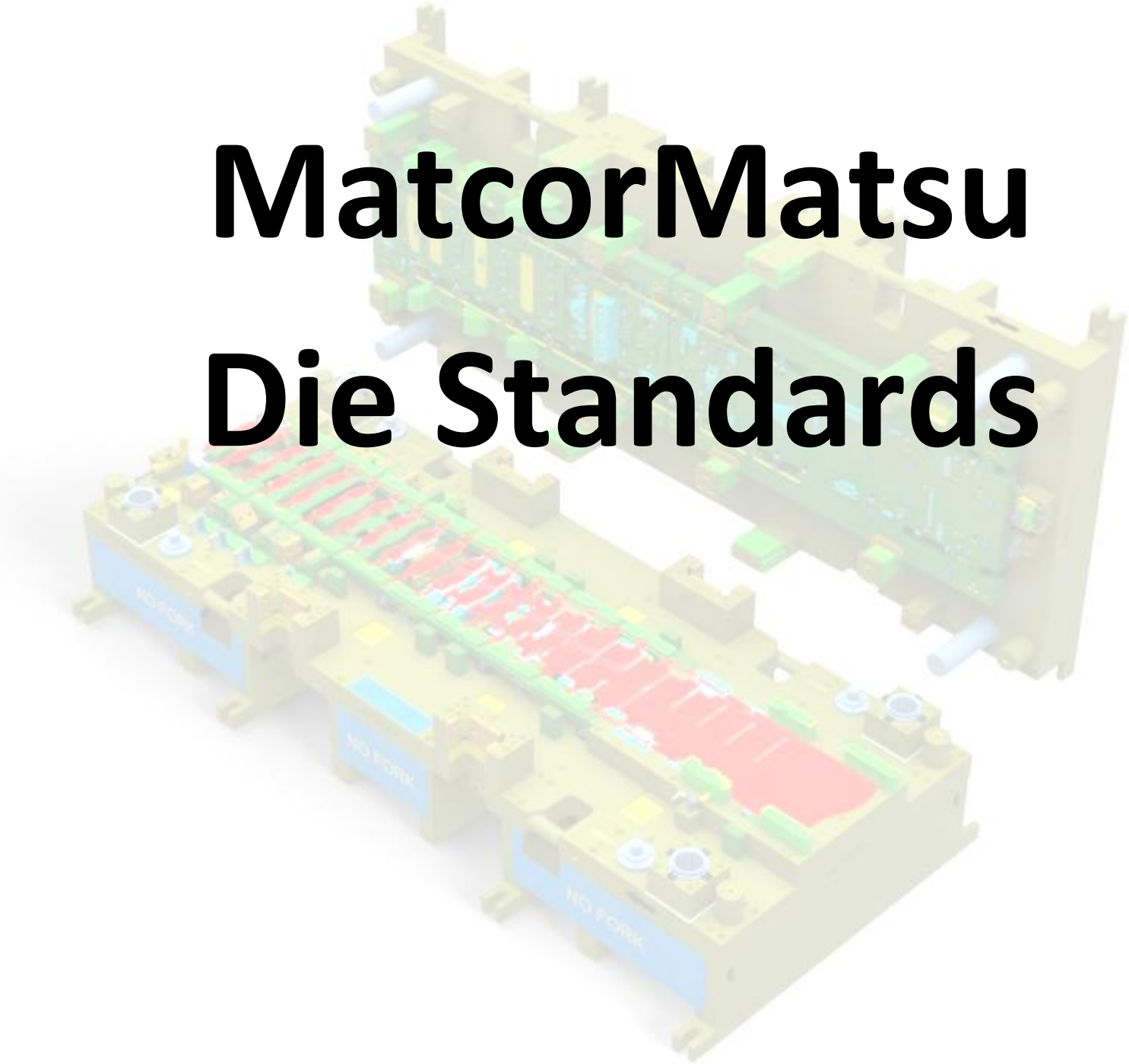
MatcorMatsu Die Standards



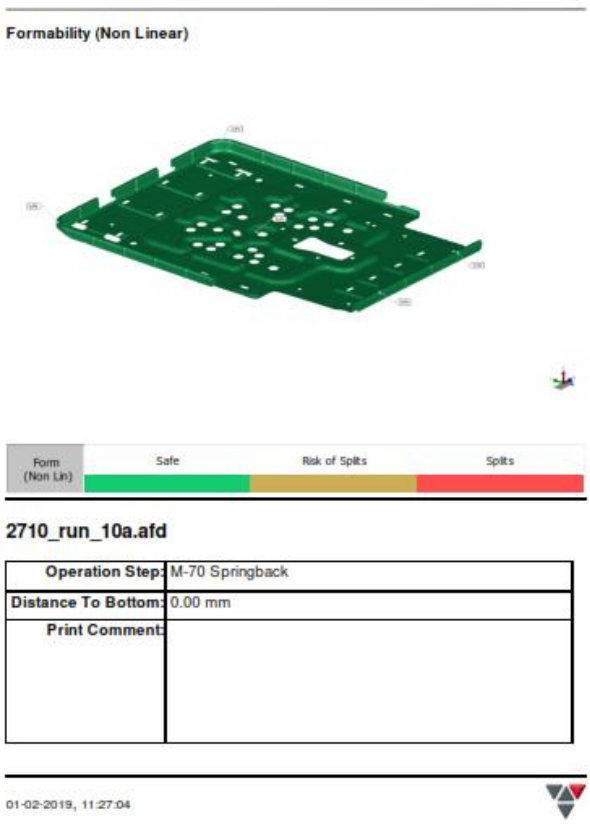
Index

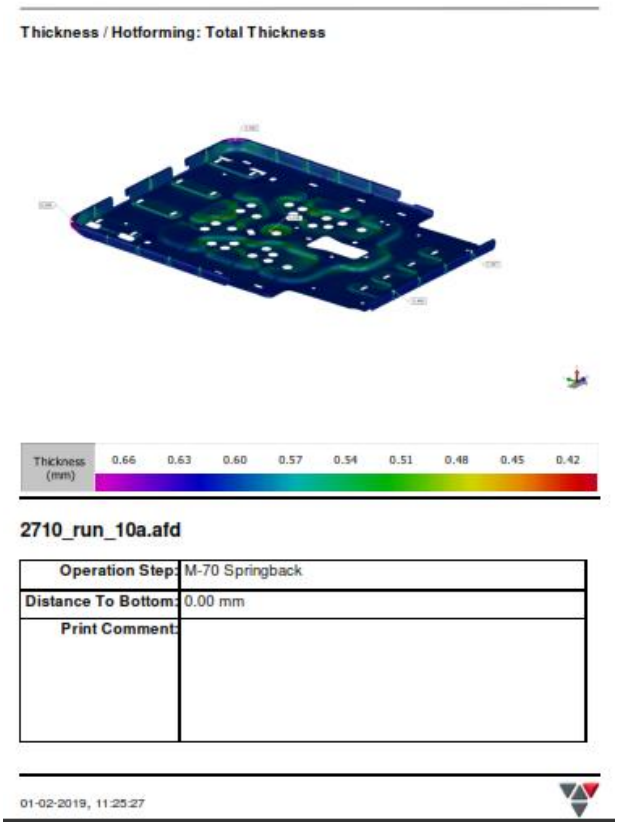
ITEM	DESCRIPTION	PAGE
1	SIMULATION REPORT	03
2	LAYOUT PROCESS	07
3	GENERAL DIE DESIGN	11
4	CASTING DIE DESIGN	48
5	AUTOMATION	54
6	PRESS SPECIFICATION	58
7	DIE PAINT & IDENTIFICATION	62
8	PACKAGING INFORMATION	63
9	BUY OFF REQUIREMENTS	65
10	DESIGN INFORMATION	76
11	SPARE PARTS	78

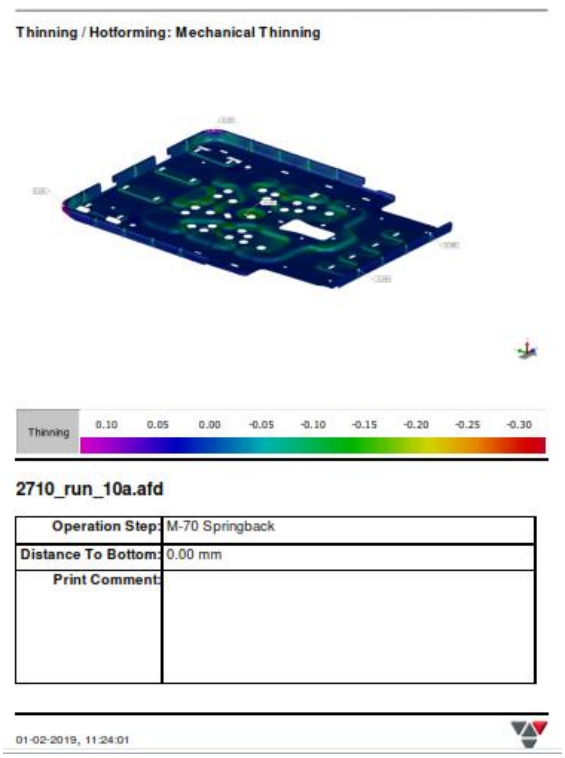
1. SIMULATION REPORT

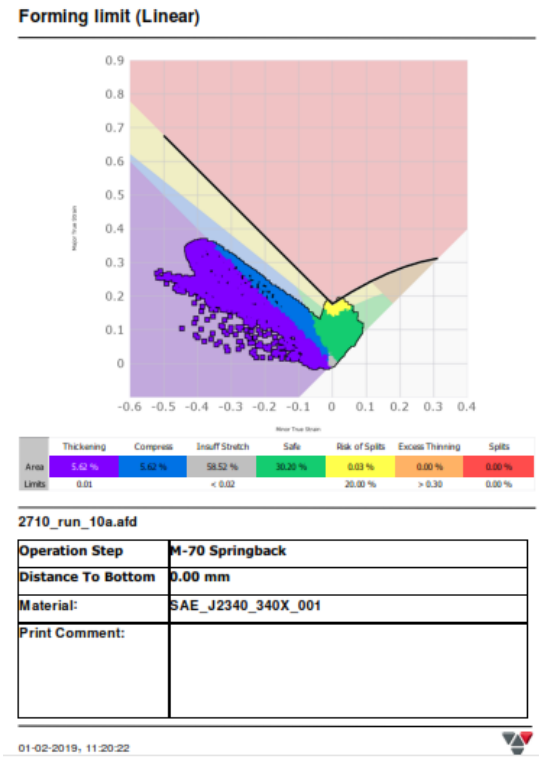
The Simulation report must include the following information:

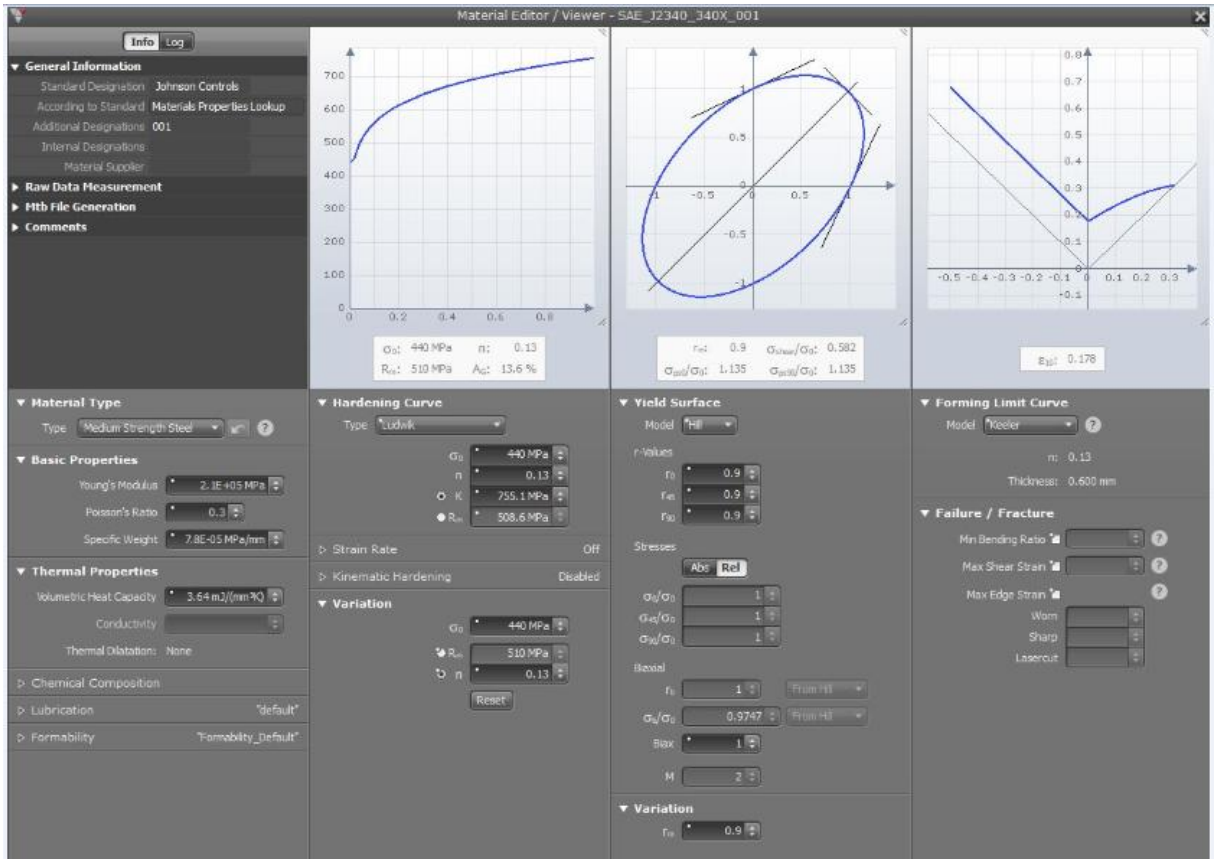
- Thinning, wrinkles, and spring back analysis,
- FLD diagrams.
- Die action sections
- Total tonnage per station.
- Blank size used on simulation report.
- Steel spec of the part.
- Engineering level of the part.
- If the part has thinning or wrinkles problems, write down proposal to Improve.
- Sim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





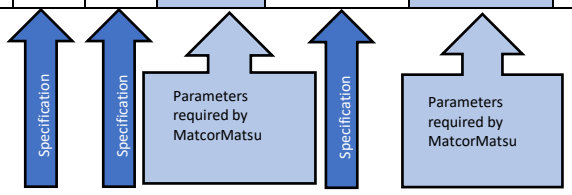

Thinning / Hotforming: Mechanical Thinning
Thinning
0.10 0.05 0.00 -0.05 -0.10 -0.15 -0.20 -0.25 -0.30
2710_run_10a.afd
Operation Step: M-70 Springback
Distance To Bottom: 0.00 mm
Print Comment:
01-02-2019, 11:24:01


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

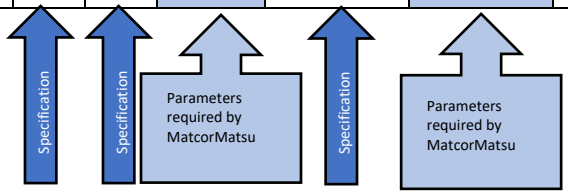

Material Editor / Viewer - SAE_J2340_340X_001
Info Log
General Information
Raw Data Measurement
Mtb File Generation
Comments
Material Type
Basic Properties
Thermal Properties
Chemical Composition
Lubrication
Formability
Hardening Curve
Strain Rate
Kinematic Hardening
Variation
Yield Surface
Forming Limit Curve
Failure / Fracture

- 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

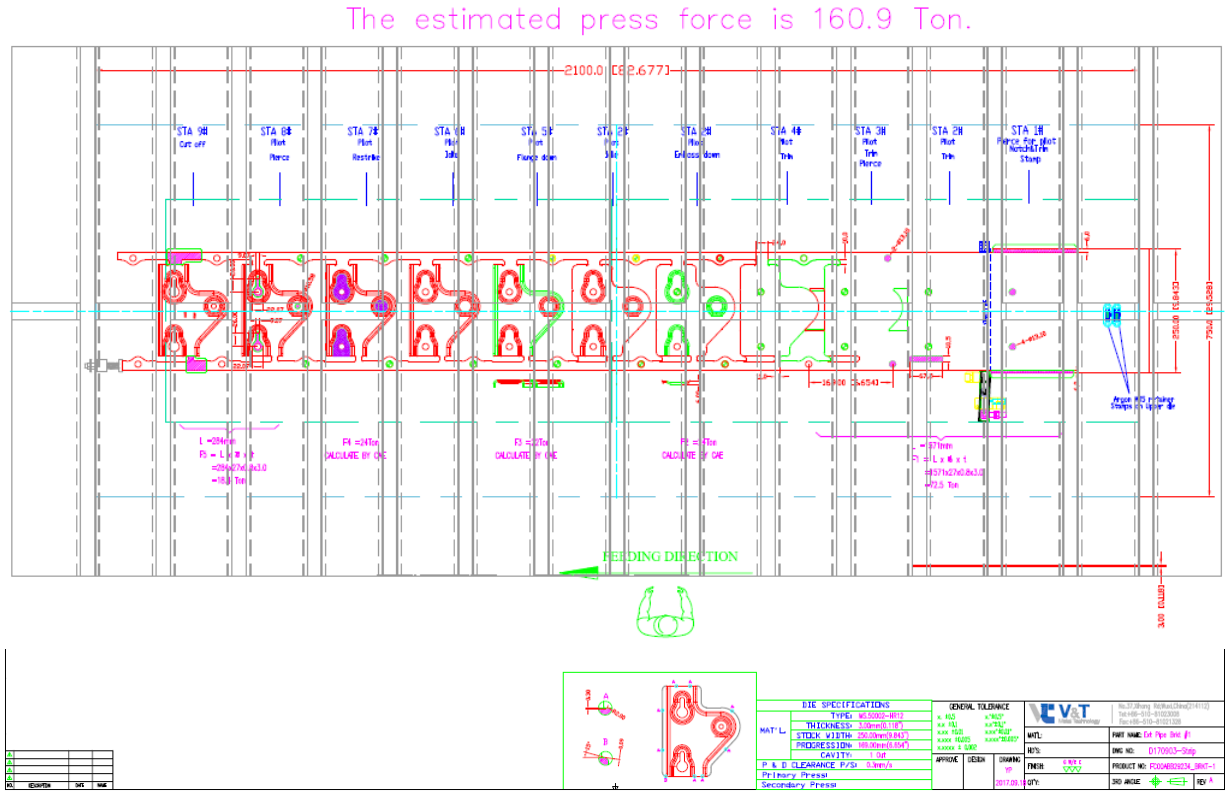


2. LAYOUT PROCESS

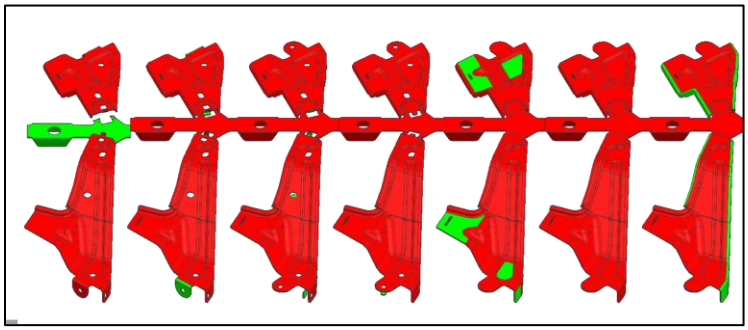
Strip layout or transfer process must be in 2D DWG, PDF and 3D STEP file.

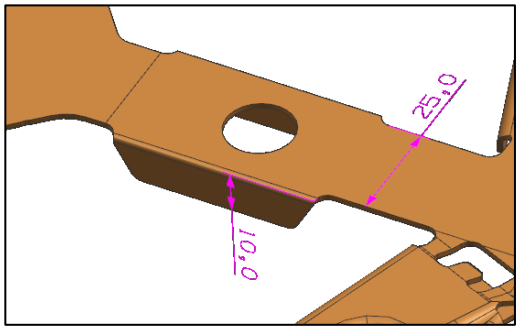
Layout must show:

1. All the Dimensions in METRIC SYSTEM.
2. Total tonnage and Tonnage by each single station. Total tonnage needs to be undder 80% of press capacity.
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.

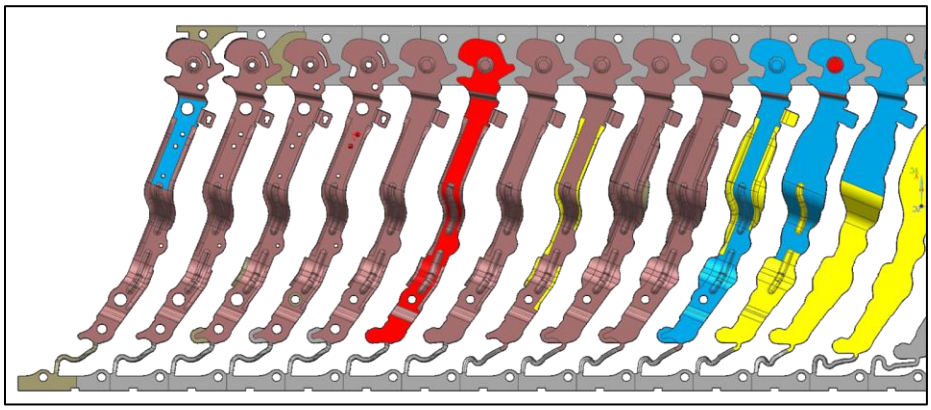


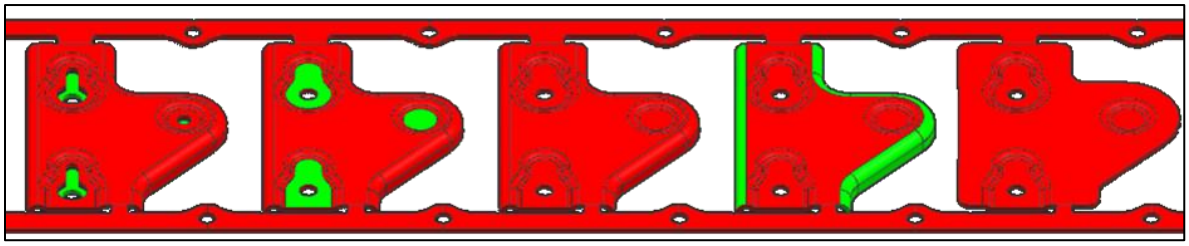
- Center Carrier must be strong adding a U flange 10mm height for stability when possible.



