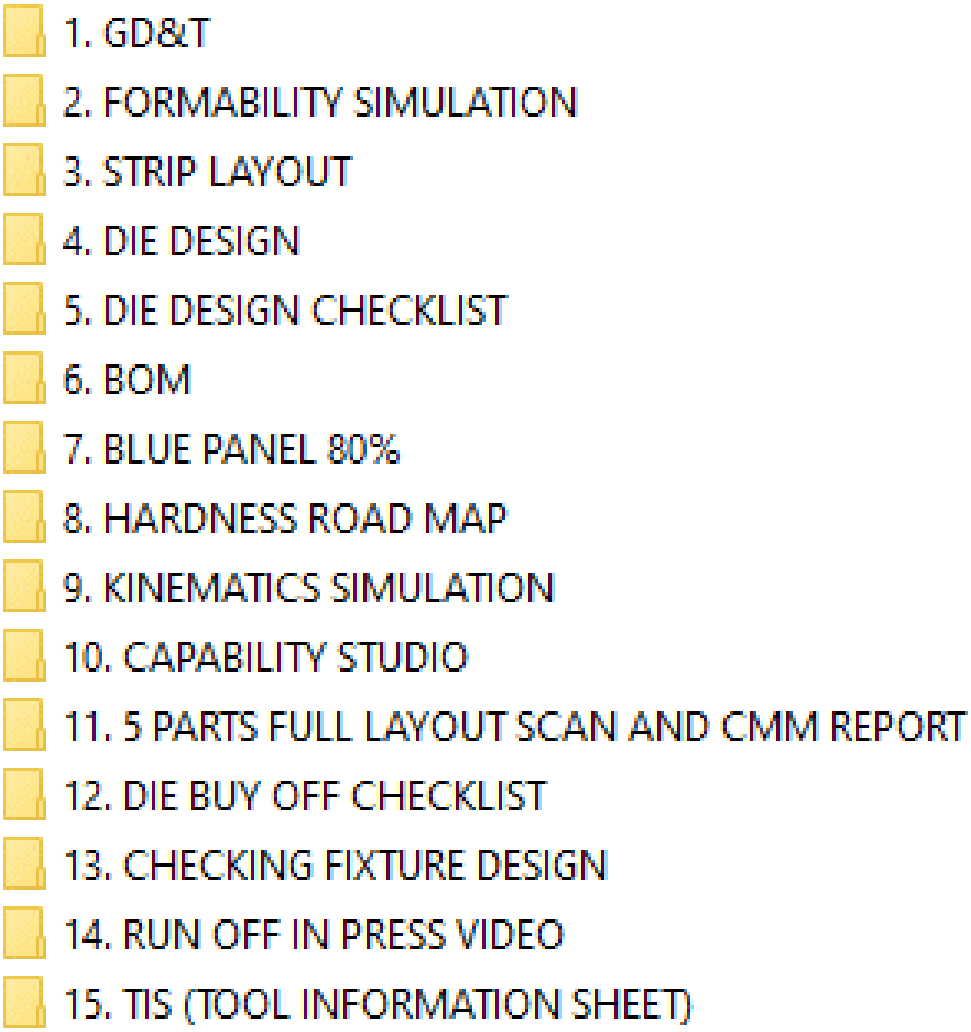


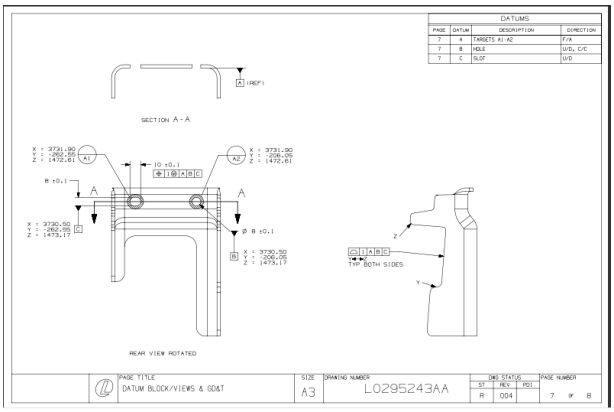
Opened container is needed for easy die and checking fixtures discharge.

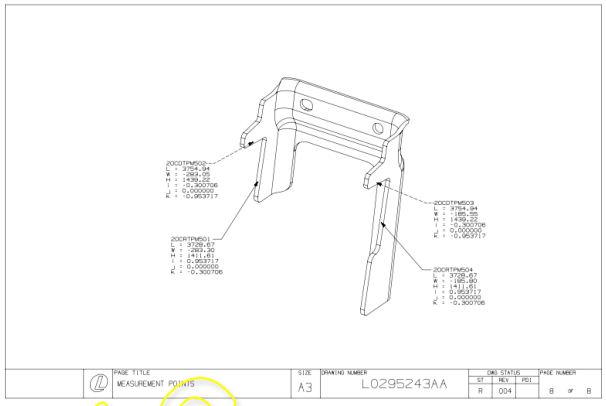
# 9. BUY OFF REQUIREMENTS

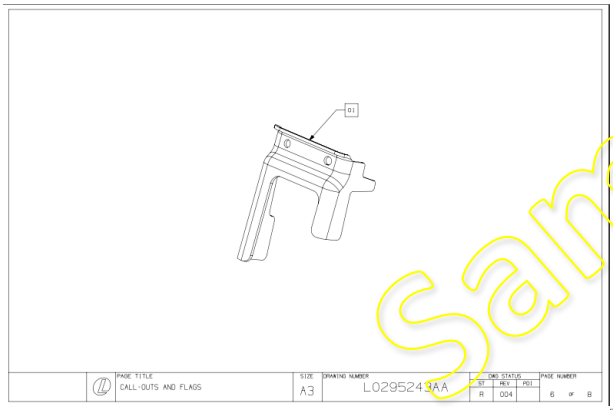
- Supplier Must provide all information required listed below.