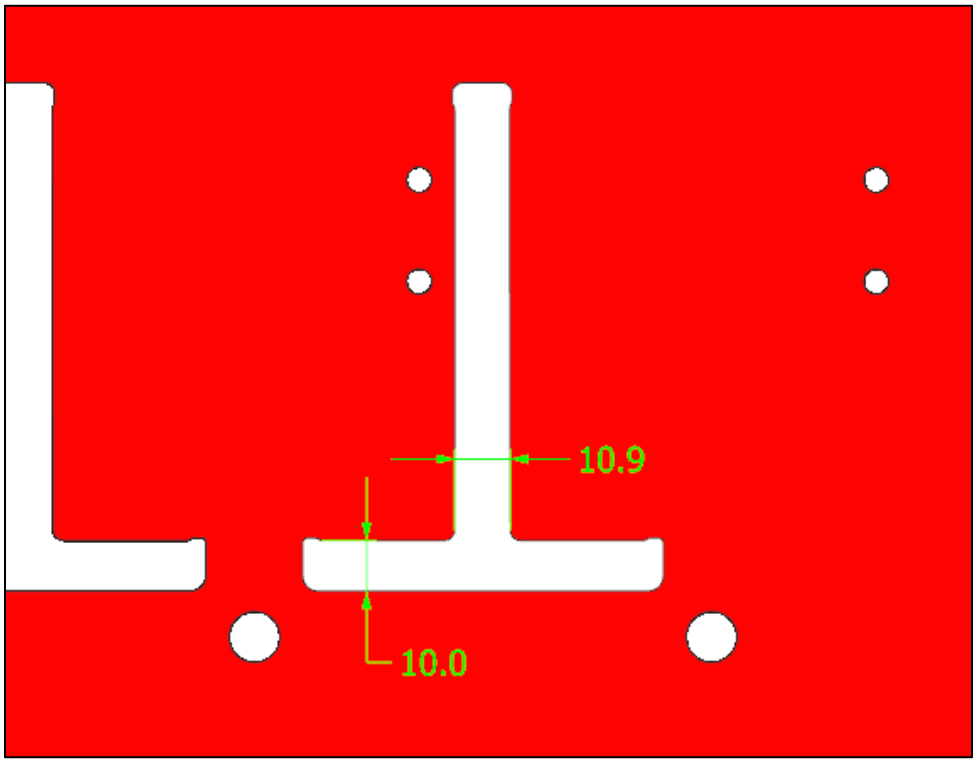


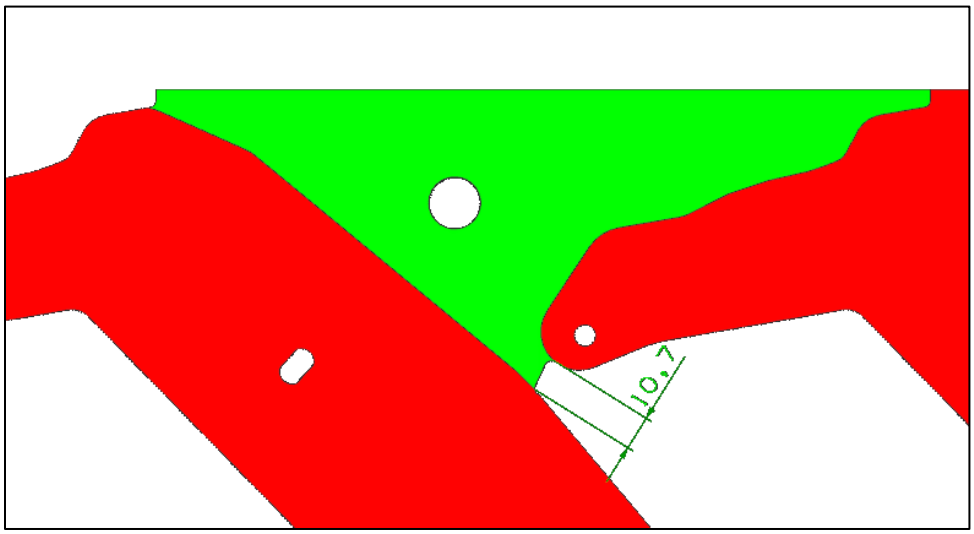
- Lat carrier must be strong and wide enough for stability.



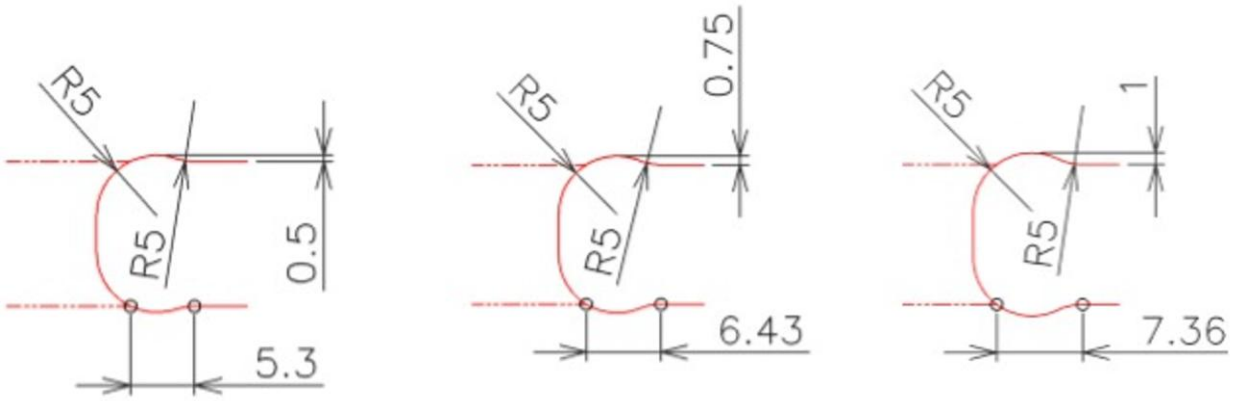


- Width of Trim punches need to be 10mm or 3 times material thickness whichever is greater. (need MatcorMatsu Tooling Engineer approval if cannot meet this standard)





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

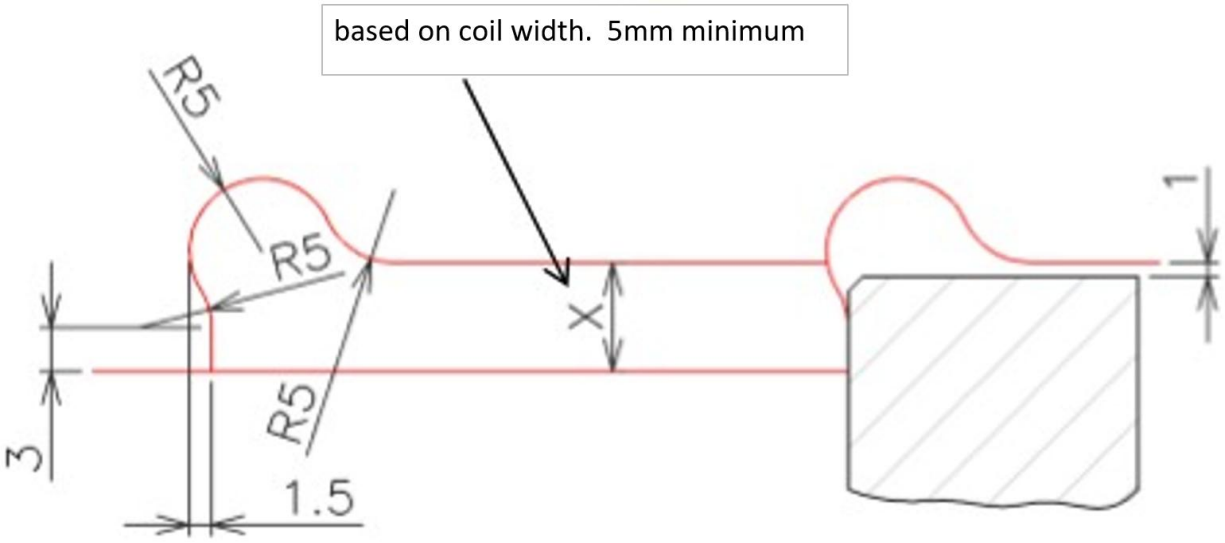


Detailed notch
0.5mm-2.5mm material thickness

Detailed notch
2.6mm-4mm material thickness

Detailed notch
> 4.1mm material T.

- Coil edge cut to follow below standard.



3. GENERAL DIE DESIGN

- Process layout, simulation and Die design need to be reviewed and approved by the Tooling Engineer before die build.

- 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)**.**

- Material cert is required for die steels.

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

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

- **Progressive Dies: should be made of steel plate (no casting).**
- **Transfer Dies: for parts 1.5mm or thicker should be made of steel plate, cast die is acceptable for parts that less than 1.5mm thick.**

- **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 also be used as long as exchangeable with DADCO and agreed by Tooling Engineer.

- Nitro cylinders should be charged to a max of 80% .

- Wear plates, guide blocks, keepers, Danly/Lamina brand, or equivalent according NAAMS Standards (Do not use special Sizes)

- For stripper pads and lifters: Standard Lifters, Guide pin / bushing, wear plates can be used.

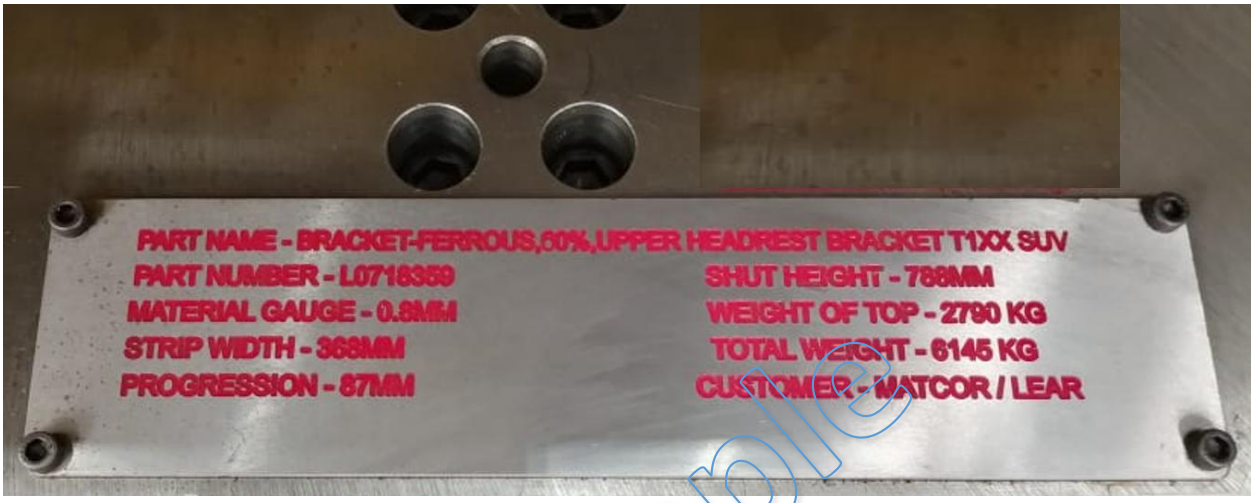
- All progressive & blanking dies must be run off in a press with coil feeder, no strip feeding.

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

- 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 (to be based on OEM requirement)



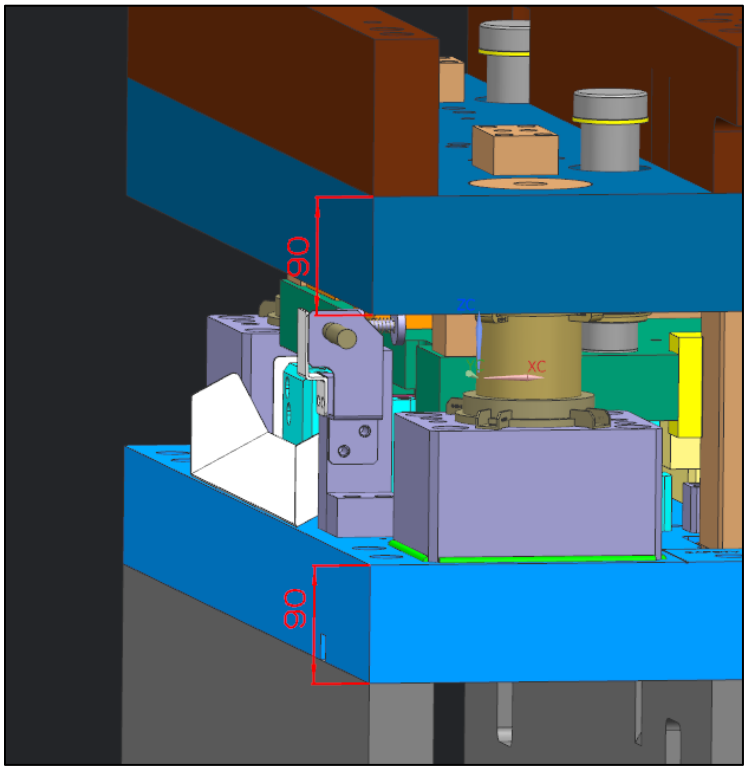


Sample

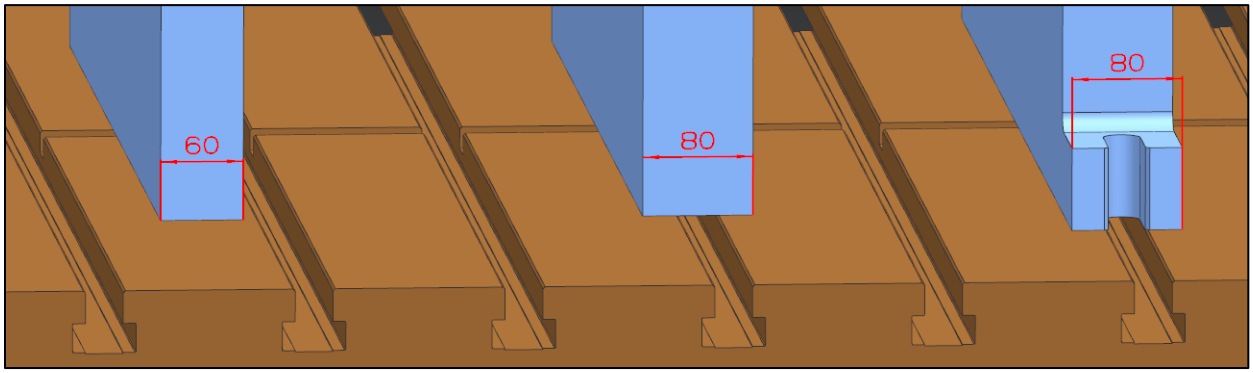
- For Sensors and connector, MatcorMatsu will share information at die design stage.
  Example:
  Sensors NPN M12 X 1
  Balluf brand
  Code: BES 516-329-G-E5-C-S4
  Connector pin
  PHOENIX CONTACT Brand
  Code: HC-B 24-ESTS-1771749
  Mounting Box
  PHOENIX CONTACT Brand
  Code: HC-B 24-SMQ-67/M1M25-1586976

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.

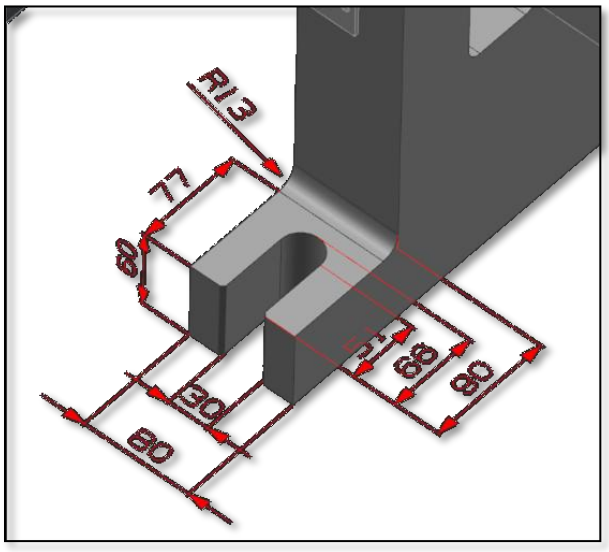
- Die shoe thickness must be 90mm (80mm can be used for small dies).



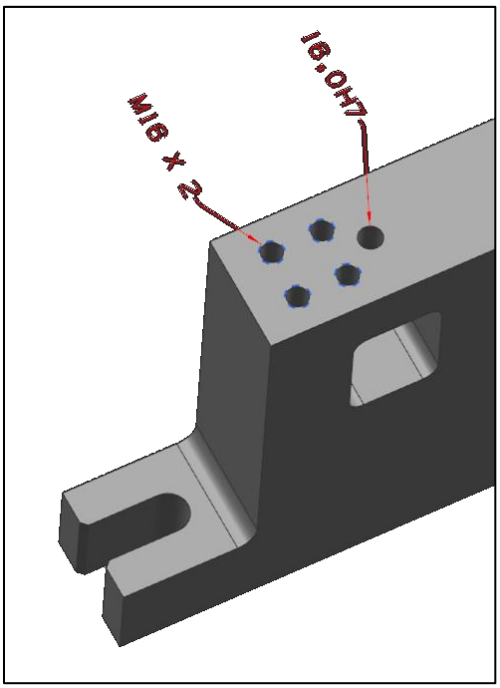
- Parallels:
  - Clamping parallel thickness must be 80mm,
  - for no clamping parallels 60mm to 80mm can be used (80mm wide must be if the parallel is over T-slot)



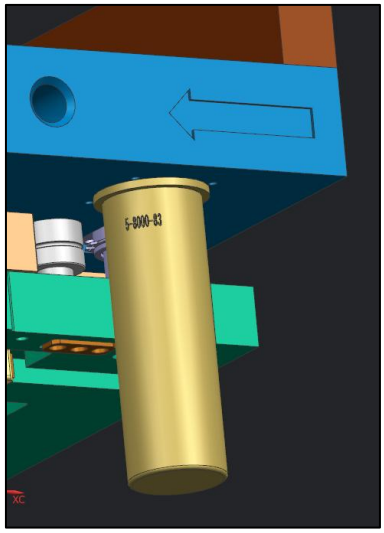
- Clamping feet dimensions will be provided by MatcorMatsu according to the presses and clamps.
  Example below:

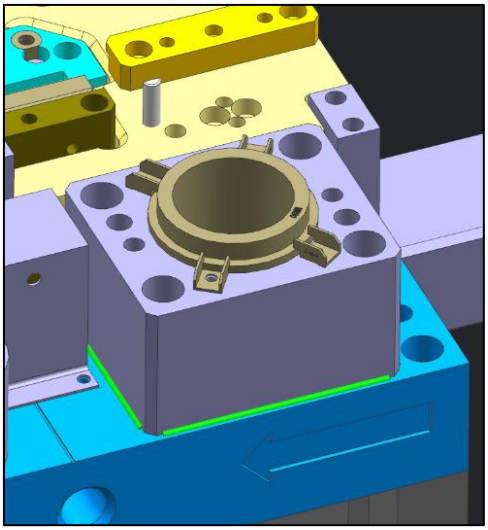


- Clamping parallel must be hold by 4 M16 screws and one Dowell pin each side.

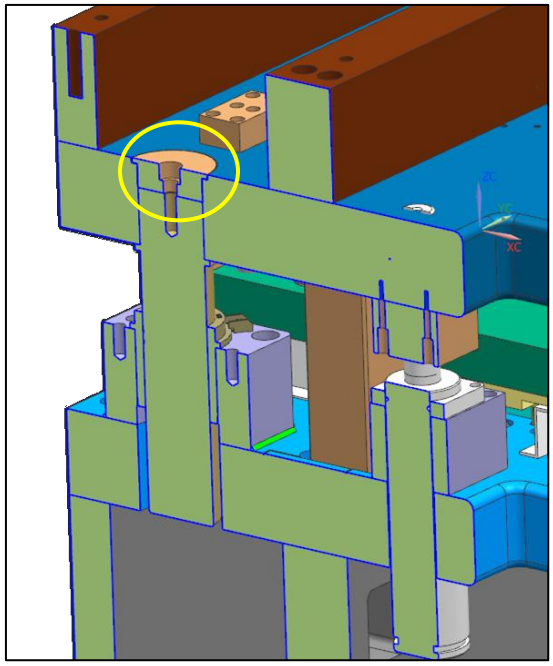


- Use bronze bushings and guide posts ⦰80mm for mid and large size dies, ⦰63mm for small dies: **(some Matcor plant requires ball guide pins, to be confirmed at design review)**

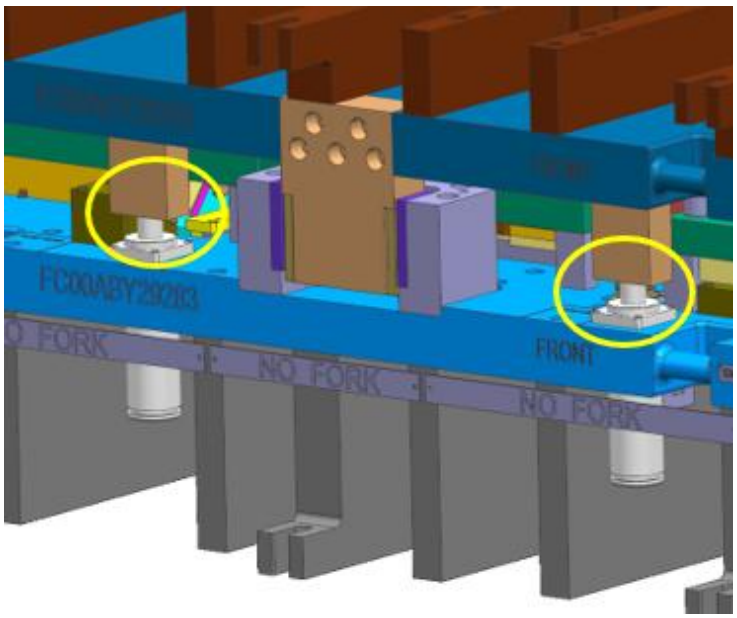




- Use safety keeper for guide post.



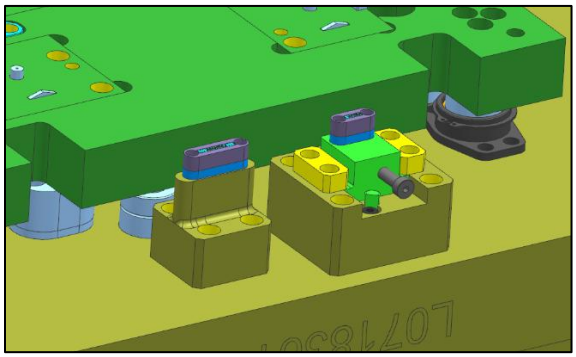
- Add storage cylinders.

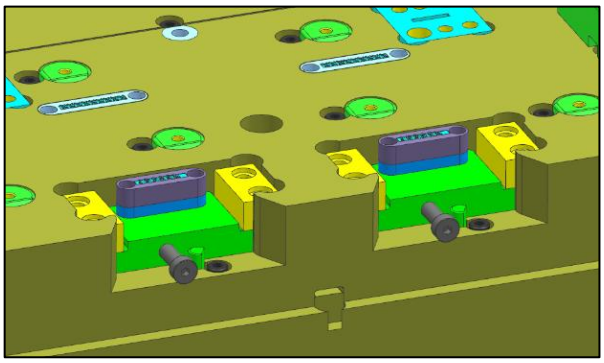


- Retainer for date stamp, Argon (brand) Spec RN1/8
  (Size depend of Customer requirement)
  http://www.argontool.com/standard_stamps1.htm

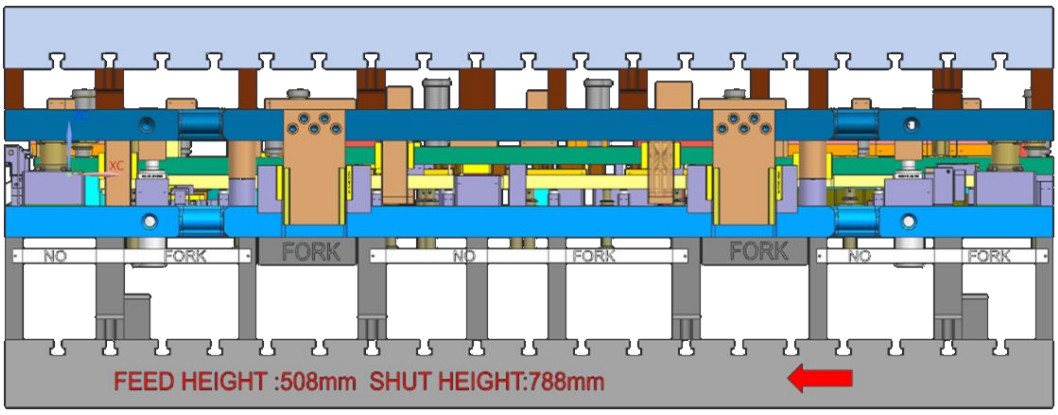


- Use quick change style holder for date stamp, and fixed stamp holder for part number (It can be in upper or lower die depending on customer requirements).

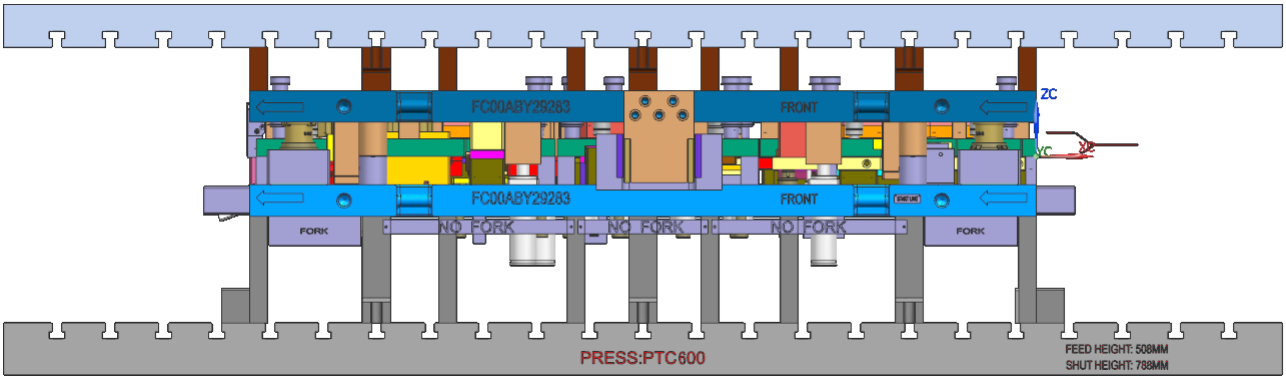




- Use 4 heel blocks for large dies.



- Use 2 heel blocks for medium and small dies.

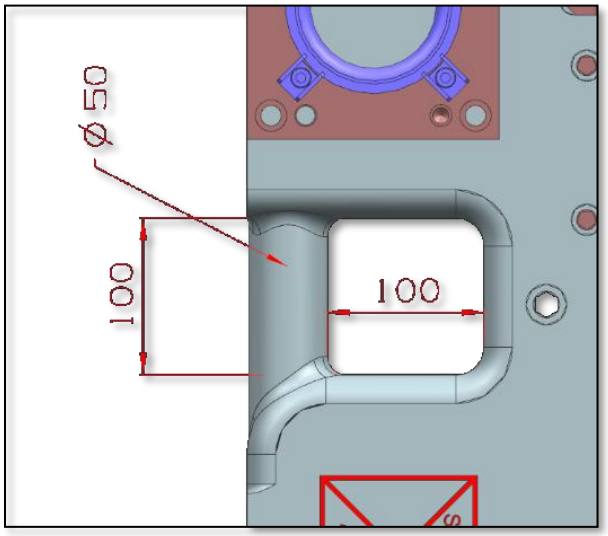


- All the Bolts used in MatcorMatsu DIES need to be GRADE 9.8 ~ 12.9
  Example HOLO-KROME, UNBRAKO, BRIGHTON BEST, MISUMI.

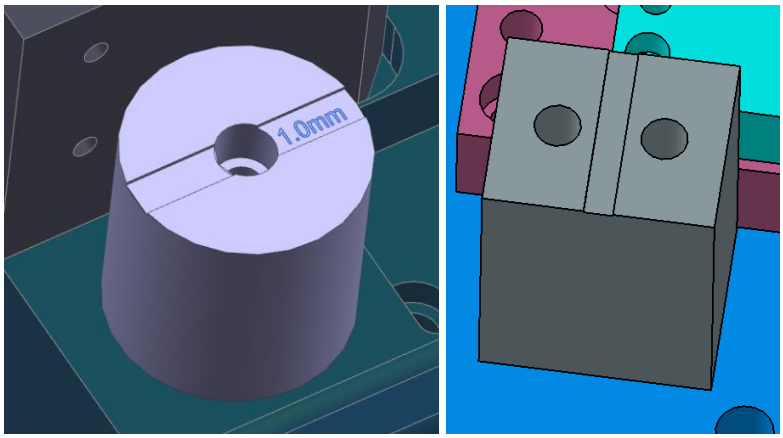


  (No flat or low head allowed under any circumstances)

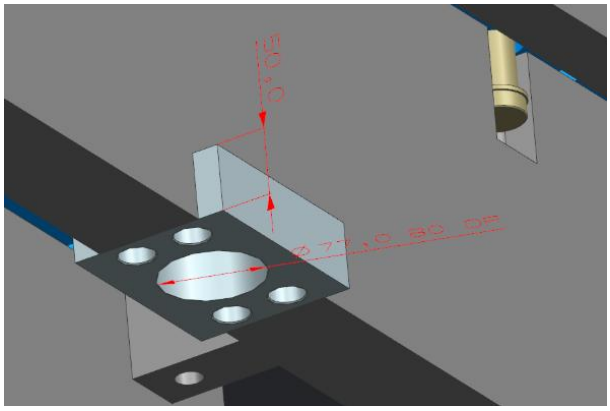
- Upper/Lower Parallel Bars must be Bolted using M16 Minimum.
- All inserts need to have enough lifting holes.
- All inserts have to be Identifying with Material Type, Detail Number, die number.
- All pocketed steels or doweled steels must have lifting holes.
- If lifting bars are required, they must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

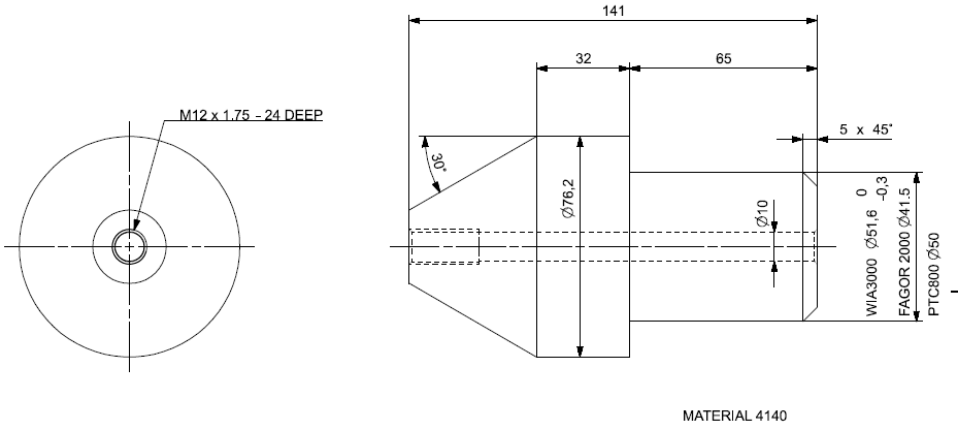


- Limit blocks must have **1mm lead check** for adjust and **bolted with M12,** and have to be placed over parallels.

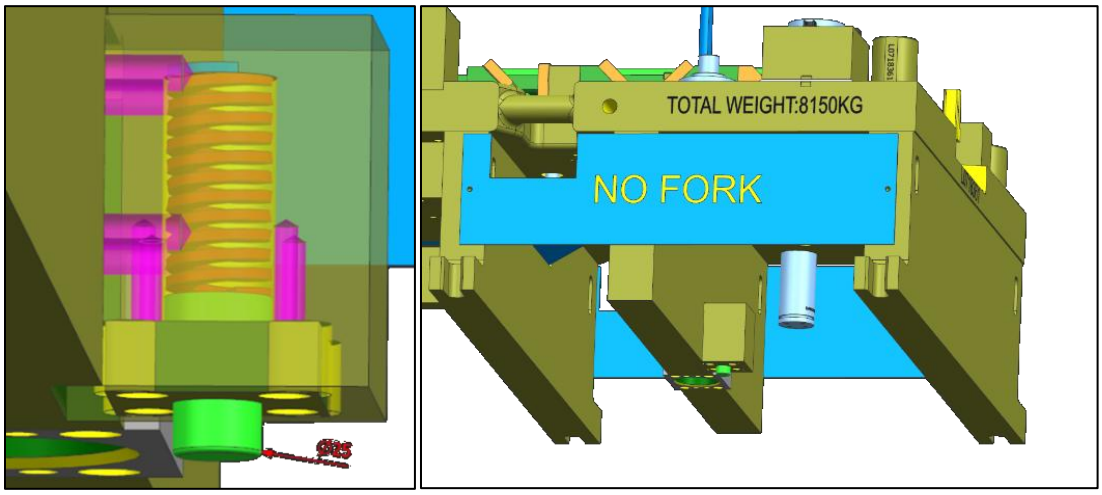


- For die location on the Bolster, MatcorMatsu will provide location system information according to the press.
  Example for moving bolster with pin locators below:



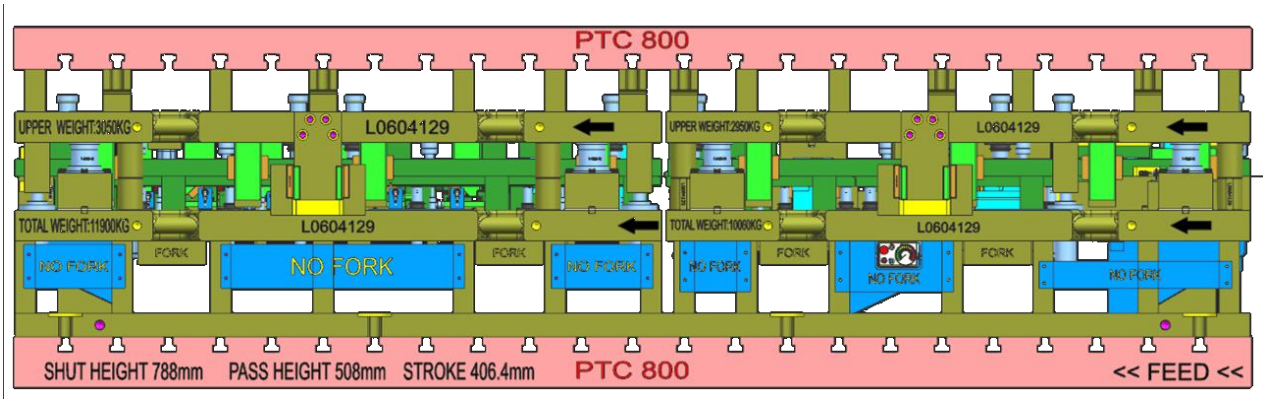


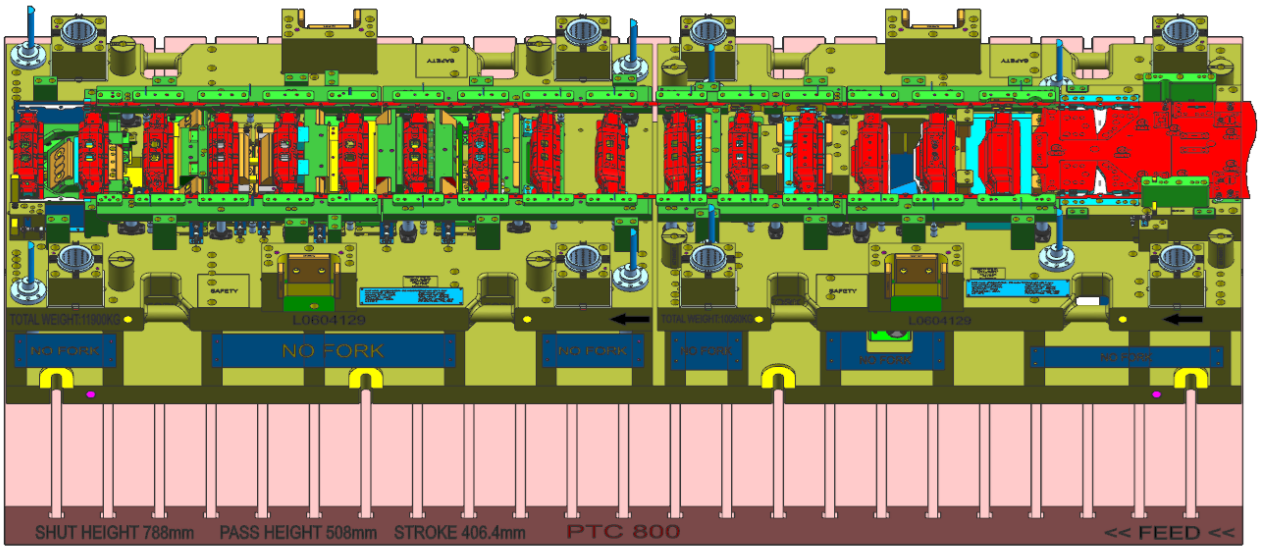
Example for fixed bolster below:



- 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.

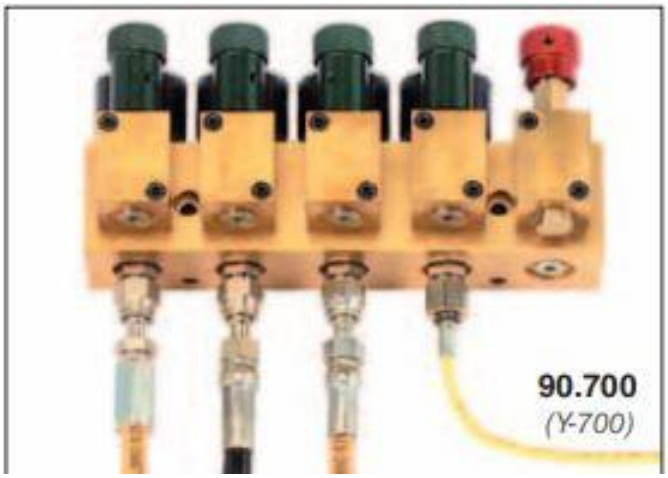
- **Die size:** dies longer than 3000mm, need to be separated, unless agreed by MatcorMatsu Tooling Engineer.





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

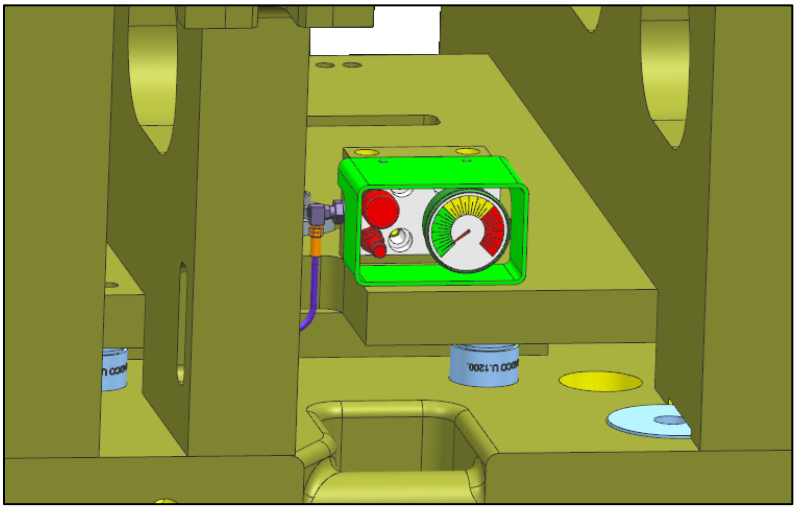
- Use control panel with 6.0 mm quick disconnect fitting. Place it in front and back of tool and use Y-700 Hose only.



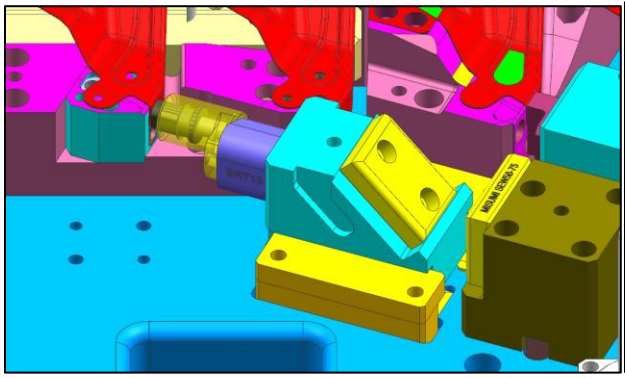
MINIFLEX®
90.700 *(Y-700)* **Hose**
+ Offers the smallest possible bend radius available for flexible hose
+ Compatible with mini-fittings for the *MINILink®* System and DADCO Zip-fittings.
– Only permanent crimped adapters available
– Cannot be linked with a surge tank

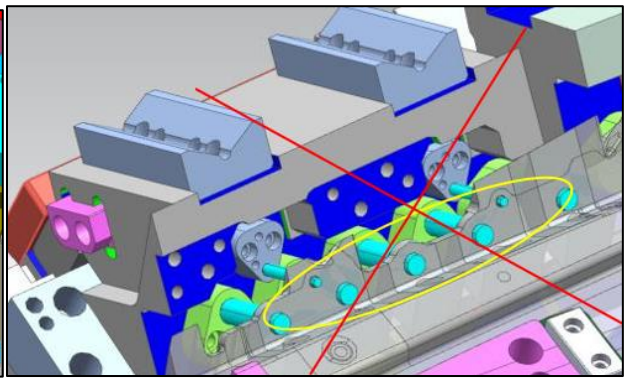
- For transfer dies All Shut Heights tolerances of die sets have to be common +/- 0.5 mm. (T)
  For **Die Set Location** 2 pin locators **per station are needed**;
  1 to the front &, 1 more to the rear of die.

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



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



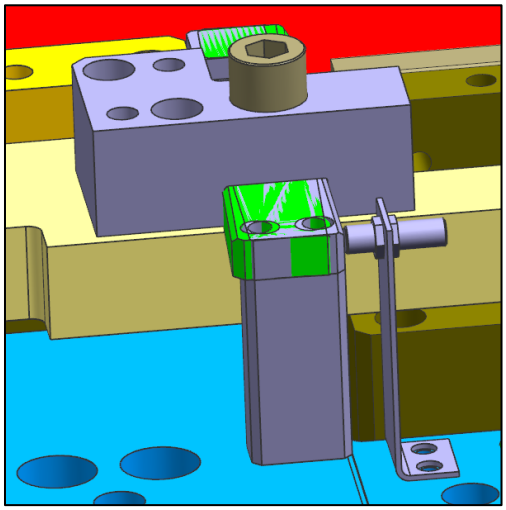


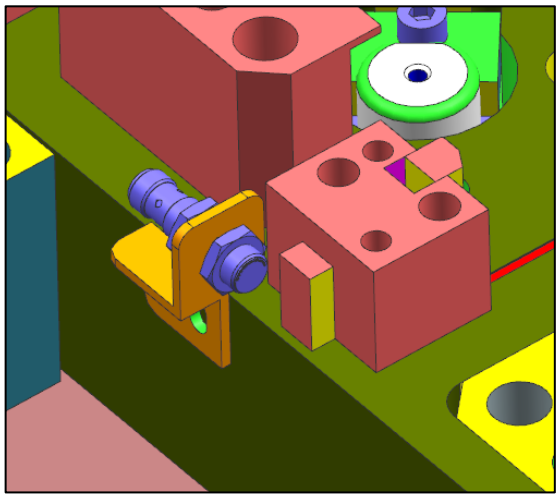
- For material thicker than 2.5mm Nitro Strip can be used according to tooling engineer requirement.



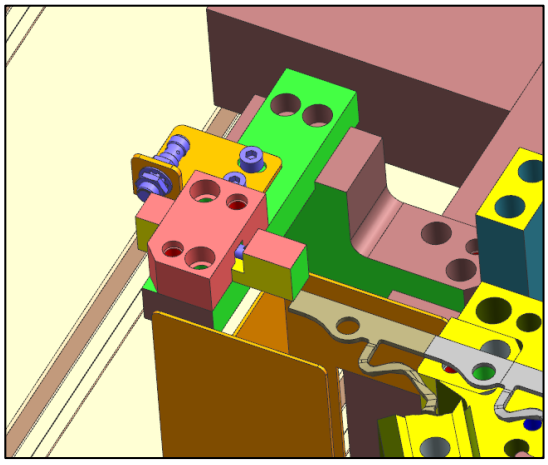
LOWER DIE

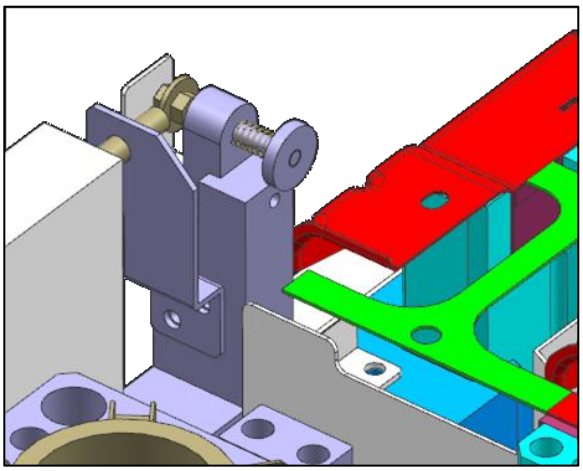
- Add sensor and finger according to the process.





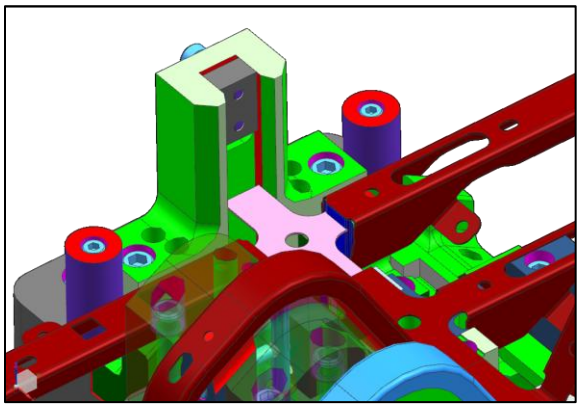
- For lateral carrier use this type of sensor fingers.