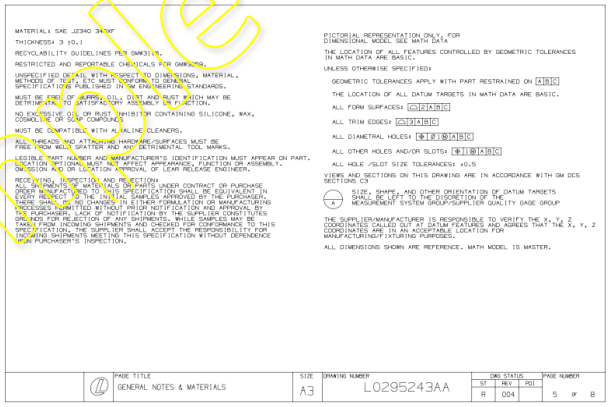


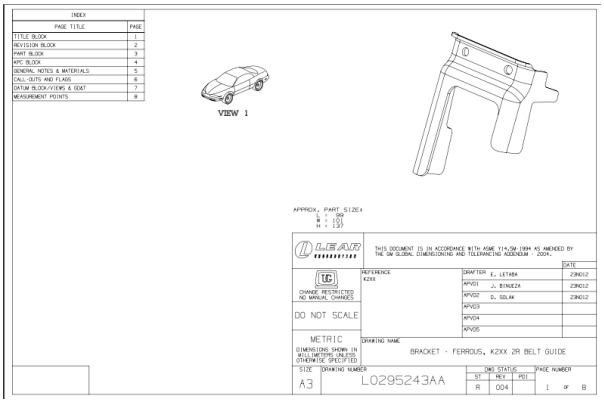
**– GD&T:** Include files containing information relating to GD&T's and all the information with engineering level updated.