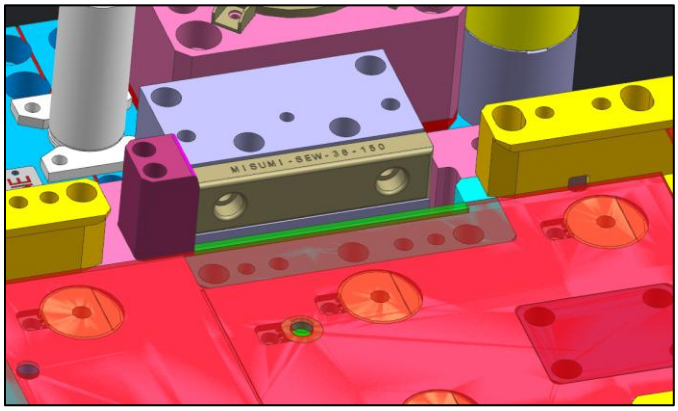


- Add sensor covers and pipes to protect the sensor cables

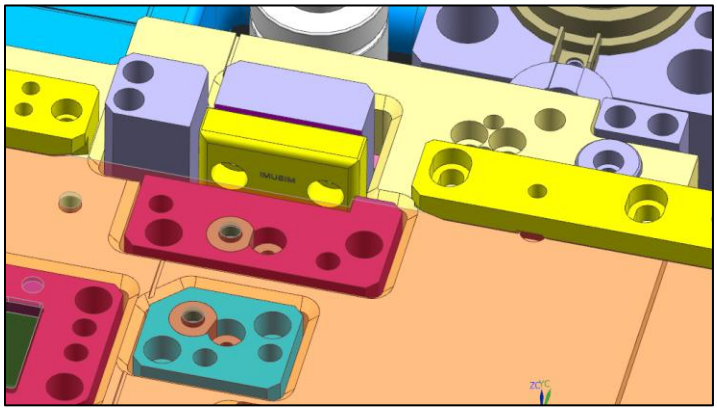
- For center carrier use this type of sensor finger with “V” guide block.



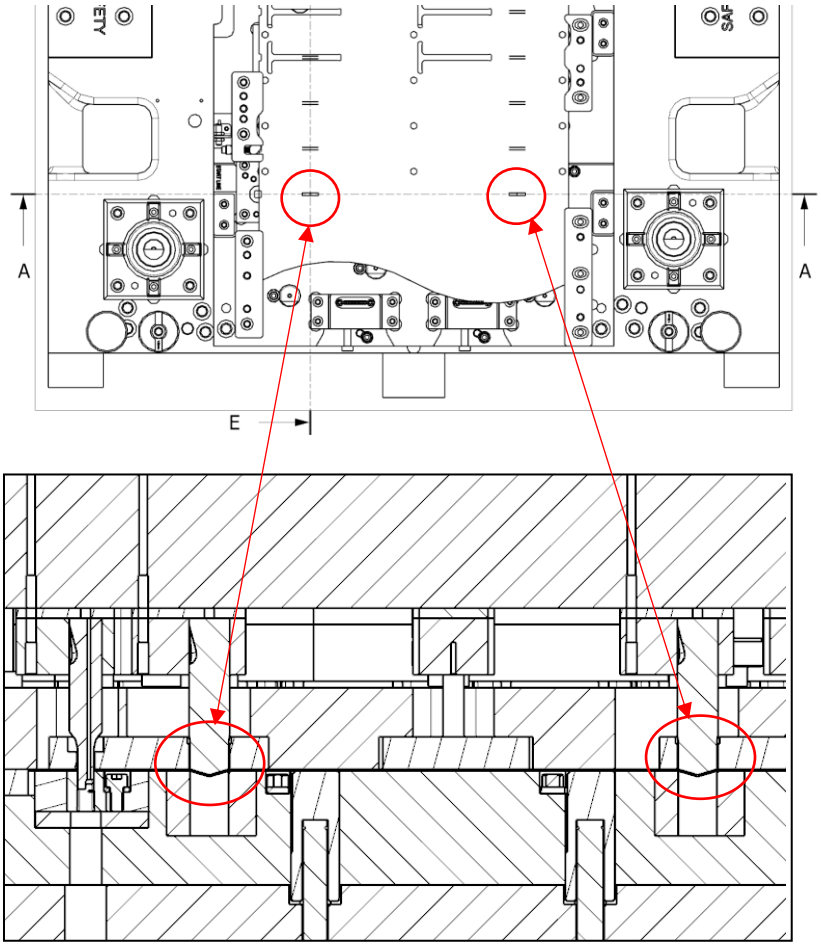
- Progressive dies require at least one solid stop block at the rear of the Die (to avoid over-progression).

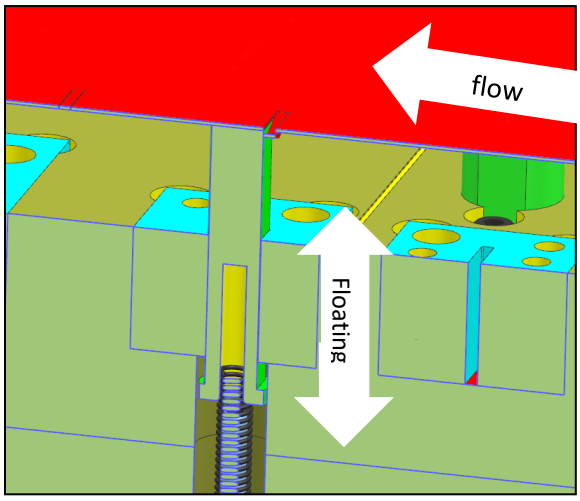


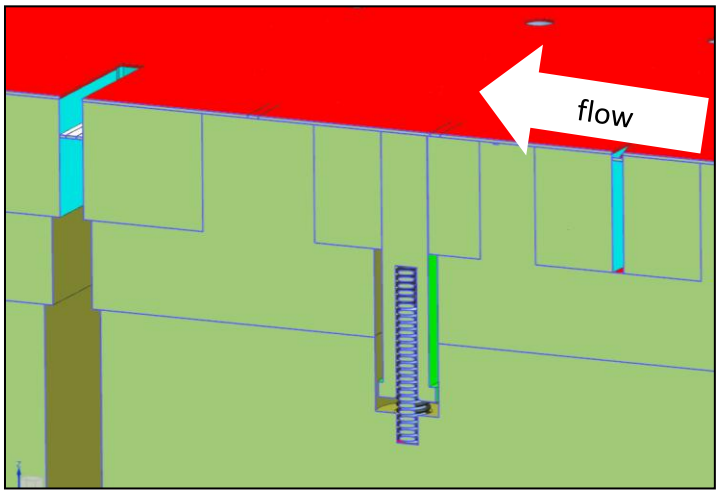
- If a single plate is used as lifter, stop block must be pocketed in die shoe never on the lifter.



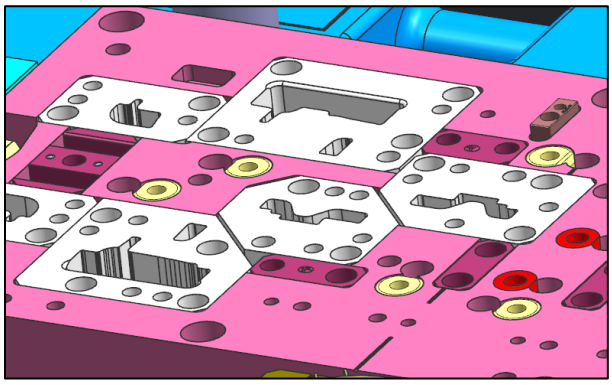
- Use FADE AWAY STOP when French stop is not feasible, as shown below.



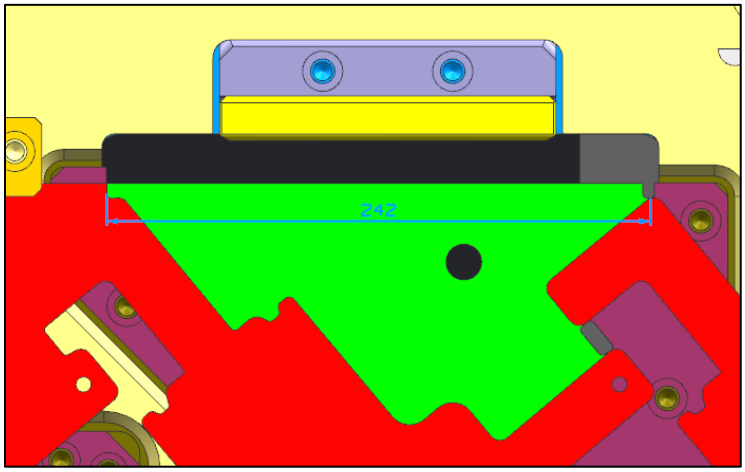




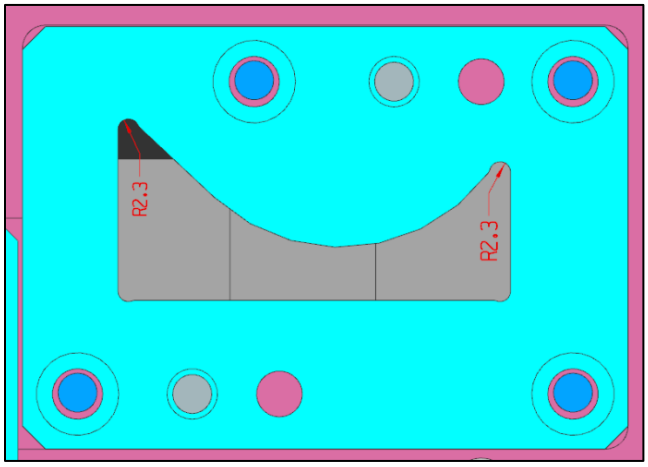
- Lower trim steels must be inserted in pocket.



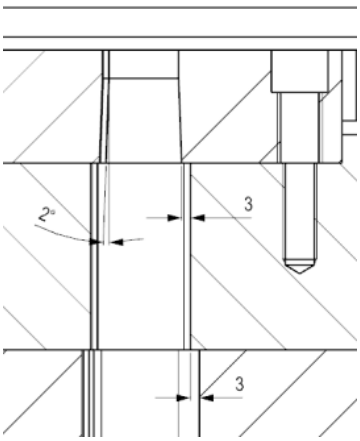
- Maximum Scrap length must be 300.0 mm.(T)



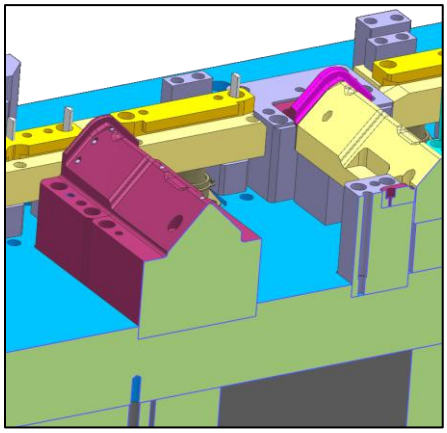
- For blades “Inner Sharp Corners are not allowed” use at least 2.0mm Radius.



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



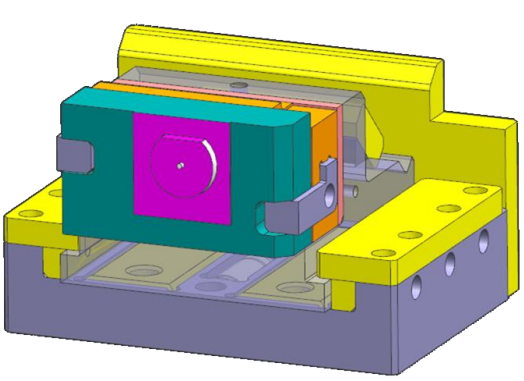
- Forming steels must be pocketed.

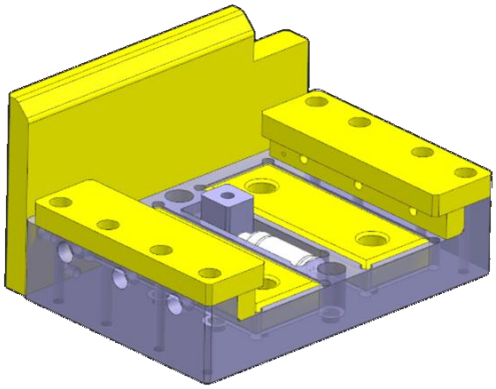


- Bottoming Marks to be installed in all draw & restrike section (argon brand) (Transfer Dies Only).

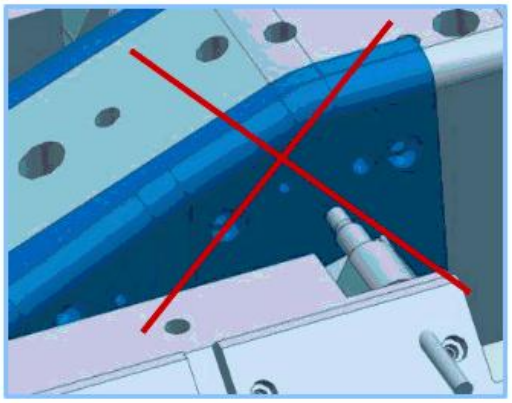


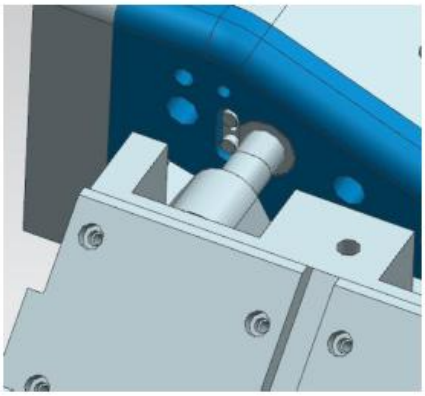
- All cam slide design must be adjustable for easy maintenance.



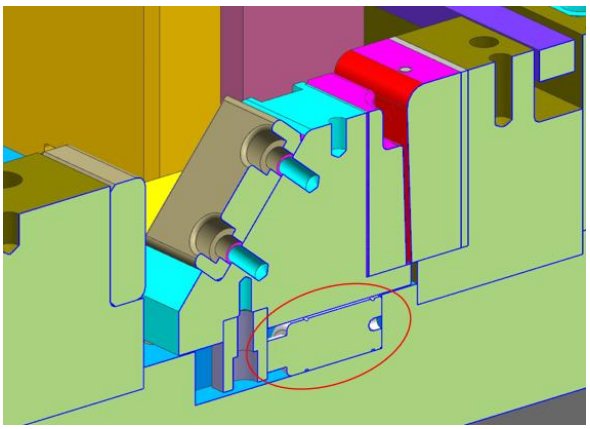


- If cam trim and piercing are made together, use standard button dies whenever is possible for easy maintenance.

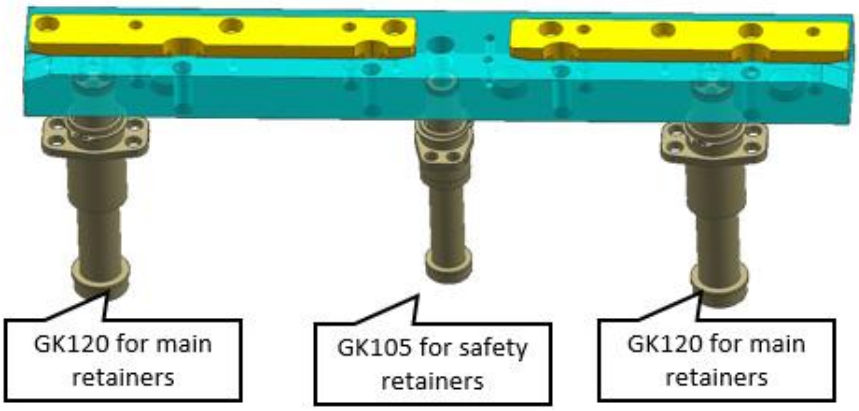




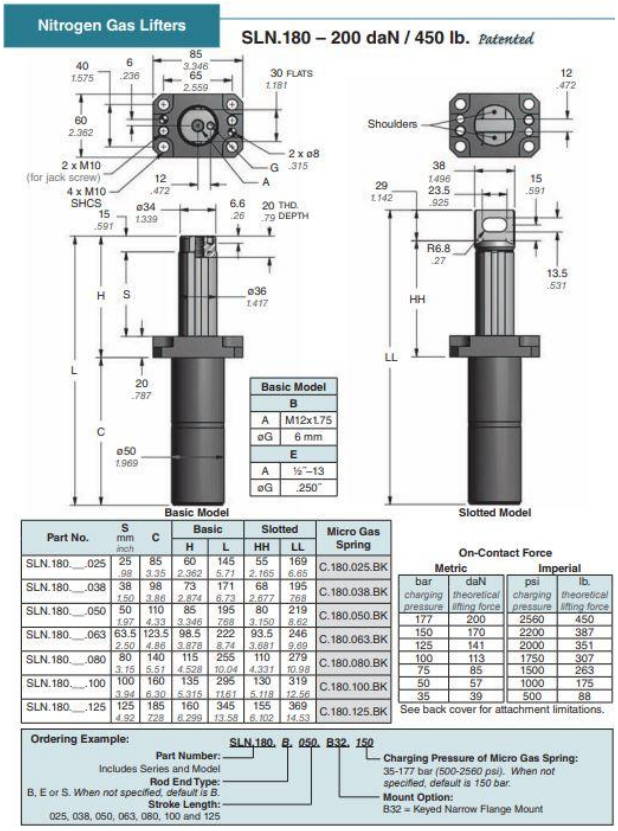
- Coil springs are not acceptable in any CAMs, nitro gas springs must be used.



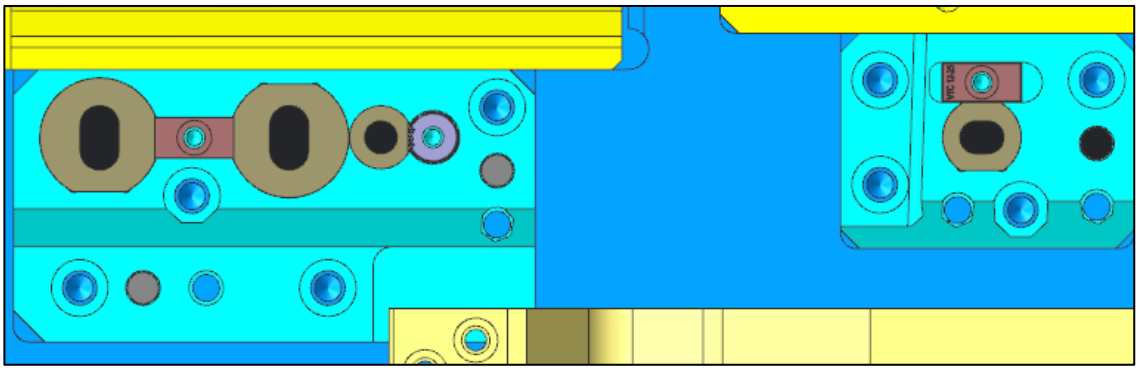
- For lifter bars use standard lifter as shown below. Guide bushing and pin can also be used.



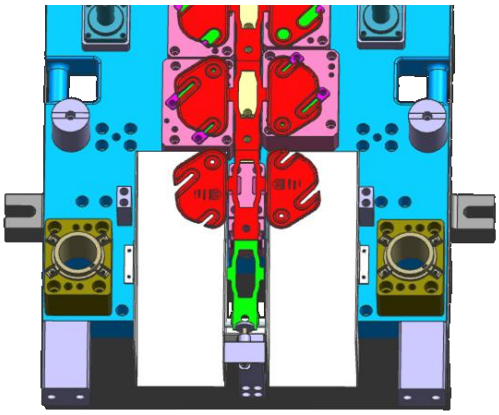
- DADCO brand can also be used for lifter bars.

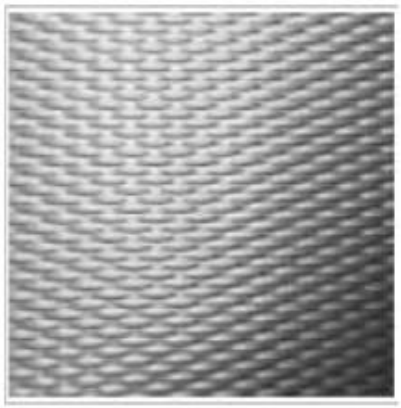


- For non-round holes (slot holes, square holes, etc..) use a flat face as error proof as show below.

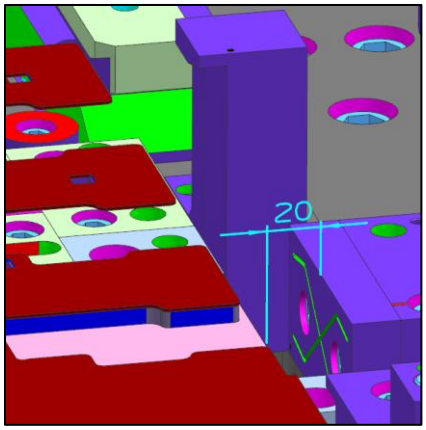


- Part chute thickness must be 3.0mm, also bubble sheet is required.

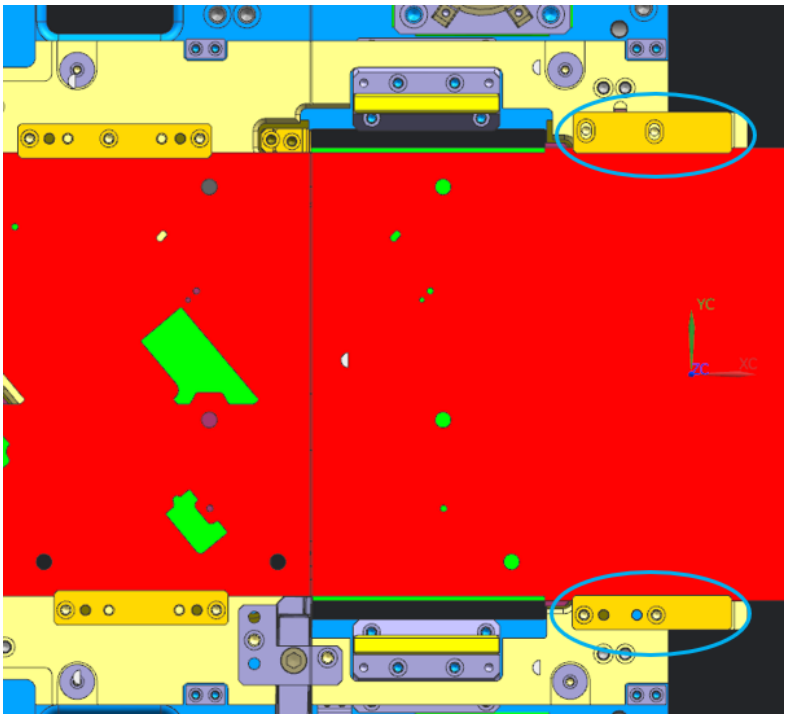




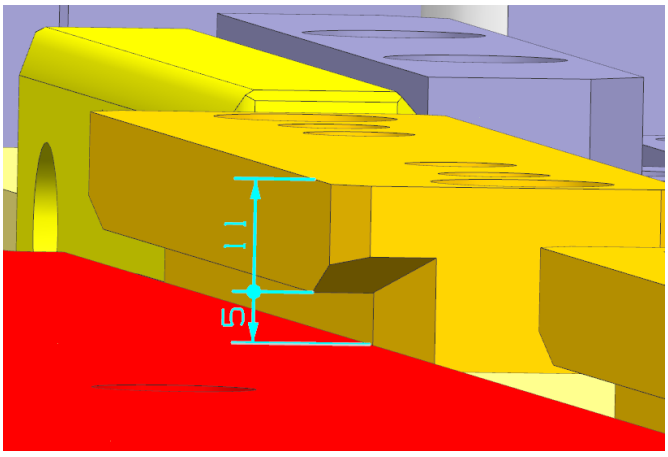
- Progressive and blank dies must be ready to run when coils arrived wider, consider (on trim just before French or solid stop) 20mm between original coil width edge and backing plate as show below.



- **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.



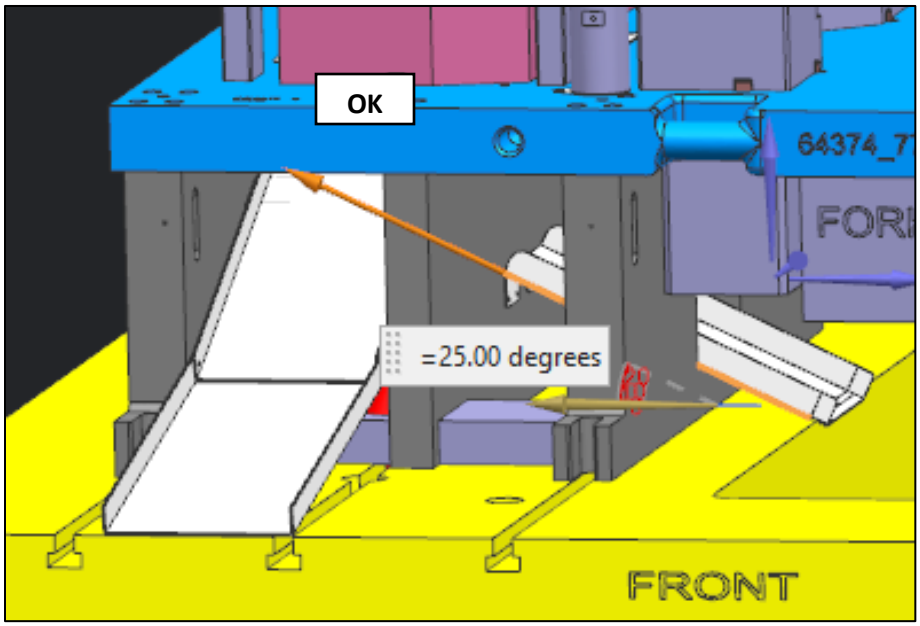
- Dimensions to be use for coil guides.

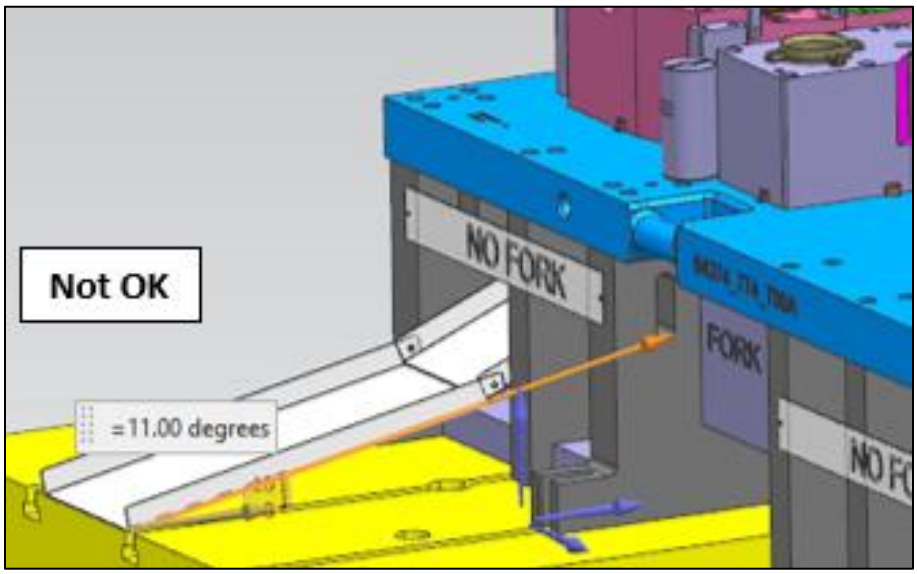


- **All the Scrap Chutes** must be strong enough 3.0mm thickness and need to be Bolted to the Parallel Bars
- Scrap to be directed to center bolster holes when available.

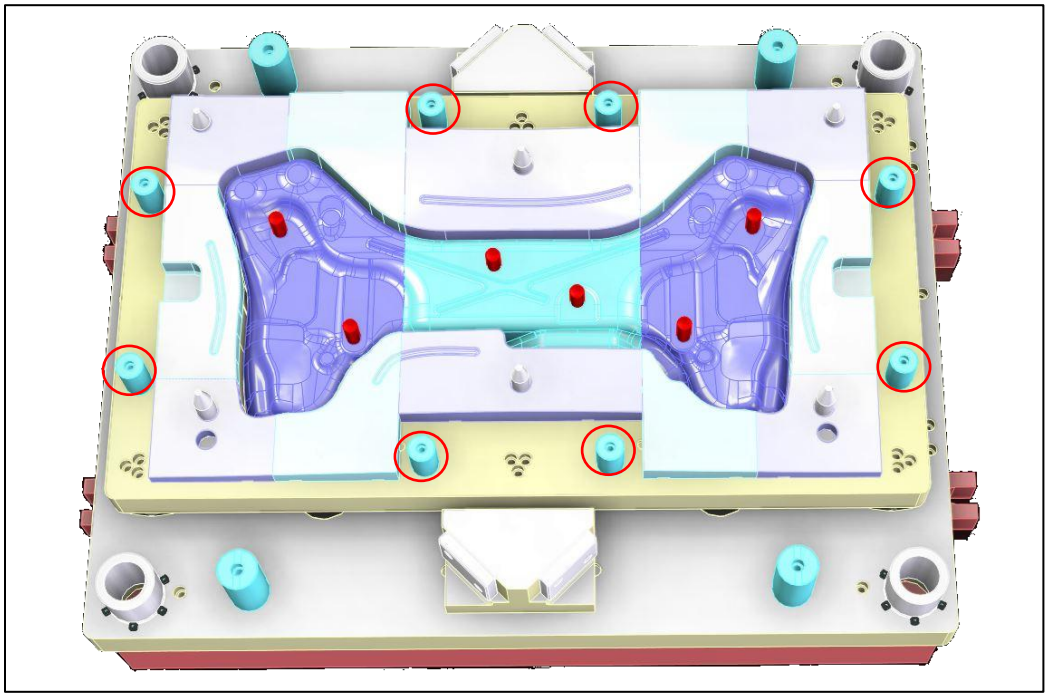
- Minimum angle accepted in scrap chutes is 25°.

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





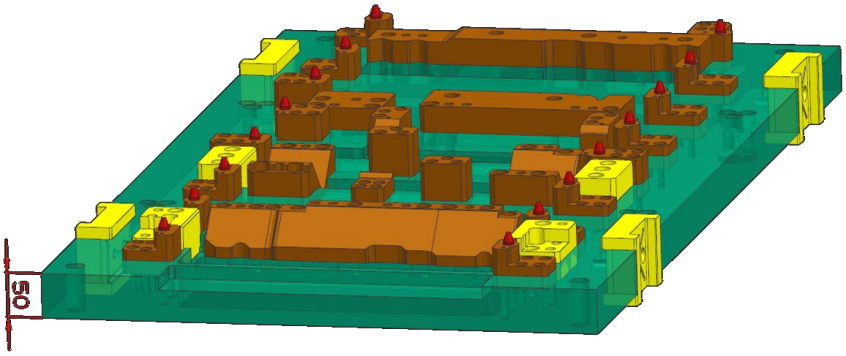
- All the Blank Holder must have equalizer Blocks.



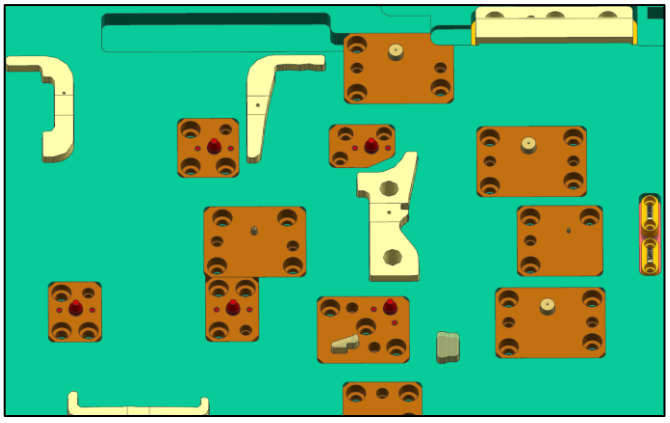
- In Transfer Die, Blank Holder must be Coated with **DUPLEX VARIANTIC,** any alternative coating must be approved by Project Tooling Engineer

UPPER DIE

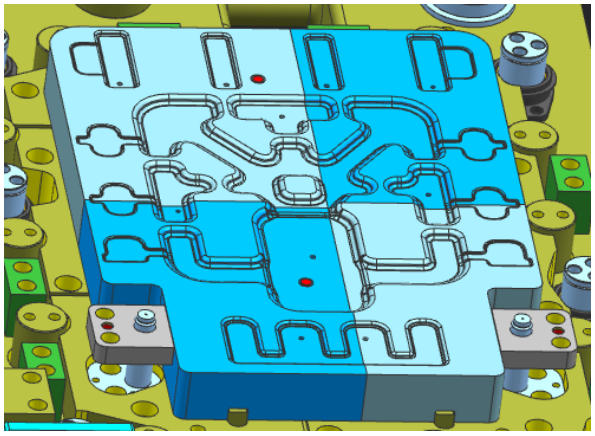
- Use at least 50mm thickness for stripper pads.



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

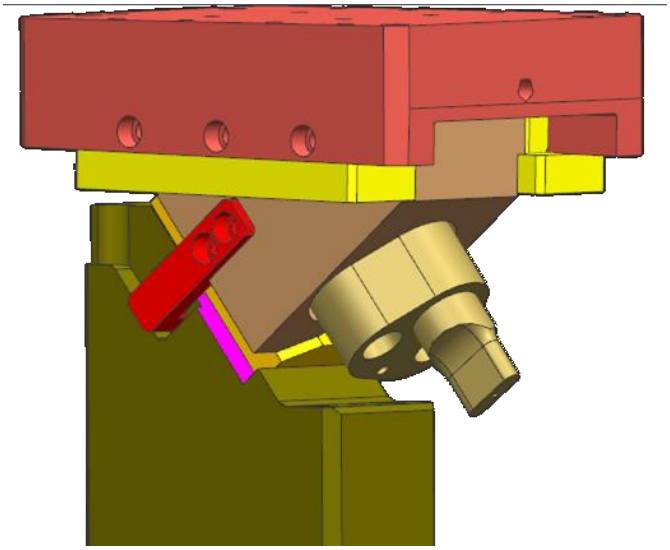


- All the Forming steels bigger than 300mm Should be split in parts for easy maintenance.

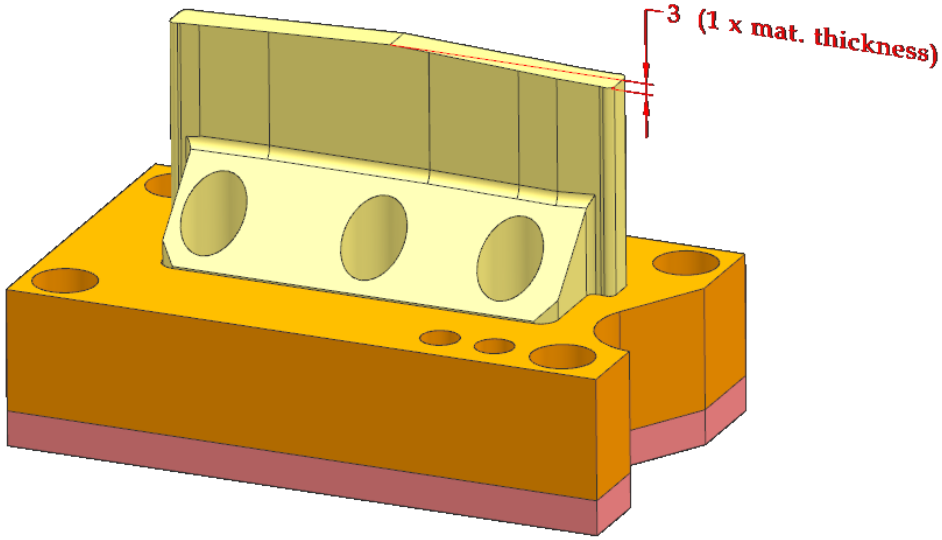


- **Lifting holes** for stripper pads and big components must be no smaller than M16.

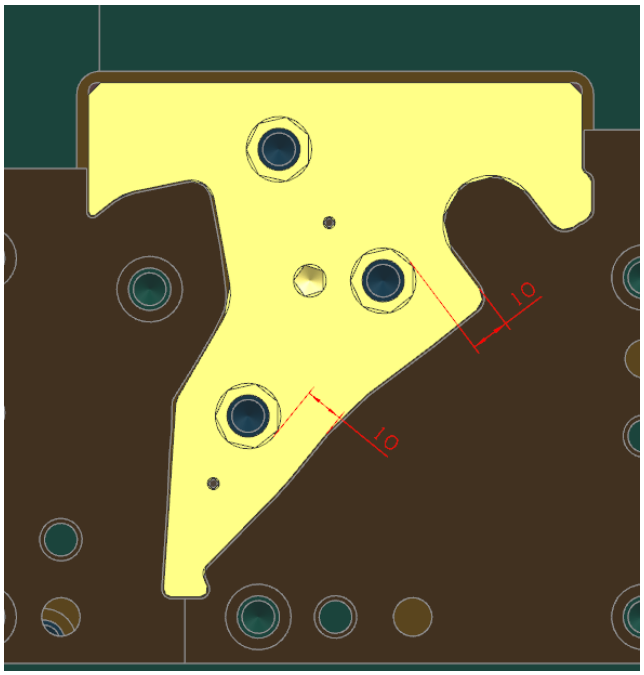
- Cam slides must have 2 positive pullbacks or Return Guides. Two bolts required for each one.



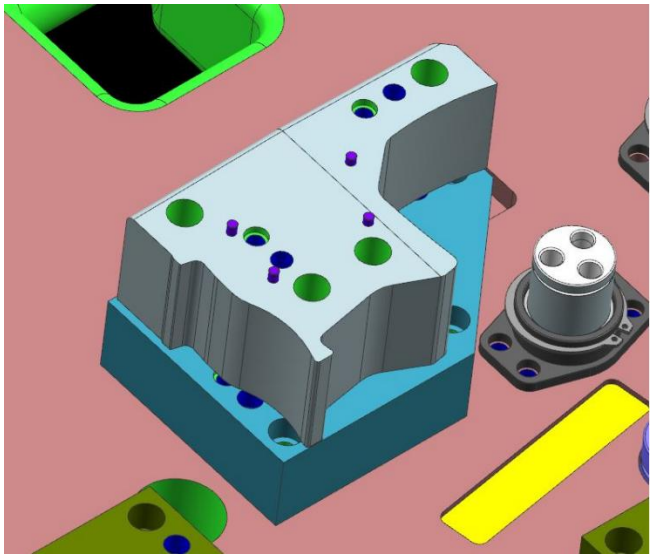
- Trim punches must be sharpened with scissors angle 1 material thickness height.



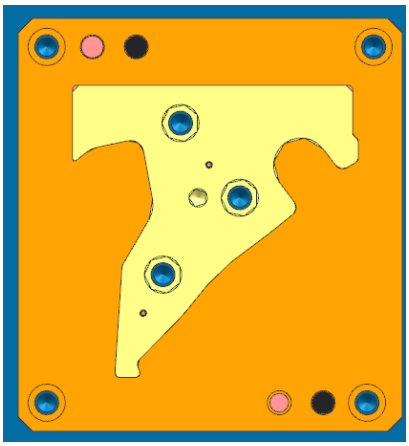
- Minimum distance allowed from trim edge to holes must be 10mm



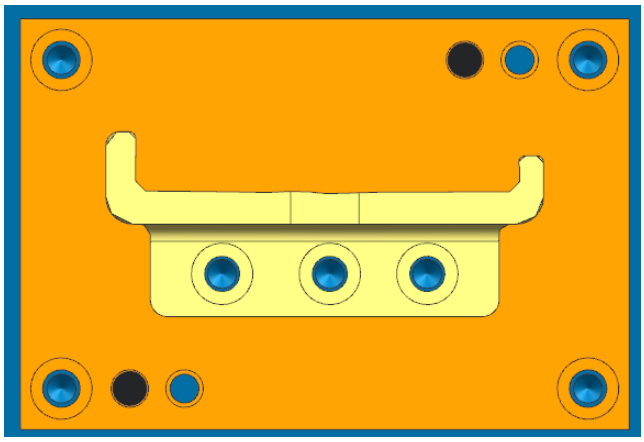
- All the Big and tall punches must be mounted on a base plate.



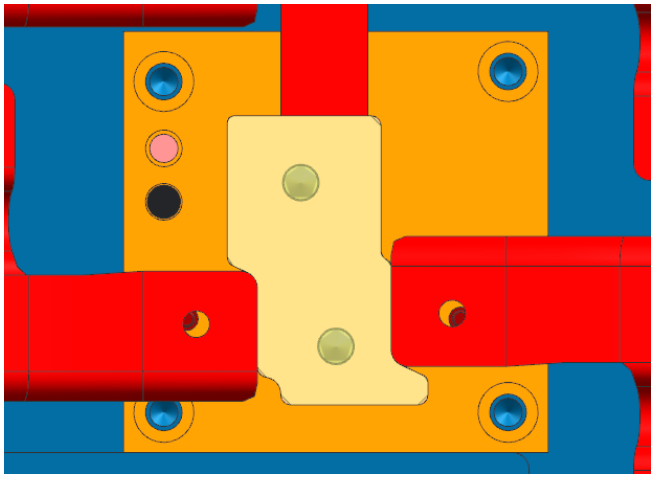
- Type of trim punches allowed.



Screw from top



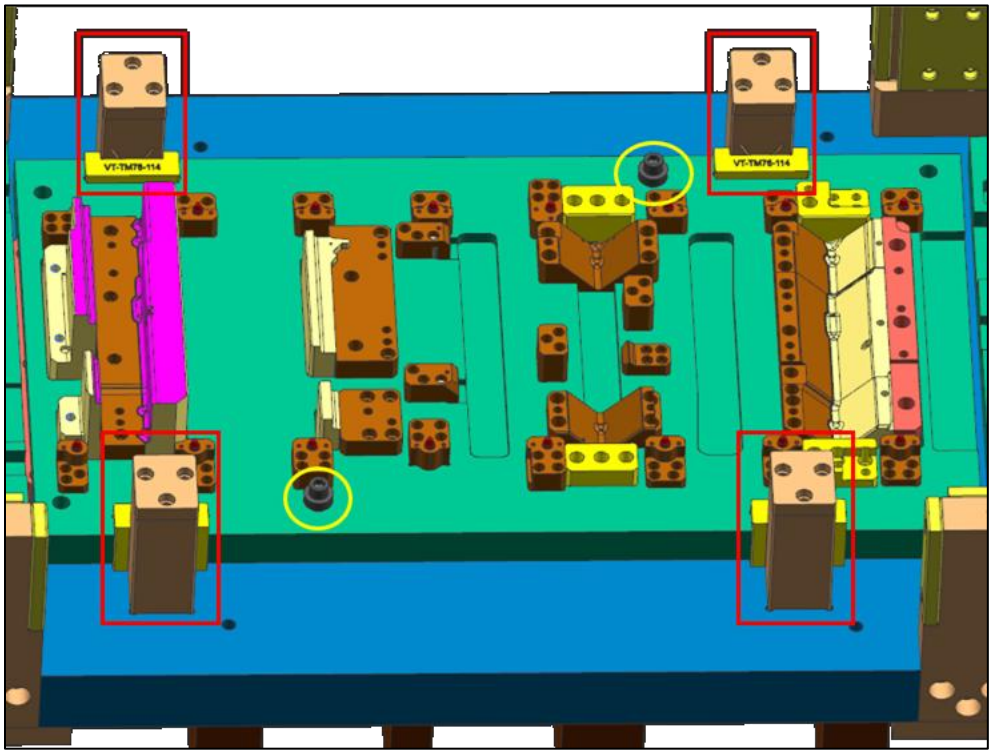
Screw from shank

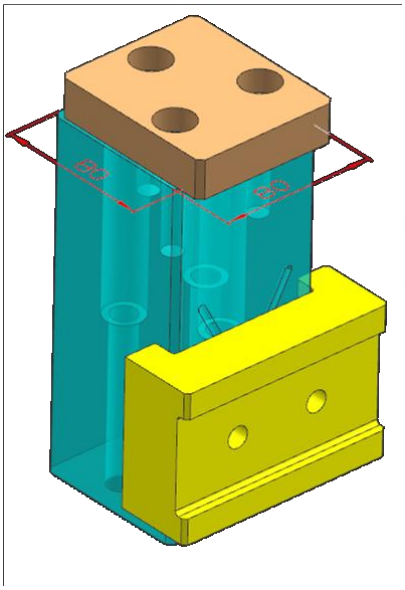


Screw from bottom

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

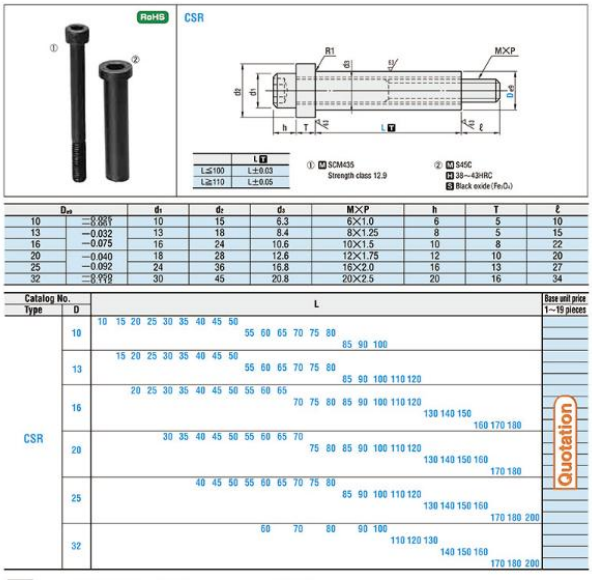
- Use guide blocks on stripper pads and 2 safety spool retainers when forming with pad.