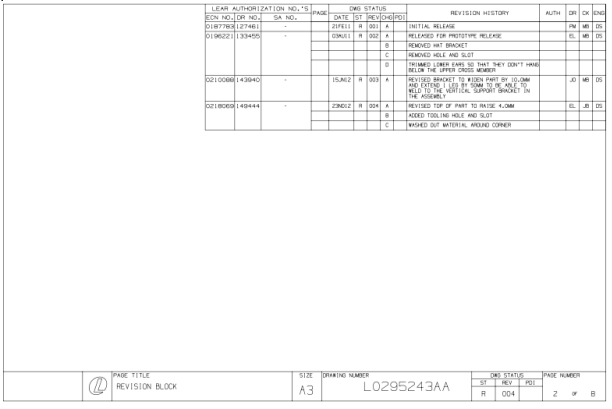


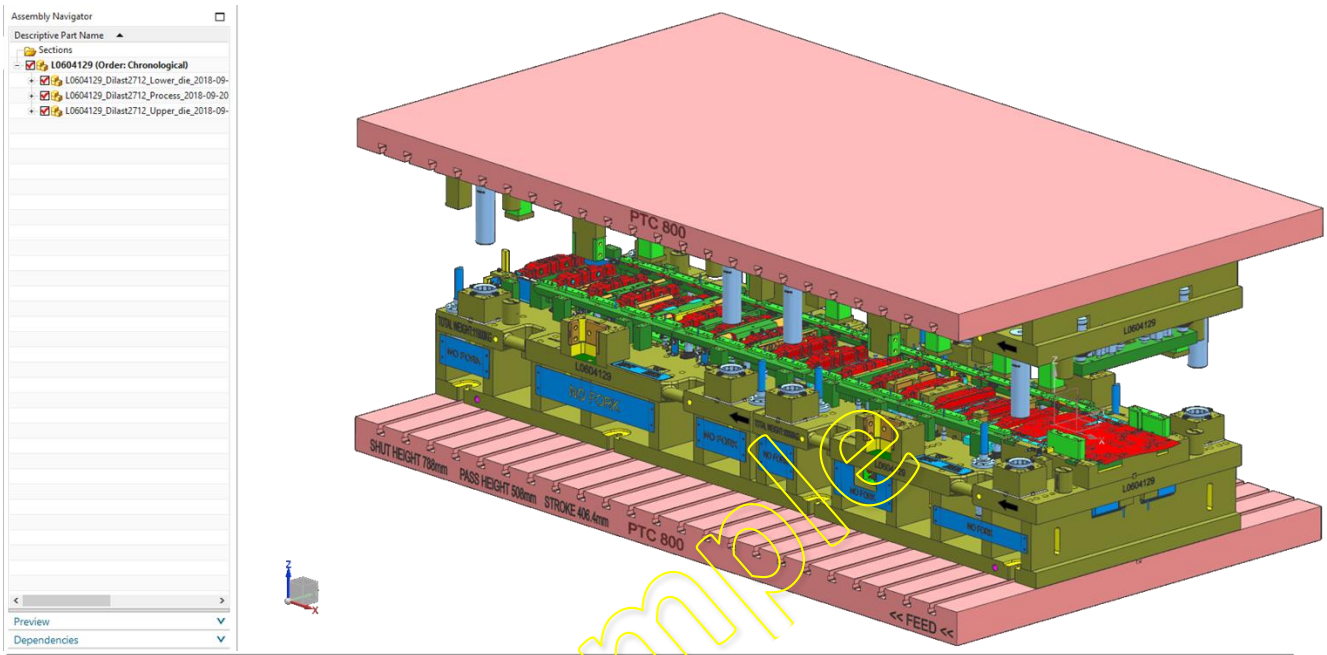



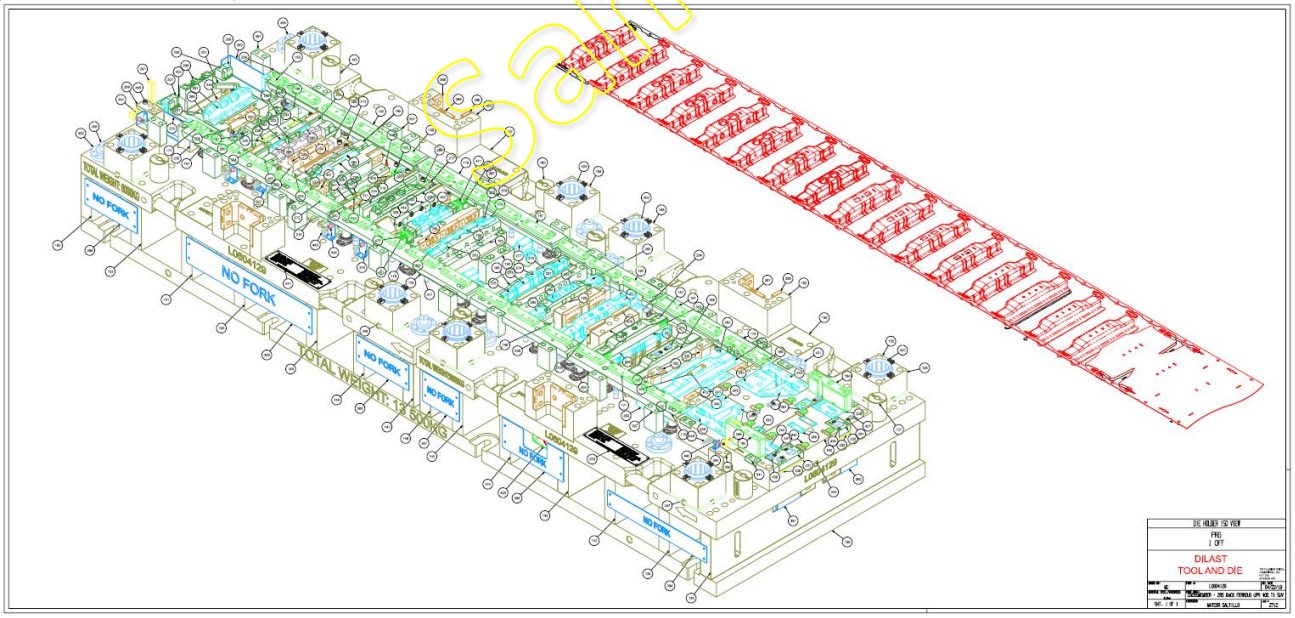



**– DIE DESIGN:**

1. Contains the die design updated after Buy-off, supply die design in both STEP and native format.
2. 2D PDF with dimensions, sections and balloons should be provided for quick reference.
3. All the components must be called by groups (Upper Die, Lower Die, Strip Lay Out, bolster, Ram Press, Gripper, etc..) in 3D and metric system.



**– DIE DESIGN CHECK LIST:**
include the die design check list that was made by the tooling engineer responsible for the die, save the updated die design check list, with the originals notes in case they were added in the last check list, in PDF format.

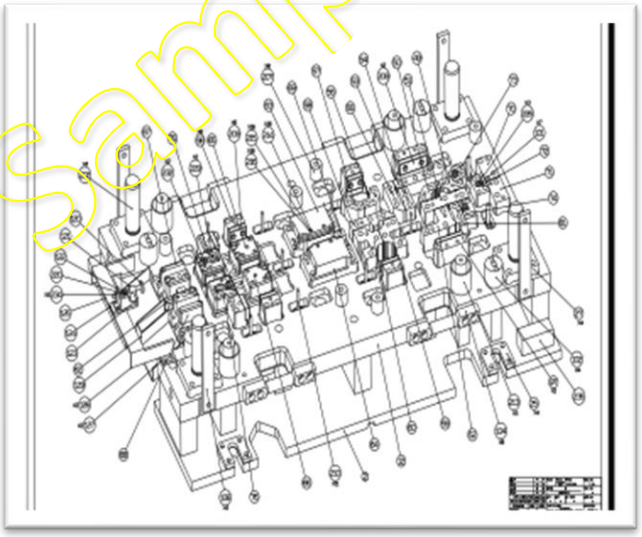
**BOM:** Must be included the bill of material authorized and updated die design, following this **EXCEL FORMAT**, with an explosion drawing with details number as a visual aid. (Include manufactured and standard parts).

A4 | 1

| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 73 | 70 | 467 | Cr12 | 95 | 196 | 10 | 1 | Punch backing | | | | STEEL |
| 74 | 71 | 468 | 1050 | 79 | 163 | 24 | 1 | Punch backing | | | | STEEL |
| 75 | 72 | 501 | Cr12 | 47.8 | 15.8 | 12.2 | 4 | Stamp retainer | | | | STEEL |
| 76 | 73 | 502 | Cr12 | 142 | 115 | 35 | 1 | Punch holder | | | | STEEL |
| 77 | 74 | 503 | Cr12 | 136 | 95 | 35 | 1 | Punch holder | | | | STEEL |
| 78 | 75 | 504 | Cr12 | 90 | 120 | 35 | 1 | Punch holder | | | | STEEL |
| 79 | 76 | 505 | P20 | 89 | 84 | 136 | 1 | Punch holder | | | | STEEL |
| 80 | 77 | 506 | Cr12 | 100 | 95 | 35 | 1 | Punch holder | | | | STEEL |
| 81 | 78 | 507 | Cr12 | 95 | 196 | 35 | 1 | Punch holder | | | | STEEL |
| 82 | 79 | 508 | 1050 | 79 | 113 | 58.7 | 1 | Punch holder | | | | STEEL |
| 83 | 80 | 601 | DC53 | - | - | - | 40 | Stamps | | | | STEEL |
| 84 | 81 | 605 | D2 | 40 | 35 | 70 | 1 | Form punch | | | | STEEL |
| 85 | 82 | 712 | 1050 | 140 | 78 | 223 | 2 | Heel blcok | | | | STEEL |
| 86 | 83 | 713 | 1050 | Φ50.00 | 93 | - | 4 | Upper stopper | | | | STEEL |
| 87 | 84 | 714 | 1050 | Φ50.00 | 68 | - | 4 | Upper other | | | | STEEL |
| 88 | 85 | 715 | 1050 | 59 | 40 | 48 | 4 | Upper other | | | | STEEL |
| 89 | 86 | 717 | 1050 | 10 | 89 | 25 | 1 | Upper other | | | | STEEL |
| 90 | 87 | 718 | 1050 | Φ19 | 28 | - | 1 | Upper other | | | | STEEL |
| 91 | 88 | 720 | 1050 | 50 | 61 | 12 | 4 | Keeper | | | | STEEL |
| 92 | 89 | 721 | CR12 | 50 | 50 | 130 | 4 | Keeper | | | | STEEL |
| 93 | 90 | 722 | 1050 | Φ76.00 | 24 | - | 4 | Upper other | | | | STEEL |
| 94 | 91 | 723 | Cr12 | 20 | 100 | 100 | 2 | Upper other | | | | STEEL |