SPOOL RETAINERS

RoHS CSR



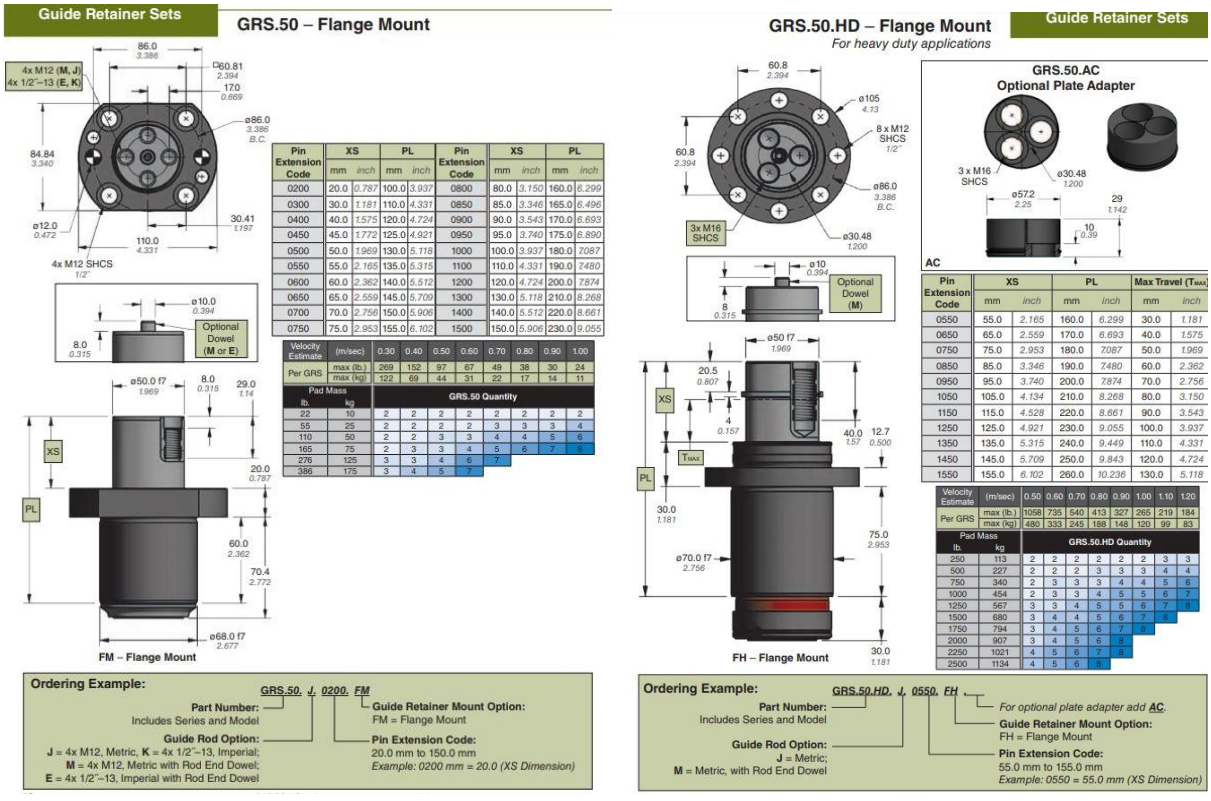
Catalog No. Type	D	L	Base unit price 1~19 pieces
CSR	10	10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 100	Quotation
	13	15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 100 110 120	
	16	20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 100 110 120 130 140 150 160 170 180	
	20	30 35 40 45 50 55 60 65 70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

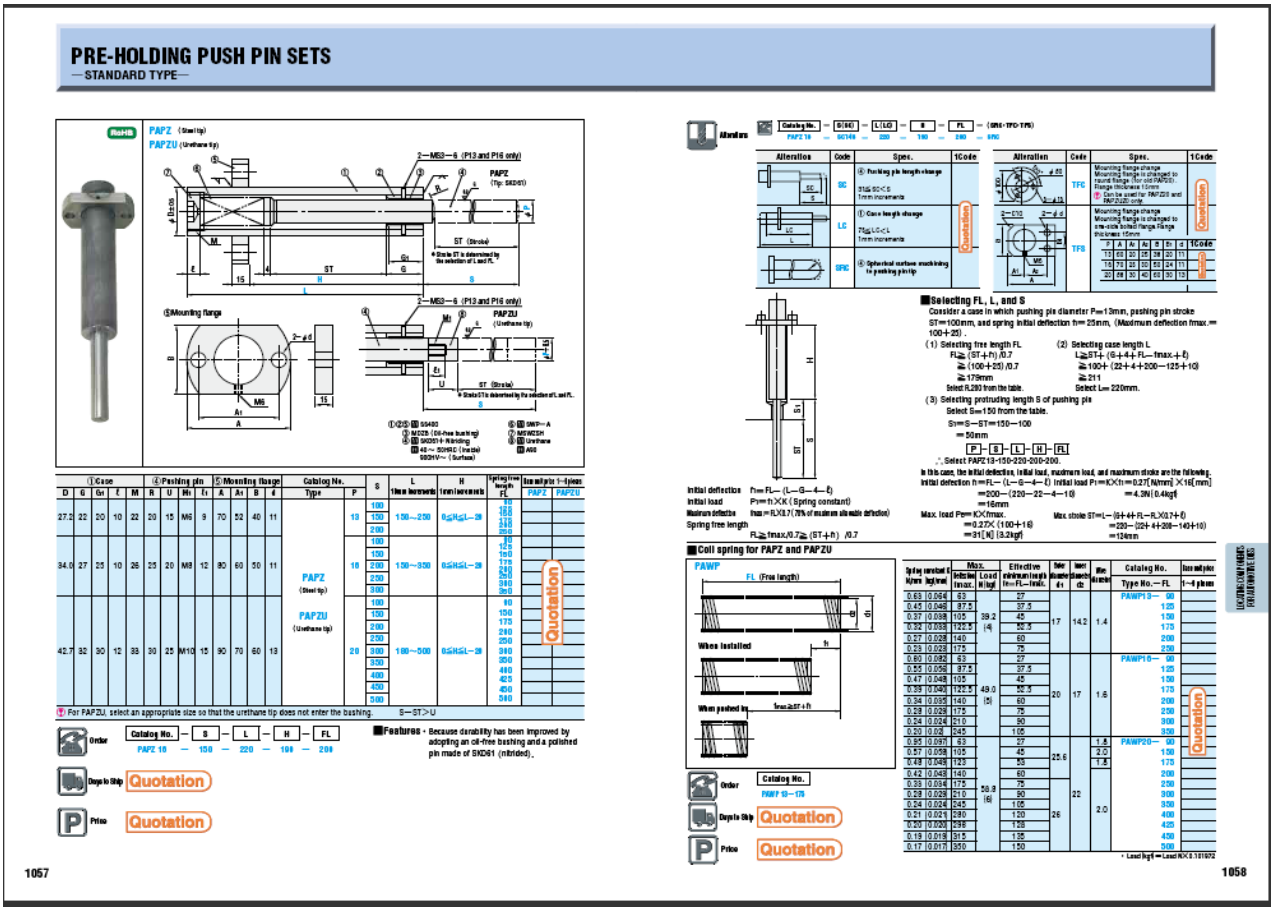
- Standard lifters GK180 or bigger can be use. Guide pin and bushing can also be used.

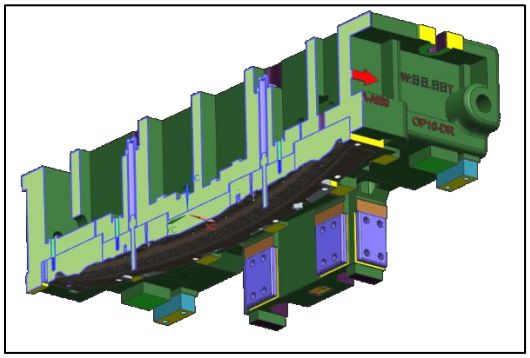


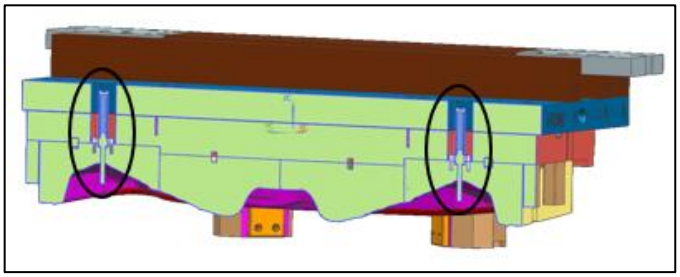
- For DADCO brand GRS.50 (light duty) and GRS.50HD (heavy duty) can be used.



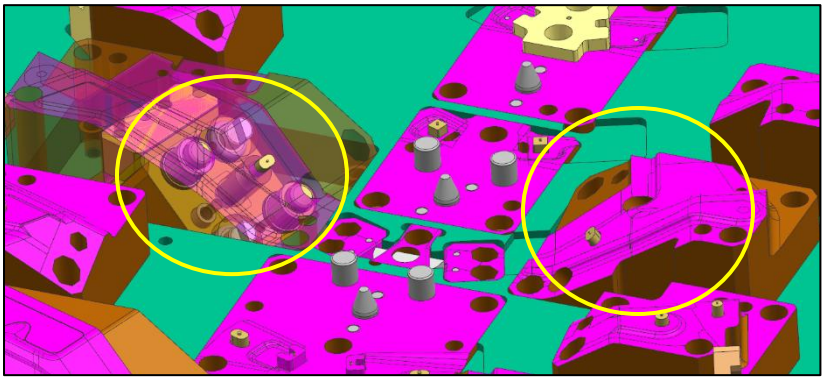
- Transfer dies use **2 Pre-Holding Push Pin** on each station. (Provided by Tool shop.)

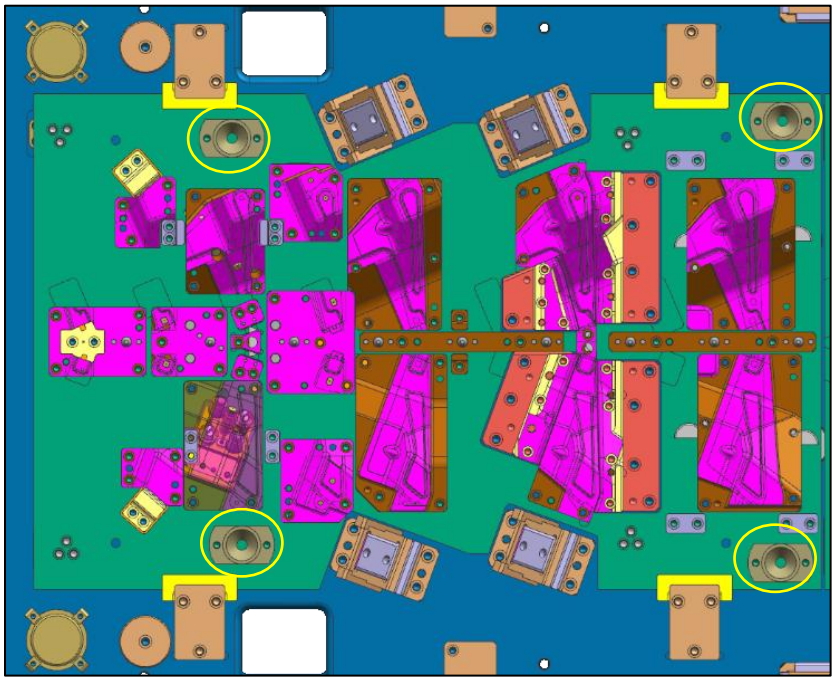




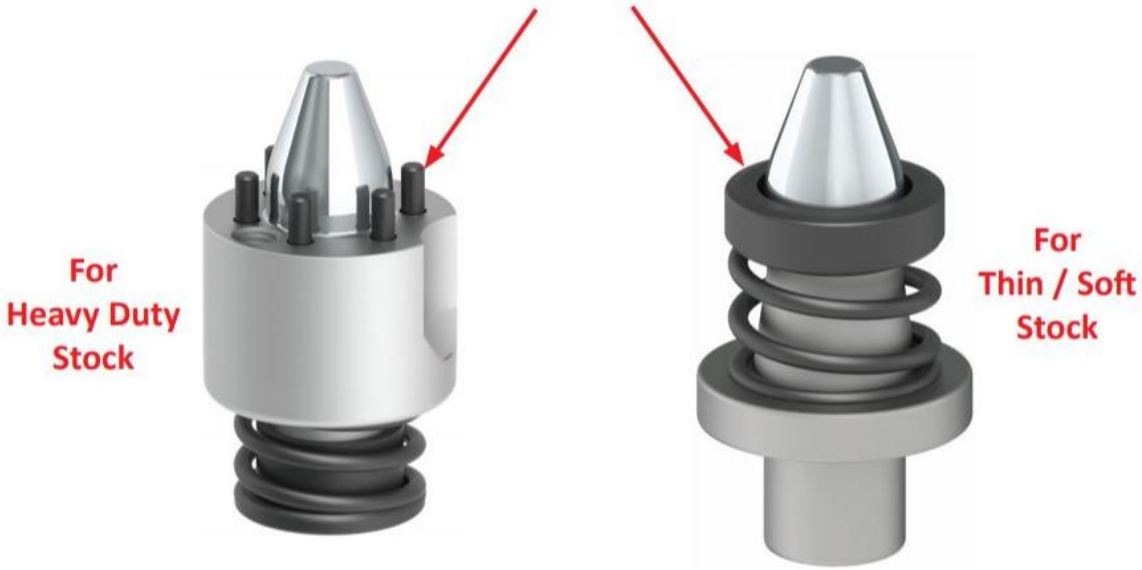


- If aerial cam mounted on stripper pad is needed, centering cones must be used.



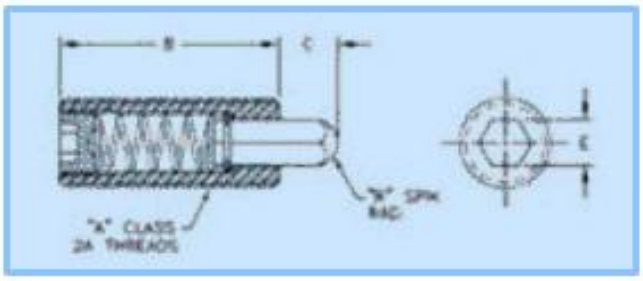


- Ejectors are required for pilot pins. Standard lifter pilot is preferred when there is enough space.

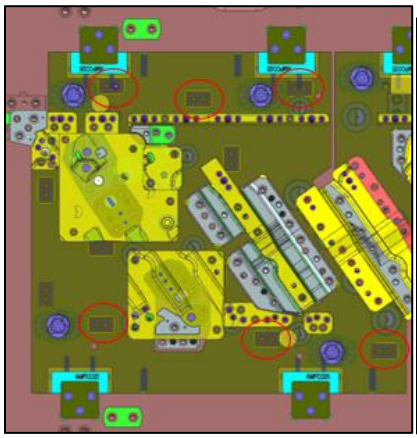
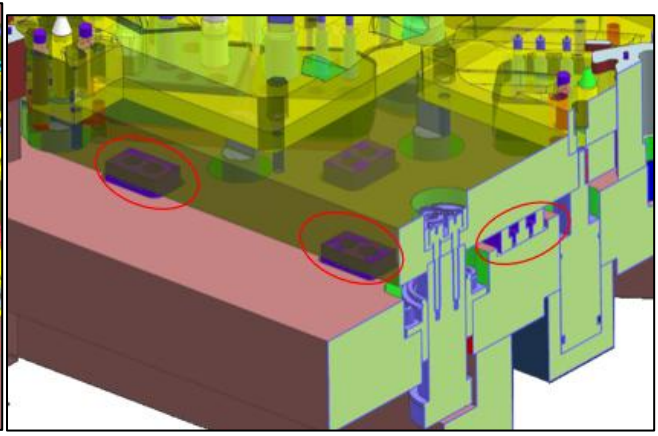


- If Spring plunger is needed (Must be hexagon Tip M10 minimum) Misumi brand.



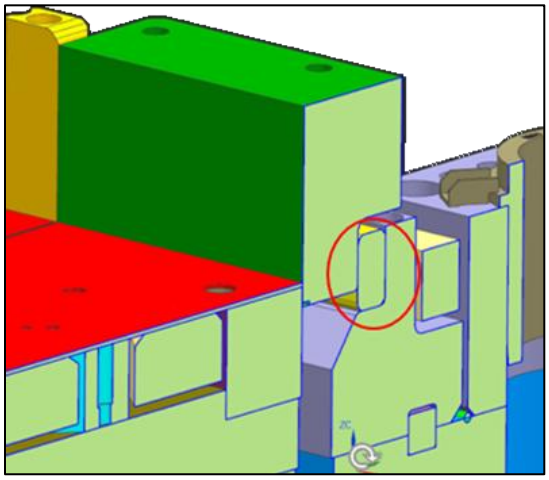
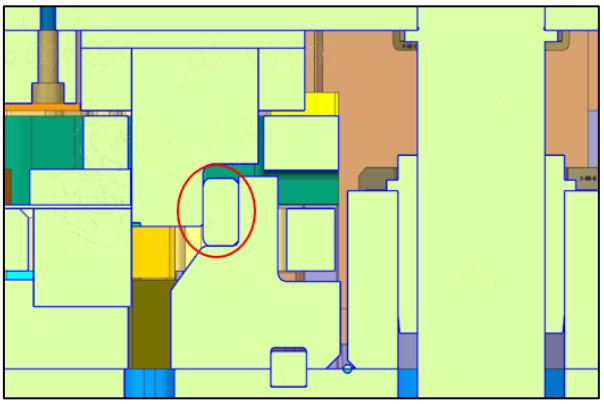


- Stripper pads must be backed up with limit blocks when forming with pad.

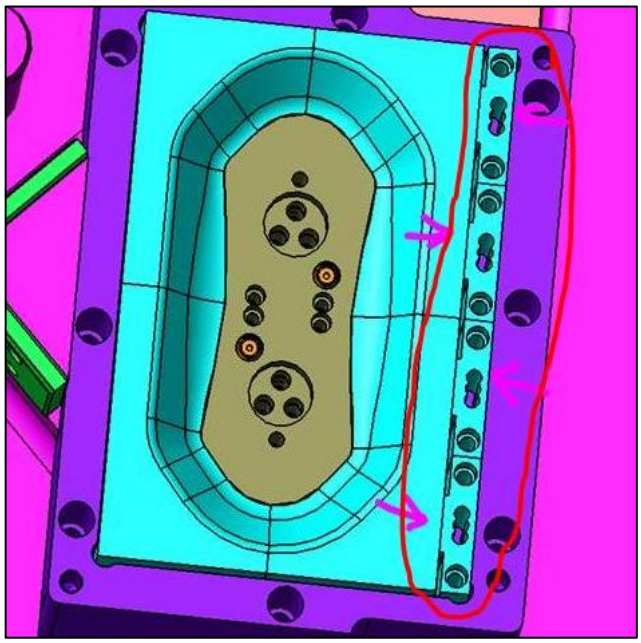



- For load-bearing counterbore, floor thickness needs to be at least 1 times of bolt diameter.

- 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.

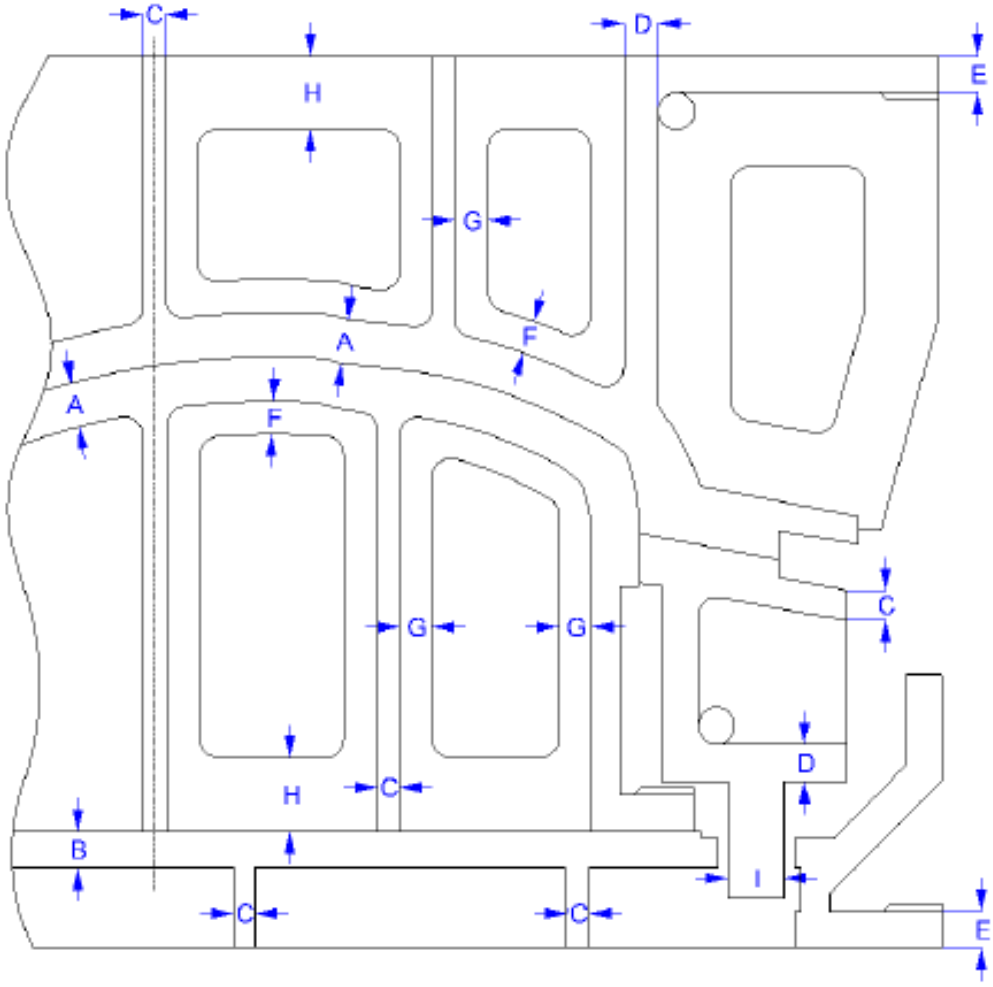
- Buy Off Sample Parts MUST BE at 100% vs. Checking Fixture and sit in all nets at Free State Method, before shipping.

- 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.