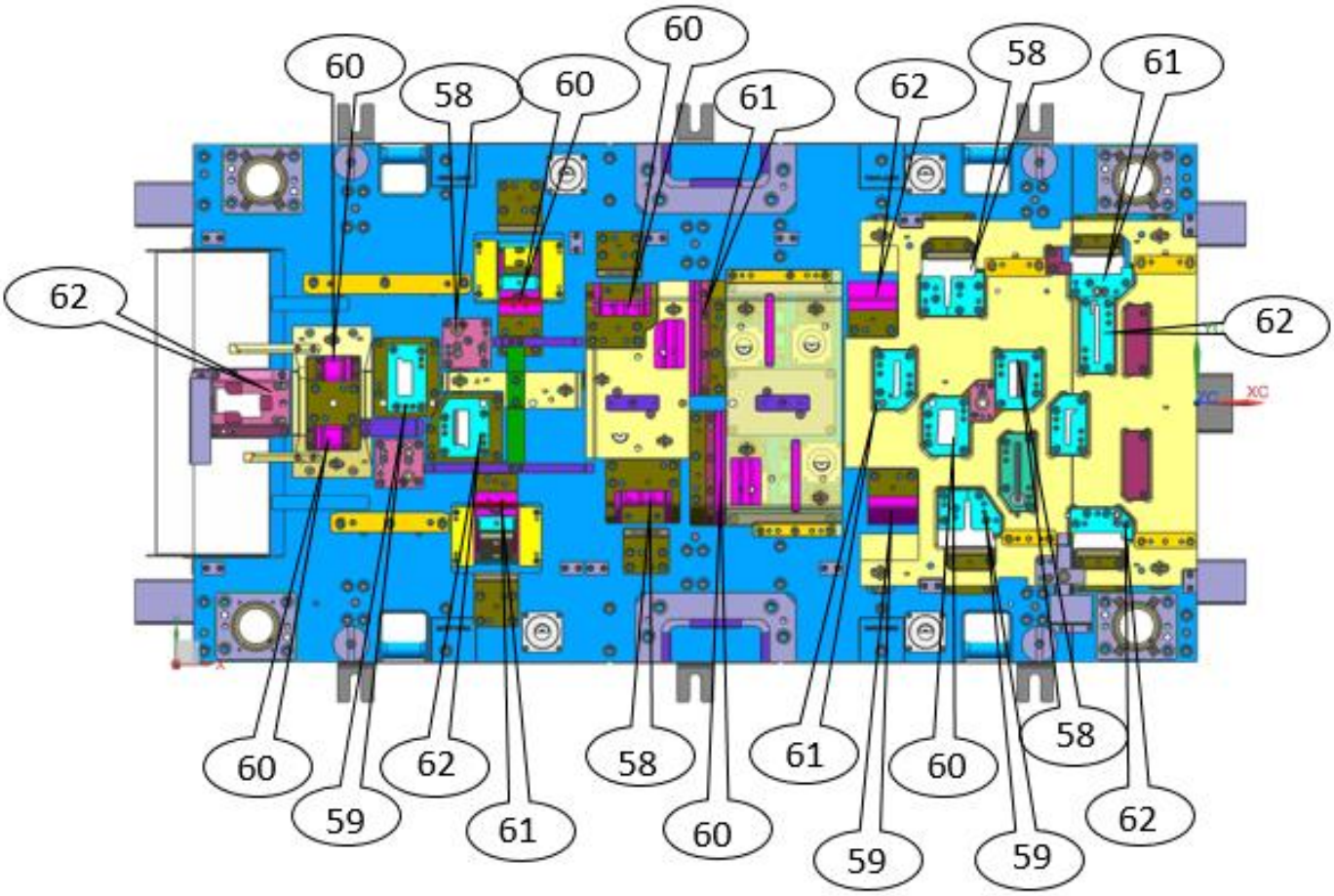
STEEL | XW-42 | AMPCO 18 | DANLY | DADCO | DAYTON | MISUMI | Standard lifter

LISTO PROMEDIO: 50.5 RECUENTO: 100 SUMA: 5050



## – HARDNESS ROAD MAPS FOR DIE OPERATIONS:

## Example: Hardness road map. (Units Hardness Rockwell C)



**– CAPABILITY STUDY (SUPPLIER):**

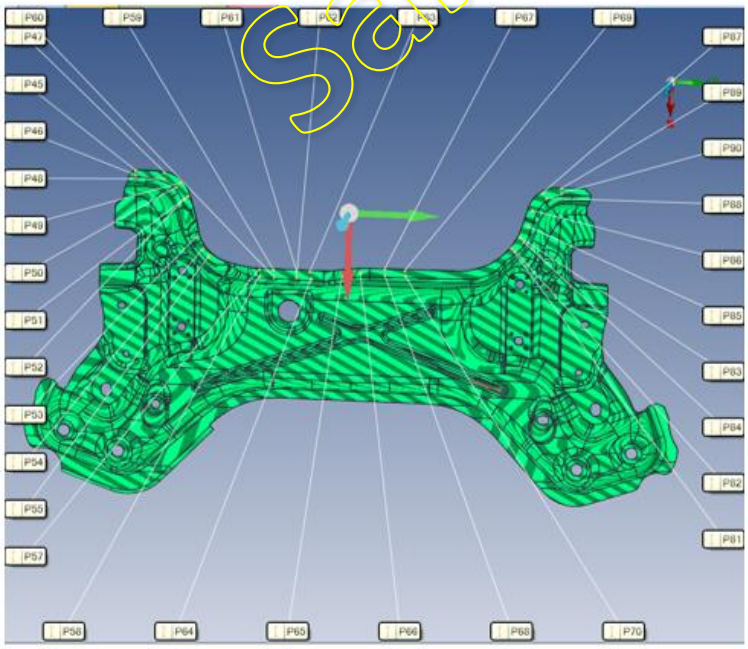
Part quality must be achieved 100% in the checking fixture, supplier must include the necessary documentation to prove the 30 pieces capability study obtaining at least a CP and CPK of 1.67, this result must be the same at final buyoff.