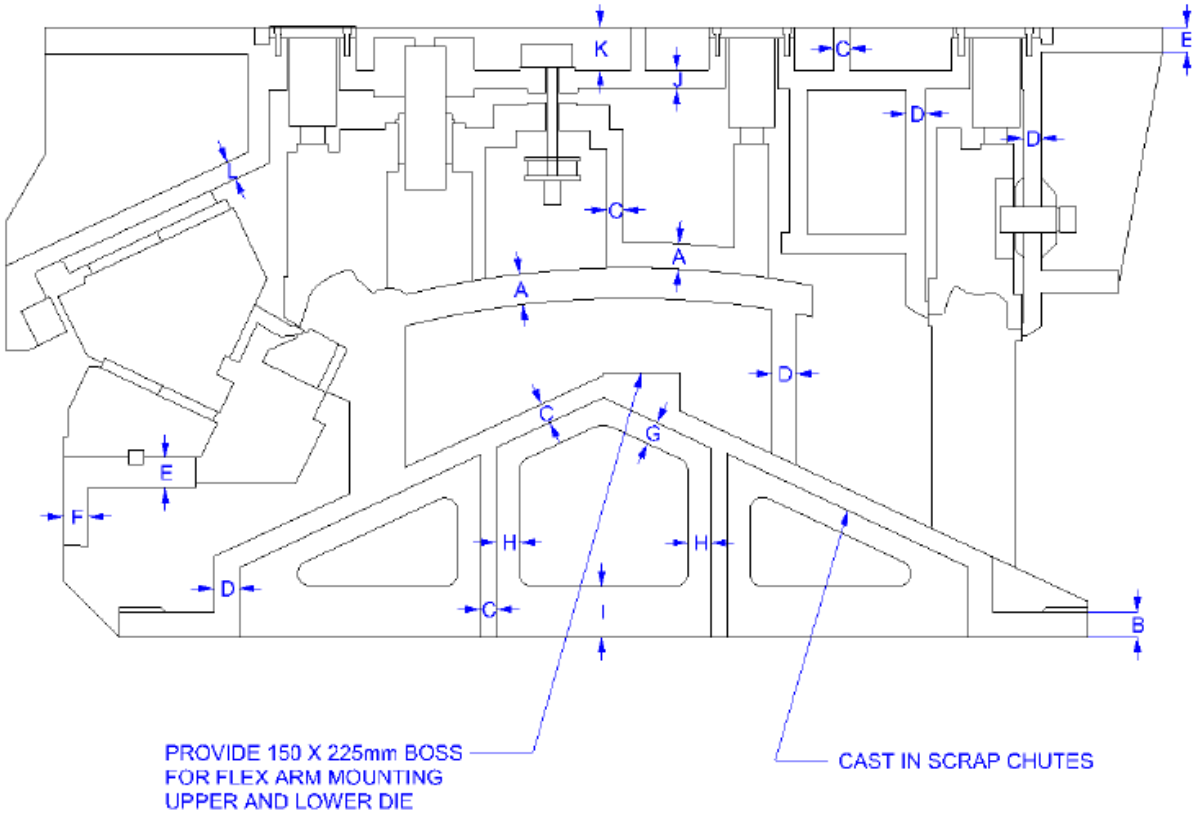
DIE SHOES / RISERS	GM-238
DRAW DIE PUNCHES	GM-190-M,GGG-70L,GM-338
BINDERS	GM-241-M / GM-246-M
FORM AND FLANGE	GM-190-M,GGG-70L,GM-338
PADS-FORM AND FLANGE	GM-238-M, GM-241-M, GM-246-M
PIERCE PUNCHES	M2
BUTTONS	A2
TRIM STEELS	D2
CAM DRIVER	GM-238-M
CAM SILIDE INSERTED	GM-238-M, GM-245-M
CAM SLIDE NON-INSERTED	GM-241-M

- **DRAW DIE CASTING CONSTRUCTION**



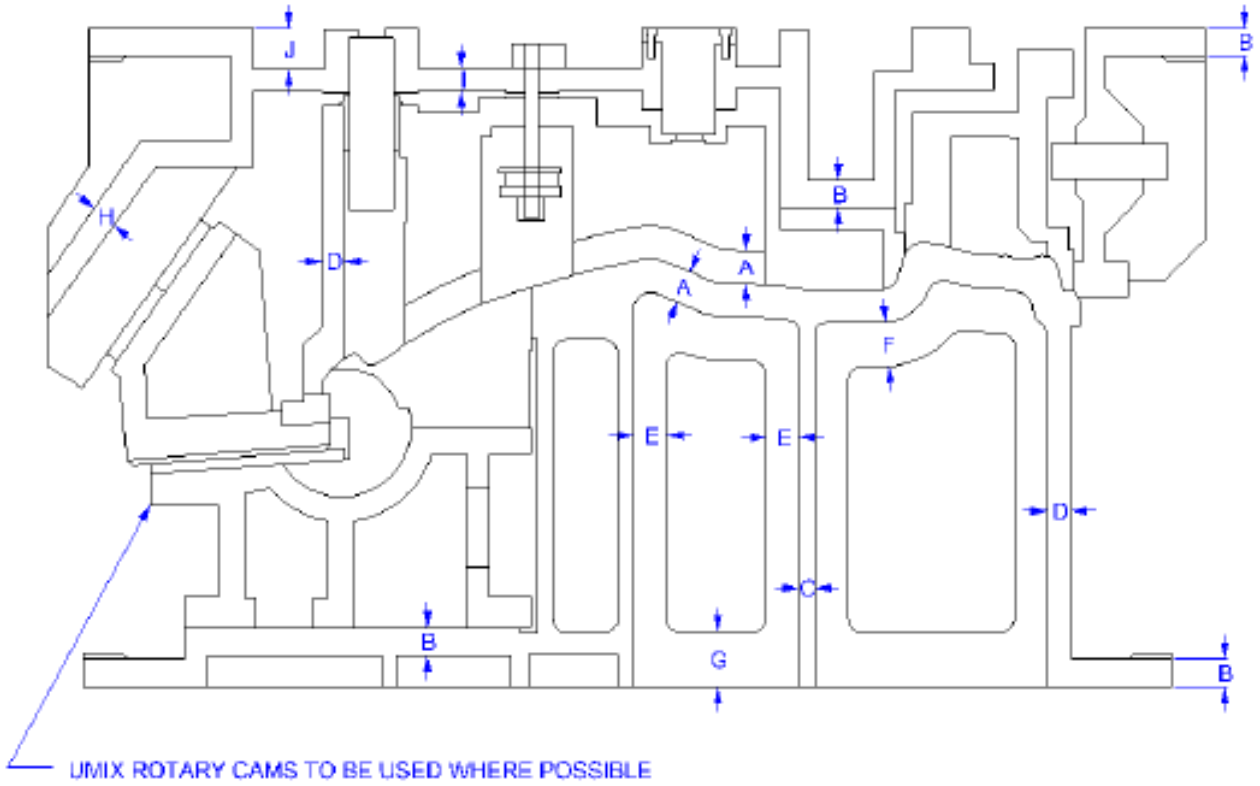
	A	B	C	D	E	F	G	H	I
mm	60	50	30	40	50	80	60	100	80

- **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**

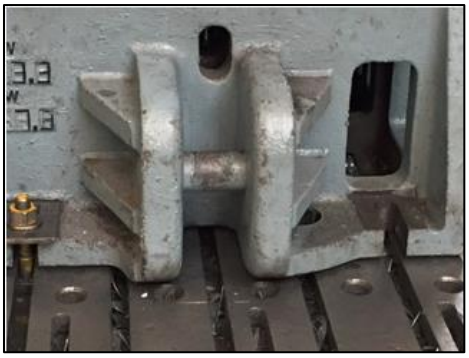


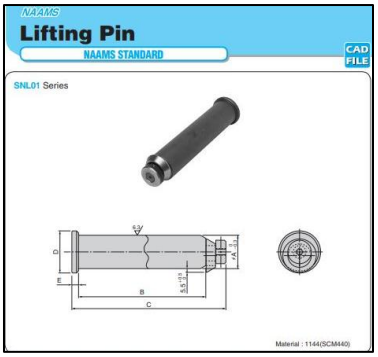
A	B	C	D	E	F	G	H	I	J
60	50	30	40	60	80	100	40	40	20

- **Lifting**

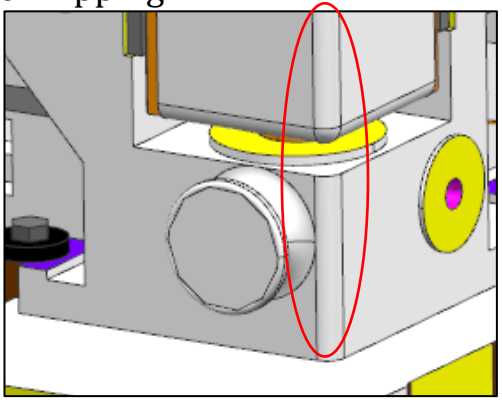
Tooling engineer will advise if the die use lift lugs with pin or lifting knobs.

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



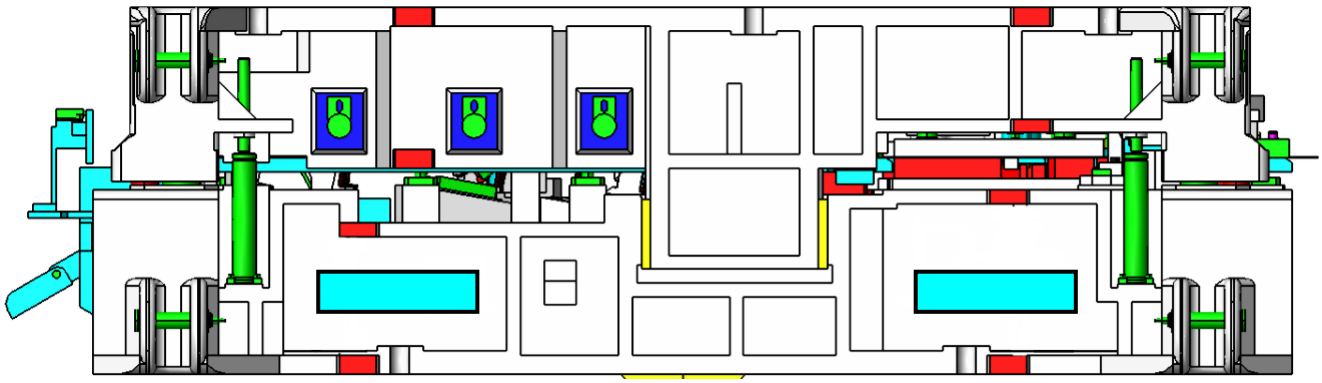


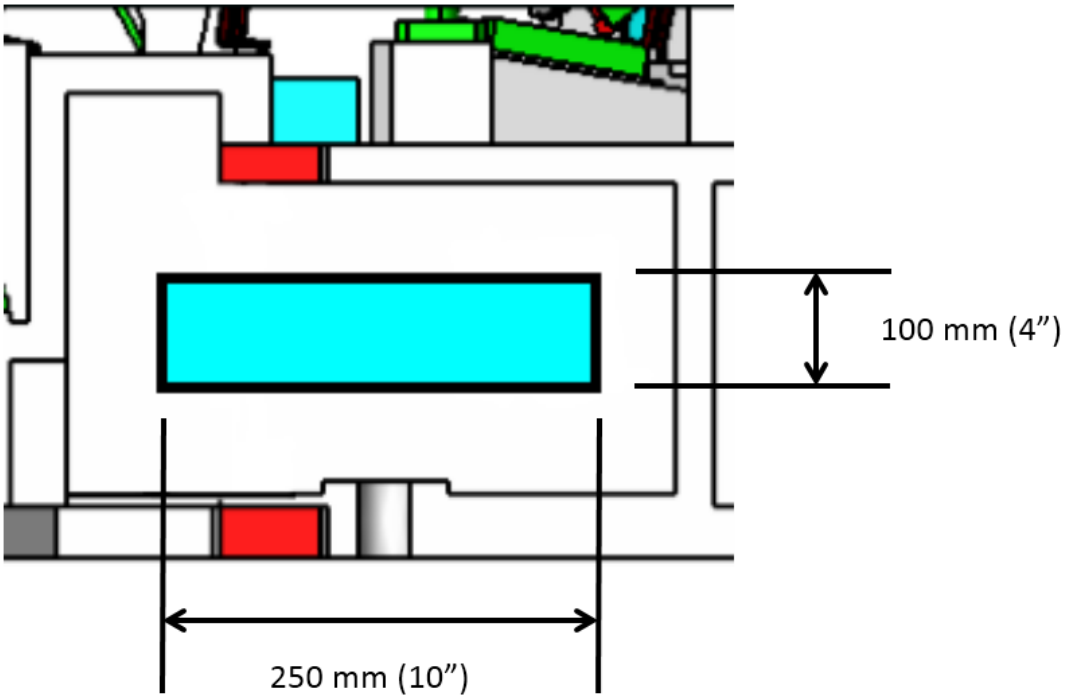
- Add a radius at edge where the Chain or cable is in contact when lifting or flipping.





- 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.
PHD brand grippers to be used to check clearance.

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

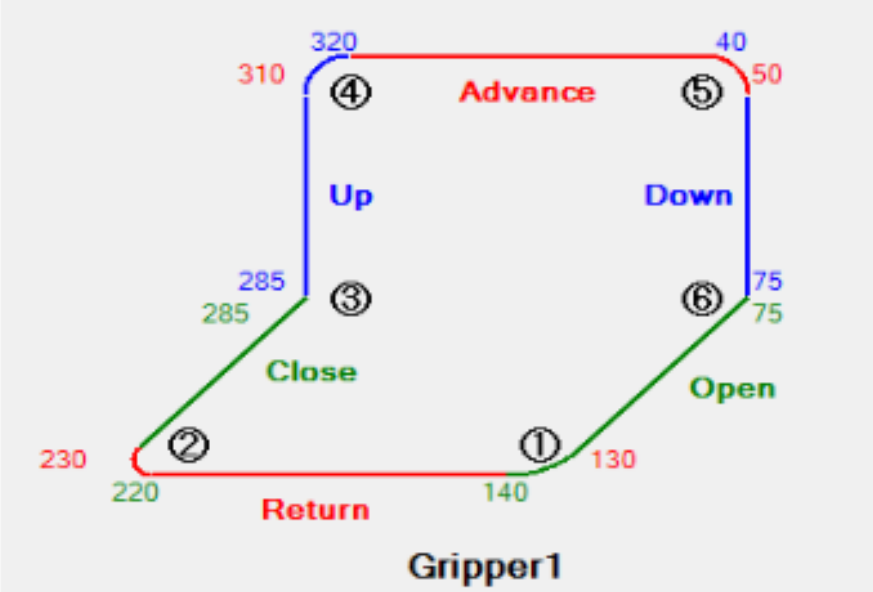
Report Date	September 13, 2018	*Application Version*	DYNMIK® Design for Die v1.2.12.0
Dilast Job #	2710		
Customer Job #	L0530739		

Transfer Travel Setting

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

Angle Information

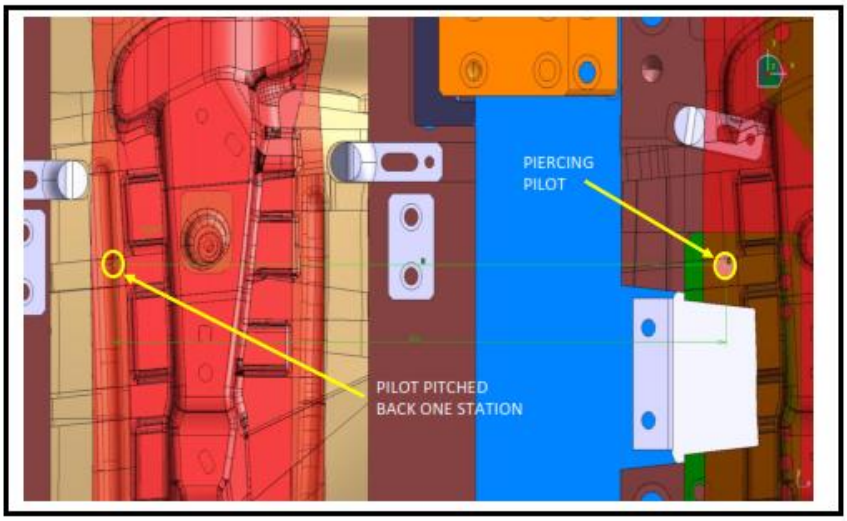
		Start	End		Start	End
X	Gripper Moves Forward	310	50	Gripper Moves Backward	130	230
Y	Gripper Moves Out	75	140	Gripper Moves In	220	285
Z	Part Pick Up	285	320	Part Drop Off	40	75



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



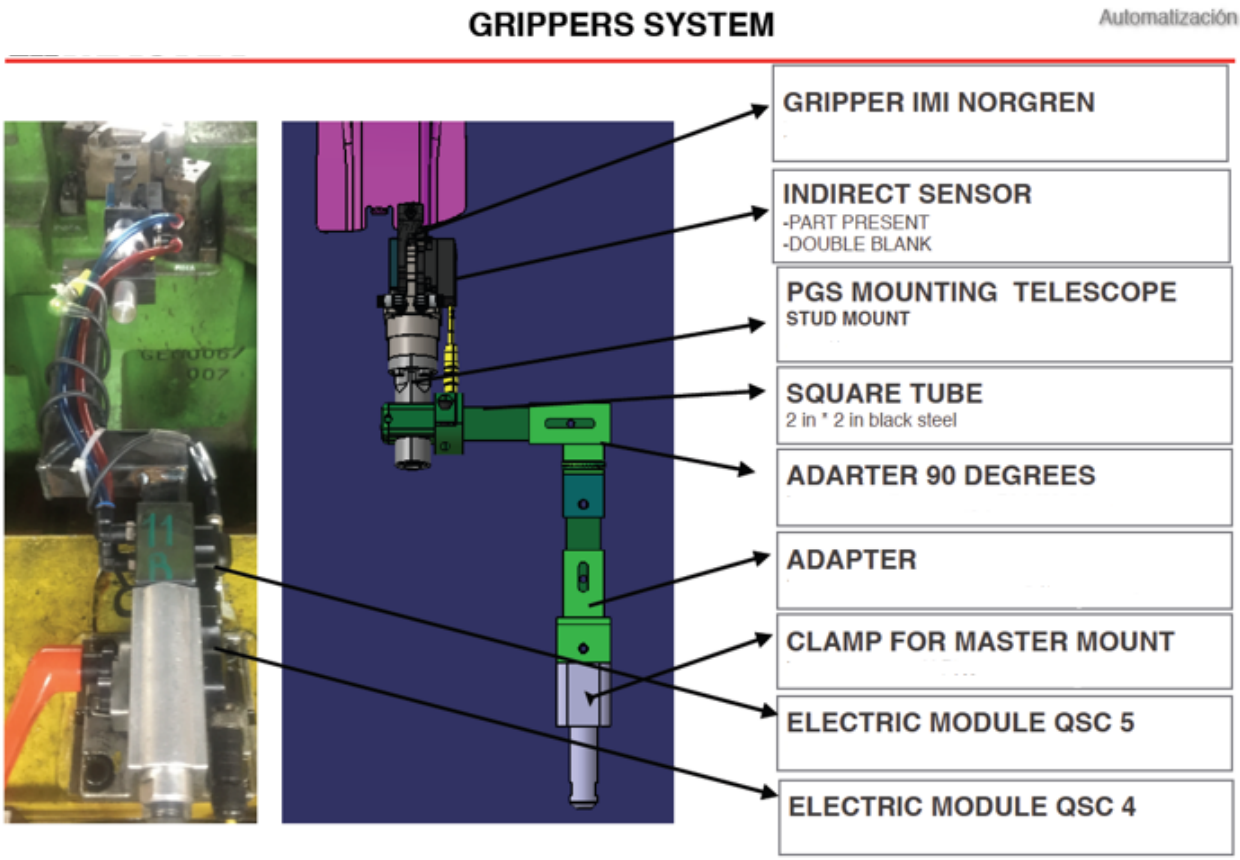
Timing Chart: No violation chart has been saved or imported.
Crank Angle: 180
Press Stroke: 0 **Lift:** 0 **Clamp:** 175 **Pitch:** 161.506
Violation Type:
Items Affected:



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.



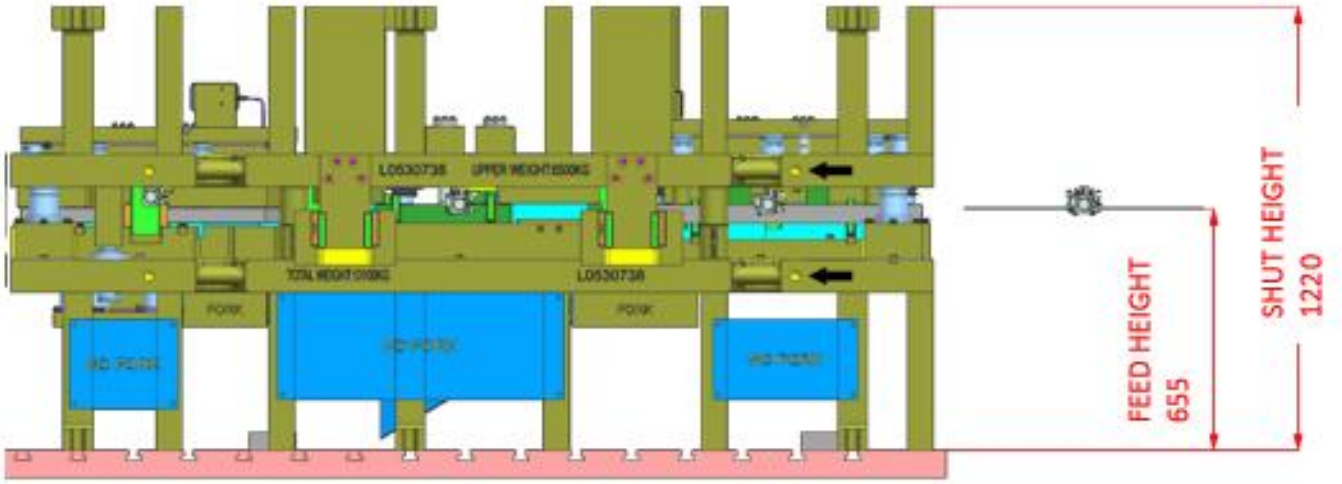
6. PRESS SPECIFICATION

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

WIA 3000 TON.