## CAPABILITY REPORT

| | | | |
|---|---|---|---|
| Part number: | 111173 | Date: | 18-Oct-13 |
| Part Name: | SILL-U/B #5 CR | Eng. Level: | AA |
| Program: | GAMMA | | |
| Characteristic: | PARTE | | |

| Piece No. | Circle:CR4 | | | | Circle:CR6 | | | |
|---|---|---|---|---|---|---|---|---|
| | X-axis | Y-axis | Z-axis | Diameter | X-axis | Y-axis | Z-axis | Diameter |
| 1 | -0.09 | -0.20 | 0.305 | 0.151 | -0.063 | -0.316 | 0.226 | 0.133 |
| 20 | 0.09 | -0.19 | 0.294 | 0.157 | 0.094 | -0.267 | 0.352 | 0.140 |
| 21 | 0.05 | -0.18 | 0.294 | 0.157 | 0.037 | -0.220 | 0.163 | 0.175 |
| 22 | -0.03 | -0.26 | 0.203 | 0.135 | -0.006 | -0.349 | 0.222 | 0.157 |
| 23 | -0.02 | -0.25 | 0.254 | 0.157 | -0.016 | -0.369 | 0.189 | 0.165 |
| 24 | 0.08 | -0.19 | 0.261 | 0.190 | 0.070 | -0.311 | 0.131 | 0.173 |
| 25 | 0.05 | -0.21 | 0.255 | 0.171 | 0.041 | -0.292 | 0.233 | 0.176 |
| 26 | 0.06 | -0.19 | 0.246 | 0.140 | 0.075 | -0.260 | 0.253 | 0.141 |
| 27 | 0.07 | -0.17 | 0.257 | 0.122 | 0.012 | -0.235 | 0.175 | 0.145 |
| 28 | 0.06 | -0.22 | 0.242 | 0.131 | 0.032 | -0.274 | 0.161 | 0.117 |
| 29 | 0.01 | -0.19 | 0.283 | 0.128 | 0.009 | -0.278 | 0.190 | 0.126 |
| 30 | 0.00 | -0.10 | 0.201 | 0.127 | -0.023 | -0.175 | 0.141 | 0.170 |
| *Descriptive Statistics* | | | | | | | | |
| Upper Spec | 0.50 | 0.50 | 0.50 | 0.25 | 0.50 | 0.50 | 0.50 | 0.25 |
| Nominal | | | | | | | | |
| Lower Spec | -0.50 | -0.50 | -0.50 | -0.25 | -0.50 | -0.50 | -0.50 | -0.25 |
| **average** | **-0.01** | **-0.21** | **0.25** | **0.15** | **-0.01** | **-0.29** | **0.21** | **0.16** |
| **X-DoubleBar** | **-0.01** | **-0.21** | **0.25** | **0.15** | **-0.01** | **-0.29** | **0.21** | **0.16** |
| **Range** | **0.21** | **0.18** | **0.19** | **0.07** | **0.21** | **0.19** | **0.22** | **0.07** |
| **Est. Sigma** | **0.05** | **0.04** | **0.05** | **0.01** | **0.05** | **0.05** | **0.05** | **0.02** |
| **Arith. Sigma** | **0.06** | **0.04** | **0.04** | **0.02** | **0.05** | **0.05** | **0.05** | **0.02** |
| **Cp** | **3.38** | **3.94** | **3.58** | **6.32** | **3.65** | **3.52** | **3.46** | **4.91** |
| **Cpk** | **3.33** | **2.26** | **1.78** | **2.54** | **3.59** | **1.44** | **1.99** | **1.83** |
| **Pp** | **2.67** | **3.94** | **3.80** | **5.03** | **3.23** | **3.28** | **3.47** | **4.57** |
| **Ppk** | **2.64** | **2.26** | **1.89** | **2.04** | **3.18** | **1.35** | **2.00** | **1.71** |

Road Map 50712050.



## – DIE BUY OFF CHECK LIST:

(can be downloaded from MatcorMatsu supplier portal)
Must be included in PDF with signatures.

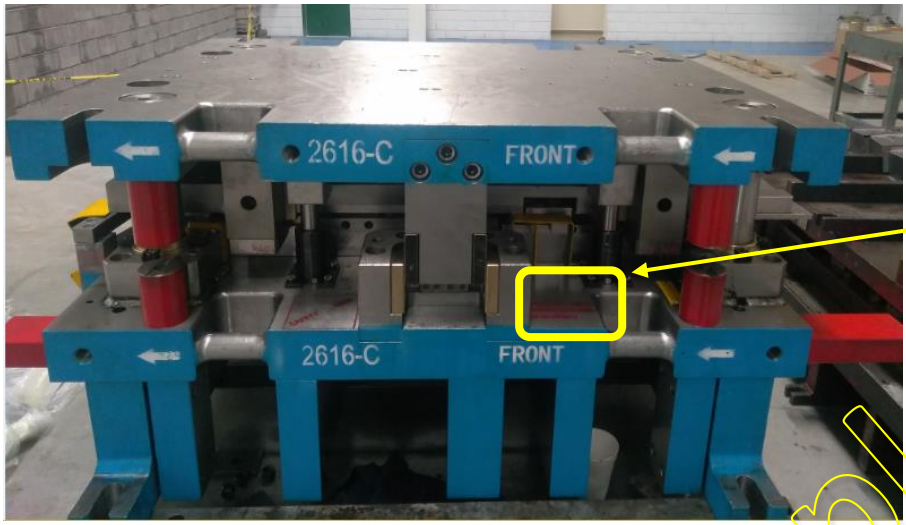
**DIE BUY OFF CHECK LIST** MatcorMatsu

| | | |
|---|---|---|
| PART NUMBER: | PROJECT: | SPM: |
| PART NAME: | DIE PROCESS: | TONNAGE: |
| PITCH: | WIDTH: | THICKNESS: |

| 1 | DYNAMIC | YES | NO | NOTES |
|---|---|---|---|---|
| | 1.- HAS THE DIE PILOTS AND / OR LOCATORS IN EACH STATION ? | | | |
| | 2.- HAS THE DIE FRENCH STOP (OR SIMILAR), SENSOR FINGERS AND FINAL SENSORS? | | | |
| | 3.- ARE THE TRIM AND PIERCE HOLES FREE OF SCRAP ACCUMULATION? | | | |
| | 4.- DOES THE DIE HAVE ENOUGH PLUNGERS AND EJECTORS TO AVOID PART BE PULLED UP BY STRIPPER PAD? | | | |
| | 5.- IS THE DIE SPEED (SPM) THE APPROPIATE ? IS THE PRESS SPM APROPIATE? WRITE IT | | | |
| | 6.- IS THE PROCESS STABLE ? | | | |
| | 7.- IS THE SESNORS SYSTEM WORKING PROPERLY? | | | |
| | 8.- ARE ALL THE DIE COMPONENTS FUNCTIONAL AND WITHOUT INTERFERENCES ? | | | |
| | 9.- IS THE PART DISCHARGED CORRECTLY TO THE CONVEYOR ? | | | |
| | 10.- IS THE DIE IN THE APPROPIATE PRESS ACCORDING THE TONNAGE REQUIRED BY THE PART ? | | | |
| | 11.- DOES THE PART REQUIRES LUBRICATION ? | | | |
| | 12.- ARE EACH PUNCH AND BUTTON DIE ALIGNED CORRECTLY? CHECK ALL HOLES AND TRIMS IN THE PART. | | | |
| | | | | |
| 2 | QUALITY | YES | NO | COMMENTS / NOTES |
| | 1.- PART QUALITY APPEARANCE IS ACCEPTABLE RESPECT TO: | | | |
| | A) FREE OF WRINKLES | | | |
| | B) FREE OF BURRS | | | |
| | C) PART EDGES WITHOUT DAMAGE | | | |
| | D) FREE OF SPLITS | | | |
| | E) FREE OF DRAGGING | | | |
| | F) FREE OF MARKS OR HITS | | | |
| | 2.- IS THE PART QUALITY DIMENSIONAL, ACCEPTABLE ACCORDING TO THE CHECKING FIXTURE ? | | | |
| | 3.- THE PART COMPLIANCE WITH A 1.66 CP AND 1.33 CPK, ACCORDING TO CMM MEASURES ? | | | |
| | 4.- IS THE PART AT THE LATEST ENGINEERING LEVEL ? | | | |
| | 5.- IS THE MATERIAL SPECIFICATION ACCORDING TO THE APL ? | | | |
| | 6.- VERIFY(CHECK WITH MICROMETER) DRAWS &/OR FORMINGS WITH RISK OF THINING, SPLITS OR CRACKS USING LIQUIDS OR SECTION CUTS FOR BETTER INSPECTION. | | | |
| | | | | |
| 3 | STATIC | | | |
| | UPPER DIE. | YES | NO | COMMENTS / NOTES |
| | 1 HAS THE DIE LIFTING HOOKS (THREAD HOLES FOR EYE BOLTS IF IS NESCESARY)? | | | |
| | 2 IS THERE AN INTERFERENCE WHEN OPENING THE DIE. | | | |
| | 3 IS THERE A DAMAGED COMPONENT ON THE DIE | | | |
| | 4 ARE STRIPPERS ARE PROPERLY ATTACHED, BALANCED, AND LEVELED? | | | |
| | 5 WHEN STRIPPERS ARE BEING DISASSEMBLIED, IS THERE ANY INTERFERENCE? | | | |
| | 6 ARE THE STRIPPER PADS GUIDED WITH AMPCO GUIDES AND STANDARD LIFTER OR DADCO RETAINER? | | | |
| | 7 WEAR PLATES : STEEL OVER BRONZE WITH GRAPHITE PLUGS | | | |
| | 8 ARE THE NYTRO CONTROL PANEL PLACED IN A SAFETY PLACE AND | | | |
| | WITH STANDARD CONEXIÓN, AND ALL NYTRO CILINDERS COMPONENTS ARE DADCO BRAND ? | | | |
| | 9 DOES EXIST A PLATE WITH NYTRO FILL INFORMATION EACH DIE STATION (CAN BE ENGRAVED ON DIE SHOE)? | | | |
| | 10 ARE NYTRO CYLINDERS PROPERLY ATTACHED WITH SCREWS OR MOUNTING FLANGES ? | | | |

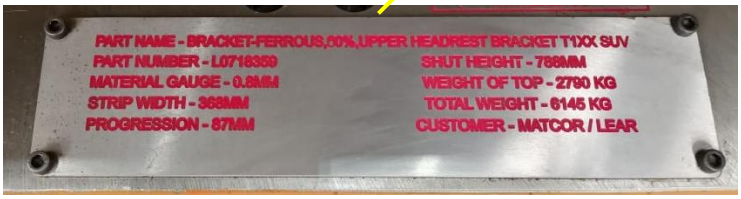
**- INFO PLATE:**

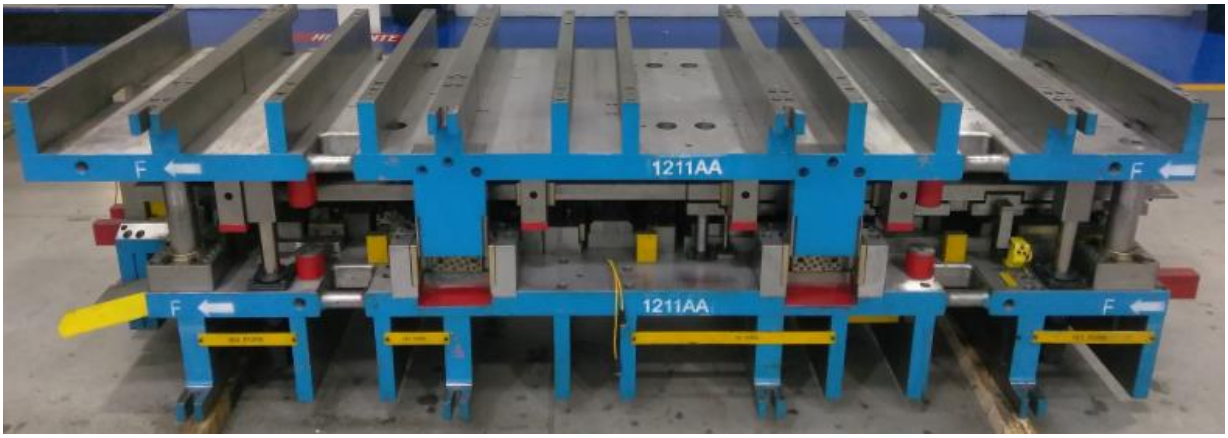
Include Pictures showing the die and information plate or information engraved according customer requirement.







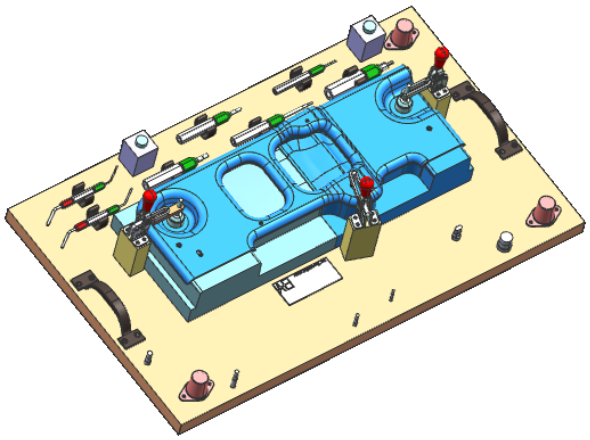

1211AA
1211AA


Sample


1211AA

**– CHECKING FIXTURE:**

Include the checking fixture design in STEP and native format, in 3D and metric system, including certification, operation manual, R&R report and all information relating to the checking fixture.



## Checking Fixture's Certification MUST BE by 3rd. Party.

**CERTIFICATE OF MEASUREMENTS**
**FIXTURE CERTIFICATION**

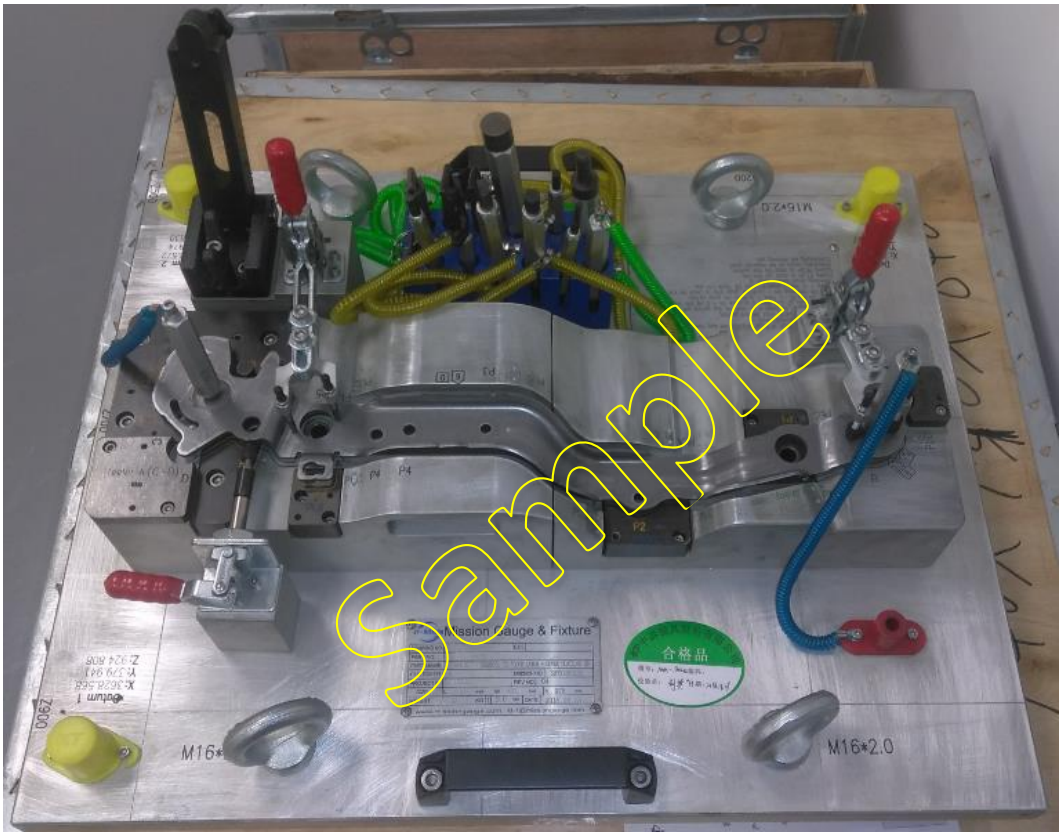
CUSTOMER: Matcor
PART NAME:
PART NUMBER: FC00AAY27005_008_BRKT-3
DATE CERTIFIED: 7-2-18
E/C LEVEL:
FIXTURE NUMBER: F171207
TEMPERATURE AT TIME OF TEST: 18.2℃
TESTED ITEMS CONDITION: NEW FIXTURE

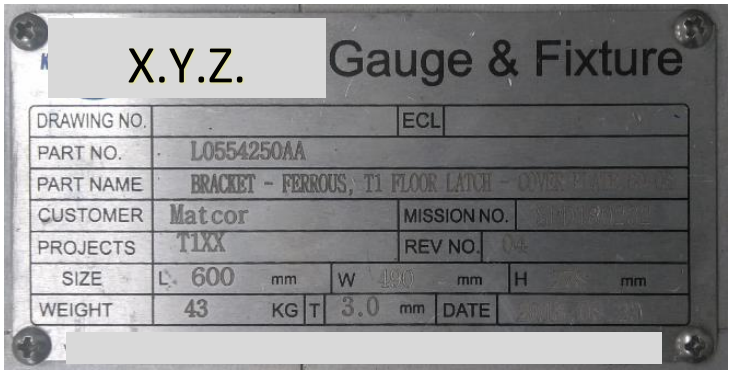
All units are in metric unless otherwise specified.
The results relate only to the items tested.
For the results refer to the report attached with this certificate
■ Roadmap
■ CMM Printout Report
□ Other

The equipment used is traceable to National Standards as follows:
COORDINATE MEASURING MACHINE: SERIAL#:I010836
SOFTWARE: PC-DMIS 2010 MR1 CAD++
CALIBRATED : 3:00 PM
TRACEABILITY #: N0.1508005

SIGNED: JOB DATE: 7-2-18
Fangyuan Measurement(Quality Manager)

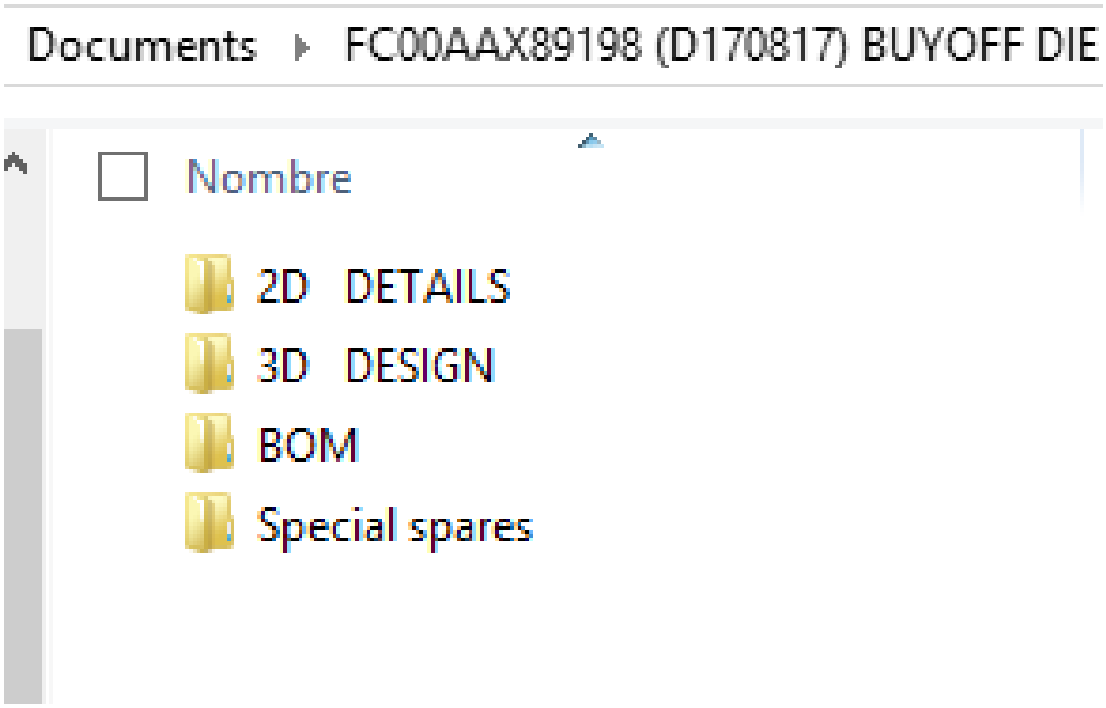
## Checking fixture.



# 10. DIE DESIGN INFORMATION

MatcorMatsu Require Die Design Updated after Buy Off and Engineering Changes implemented, in STEP and Native Format, the Folders should be in order based in the next list:



- **Die design Checklist**
  (can be downloaded from MatcorMatsu supplier portal)

**DIE DESIGN CHECK LIST** — MatcorMatsu

| | | | |
|---|---|---|---|
| PART NUMBER: | PROJECT: | ASSIGNED PRESS: | QUOTED PRESS: |
| PART NAME: | DIE PROCESS: | SHUT HEIGHT: | FEED HEIGHT: |
| FINAL BLANK SIZE: | QUOTED BLANK SIZE: | PRESS BED SIZE: | |

| 1 | SIMULATION REVIEW | YES | NO | NOTES |
|---|---|---|---|---|
| 1 | Did supplier use Yield and Tensile strength values given by MatcorMatsu? | | | |
| 2 | Does the FLD graphic show all point in safety zone? | | | |
| 3 | Does the tonnage calculation ensure the die can work on assigned press? | | | |
| 4 | Is the blank size equal or less than the quoted ? | | | |
| 5 | Can the part be made with the quoted material spec without danger of splitting or are there needed design modifications to the part geometry needed | | | |
| 6 | Is the part at the latest engineering level ? | | | |
| 7 | Do critical zones are in the range less than 20% of thinning? | | | |
| 8 | If formability simulation shows splits, wrinkles, thinning, or another issue, does suplier have an action plan? | | | |

| 2 | DIE PROCESS / LAY OUT | YES | NO | COMMENTS / NOTES |
|---|---|---|---|---|
| 9 | Are all dimensions and components in metric system? | | | |
| 10 | Has supplier confirmed that received the lastest die standards? | | | |
| 11 | Are the shut height and feed height the correct for the asigned press? | | | |
| 12 | Is the bolster printed behind the strip layout? | | | |
| 13 | Does the Process ensure projected production volume ? | | | |
| 14 | Are the french stop and sensor fingers (cut-off and initial sensor) showed? | | | |
| 15 | Is the start line indicated? | | | |
| 16 | Isn´t coil width wider than max coil feeder oppening? | | | |
| 17 | Do pilot holes are made before start line? | | | |
| 18 | Are mating trims, datum and tight tolerance holes made after re-strike station? | | | |
| 19 | Are the datum holes pierced perpendicular to cad date surface ? | | | |
| 20 | Are estimated tonnage showed station by station and total tonnage? | | | |
| 21 | Is date stamp showed at the begining of the process and each station? | | | |
| 22 | Does process layout shows: | | | |
| | a) Material spec. | | | |
| | b) Material thickness | | | |
| | c) Coil width | | | |
| | d) Pitch | | | |
| | e) Primary press | | | |
| | f) Auxiliary press | | | |
| | g) Feed direction | | | |
| | h) Lifting height | | | |
| 23 | Are Forming, trim and pierce indicated with different colors? | | | |
| 24 | If process has a center carrier, is it wide enough and guided with U flange 10mm height? | | | |
| 25 | Is de process developed to achieve tolerances and requirements according the GD&T? | | | |

| 3 | DIE DESIGN REVIEW | YES | NO | COMMENTS / NOTES |
|---|---|---|---|---|
| | GENERAL REVIEW | | | |

# 11.SPARE PARTS

- Cost of one set of punches, Buttons and Trim Steels need to be quoted at the time of sourcing and ship with die after buy off.

- Cost of one set of extrusion sections, if applicable, need to be quoted at the time of sourcing and ship with die after buy off.

- Cost of other Critical spares (forming sections, additional copies of trim section. etc.) need to be quoted upon request by MatcorMatsu Tooling Engineer at the time of final design review, and ship with die after buy off.

- All spare parts need to be clearly indicated in BOM with visual aid.

**Example: Lower Die (special spare)**