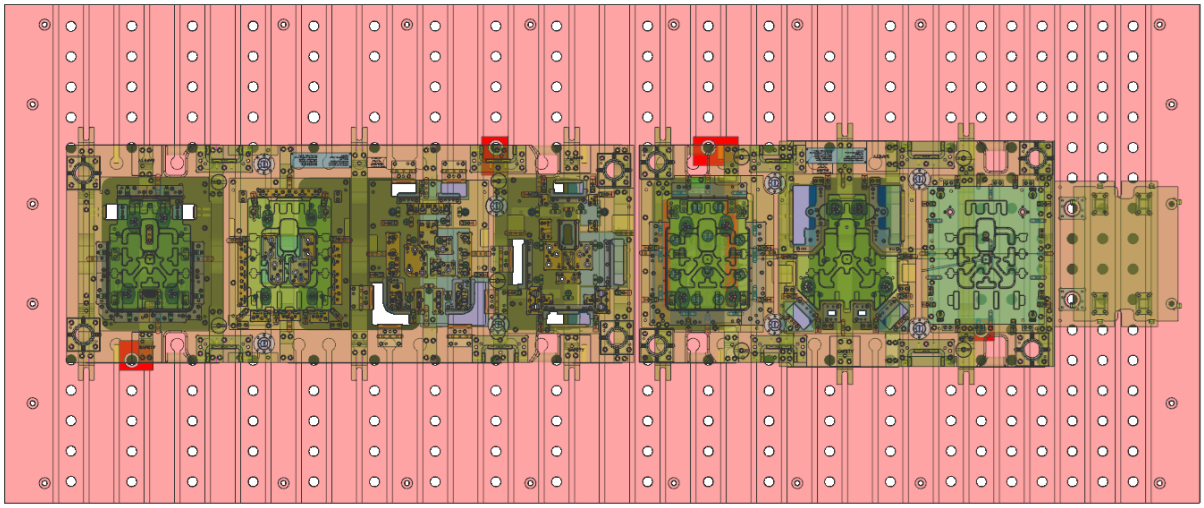
Press height information

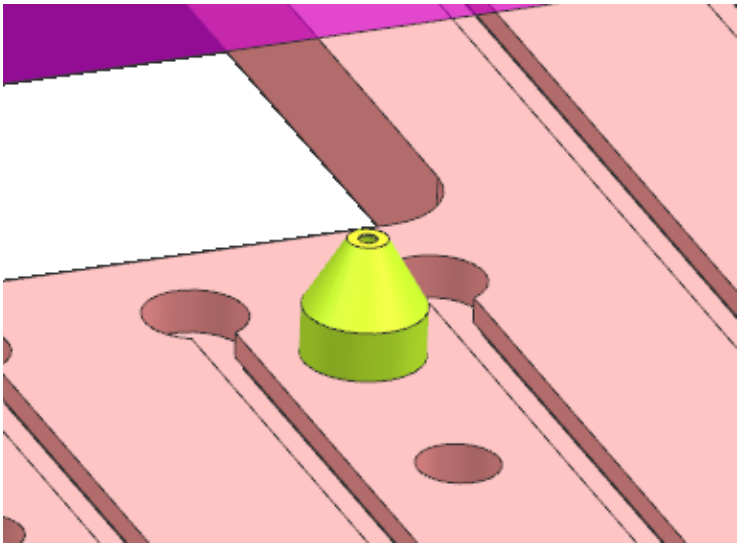
SHUT HEIGHT	1220
FEED HEIGHT	655
STROKE	762
SLIDE ADJUSTMENT	350

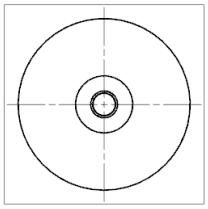


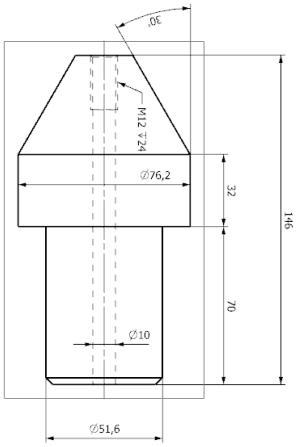
WIA 3000 TON.

Die location information.



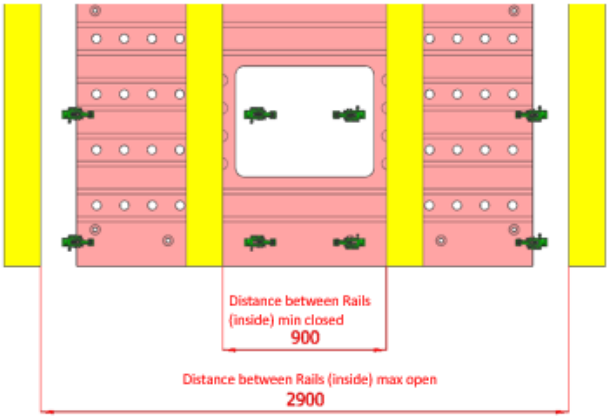


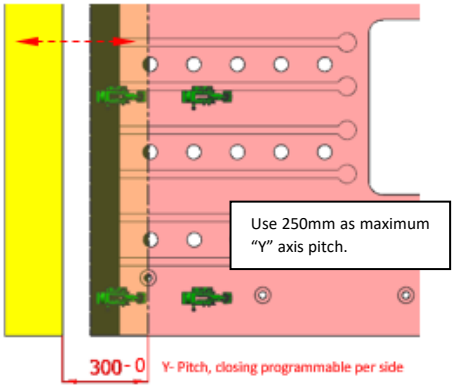


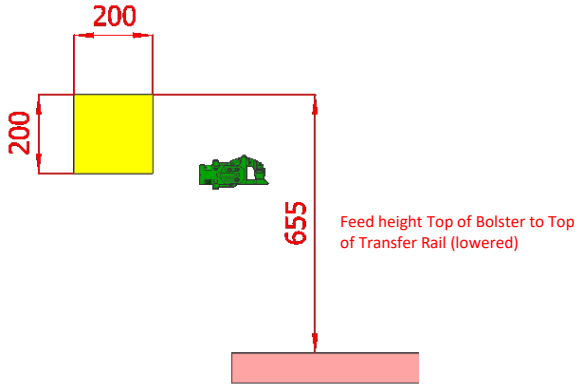


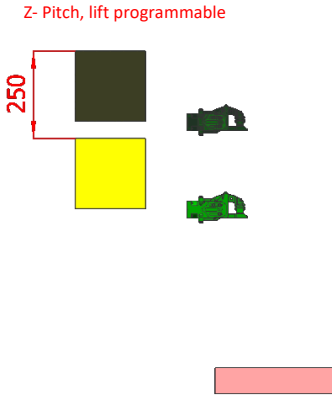
WIA 3000 TON.

Transfer bar information.





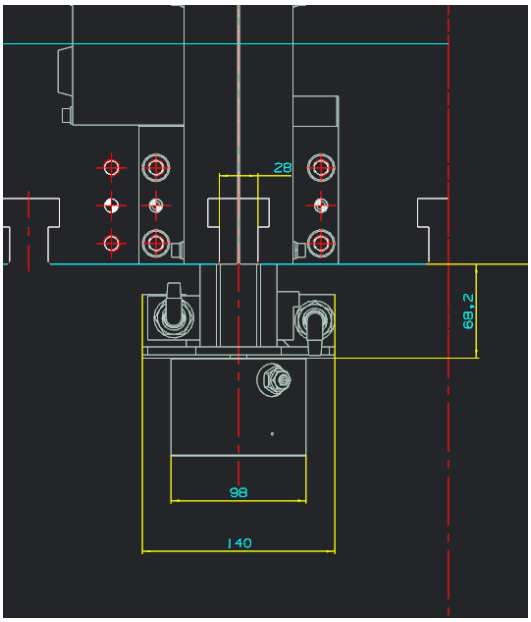


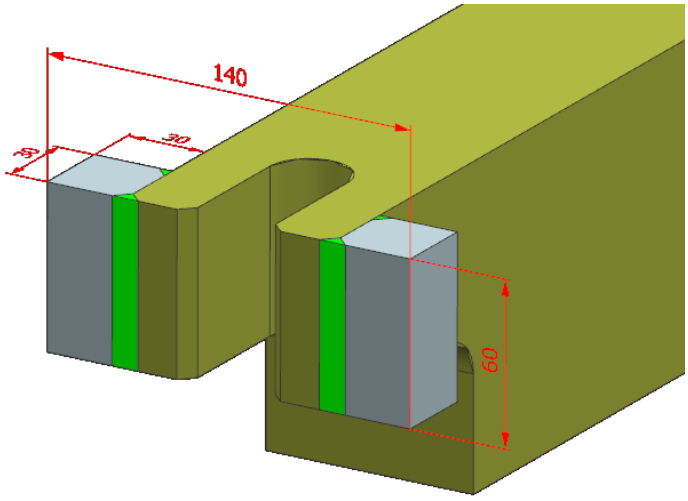


WIA 3000 TON.

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

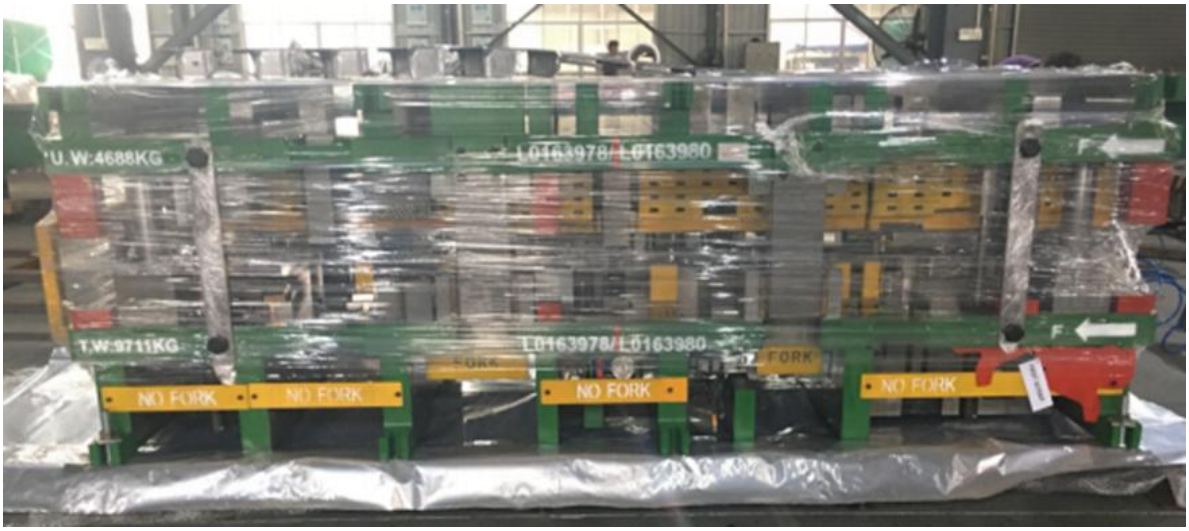
Color code will be provided by MatcorMatsu. PART NUMBER to be painted on 4 sides of die and Upper & Lower .



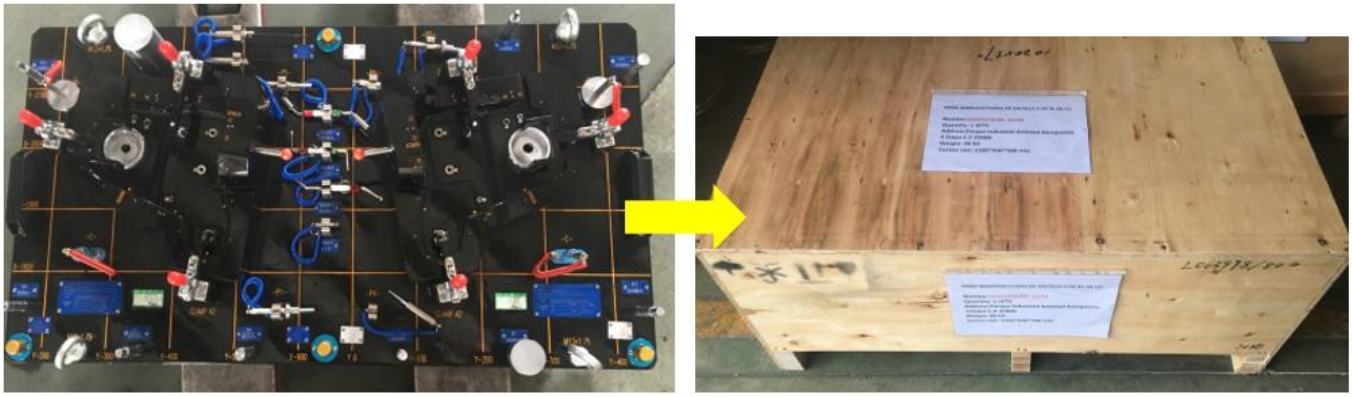


8. PACKAGING INFORMATION

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


U.W:4688KG
T.W:9711KG
NO FORK
NO FORK
NO FORK
NO FORK



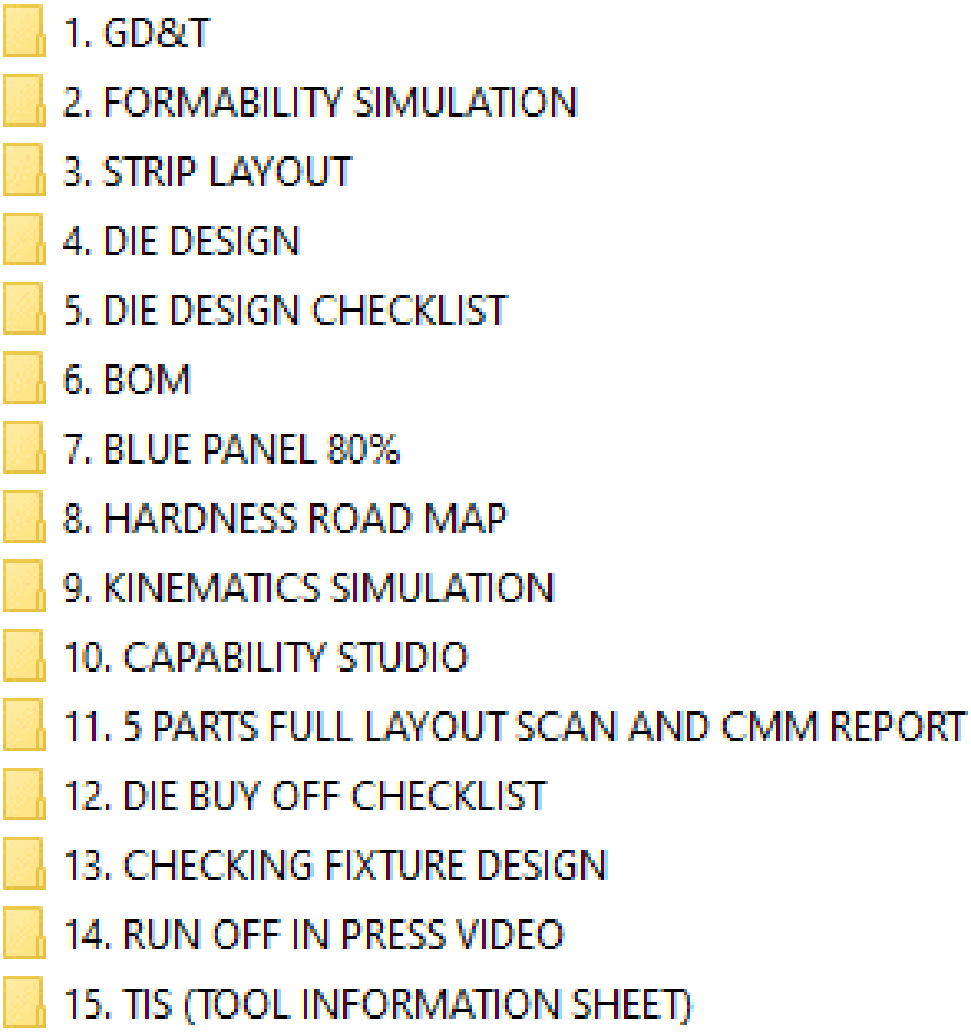


Opened container is needed for easy die and checking fixtures discharge.

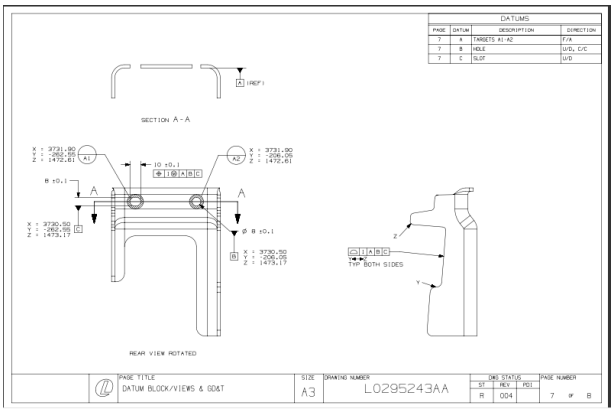


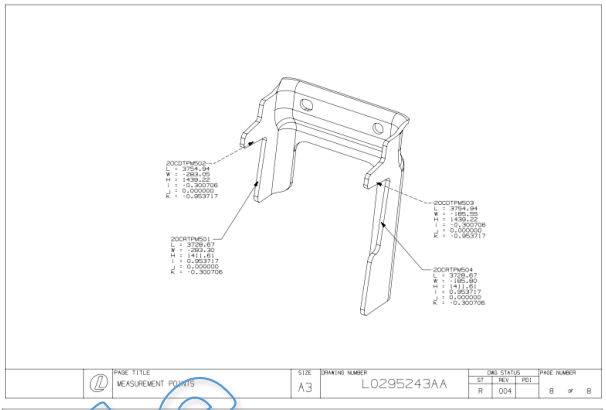
9. BUY OFF REQUIREMENTS

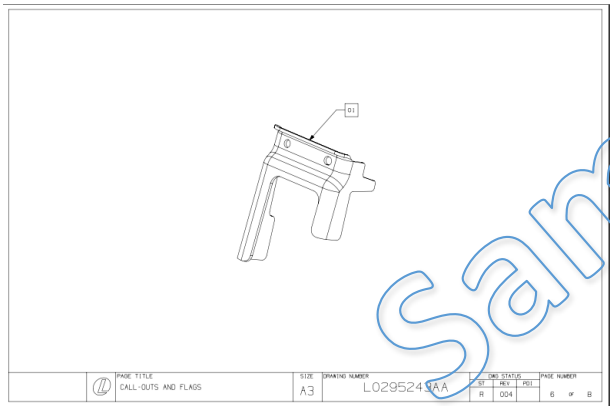
- Supplier Must provide all information required listed below.

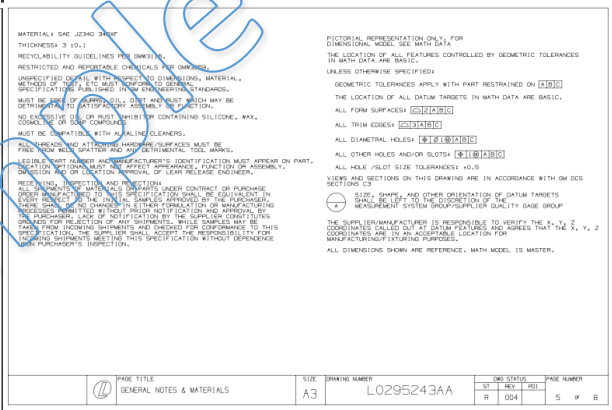


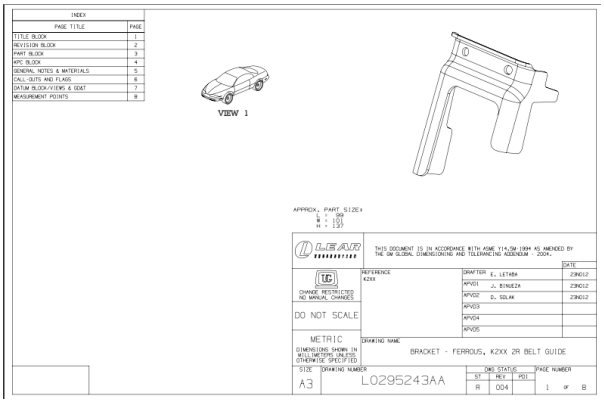
– GD&T: Include files containing information relating to GD&T's and all the information with engineering level updated.

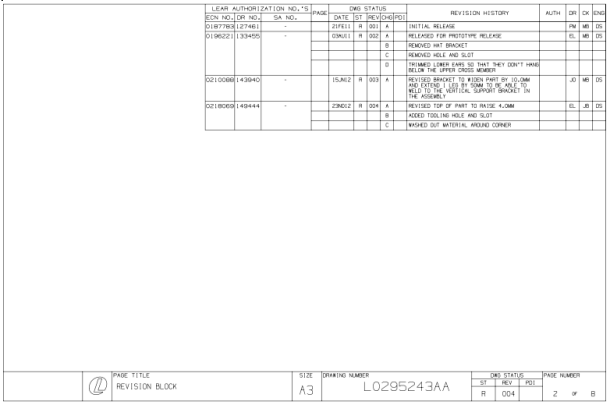








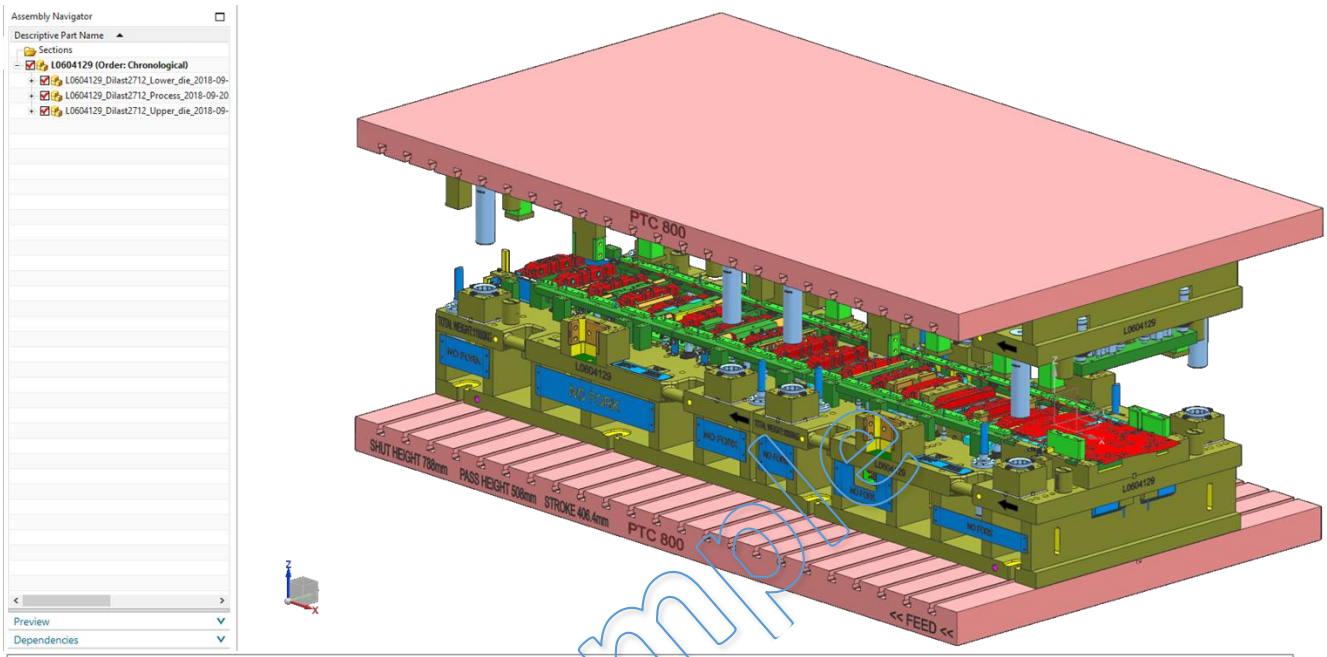


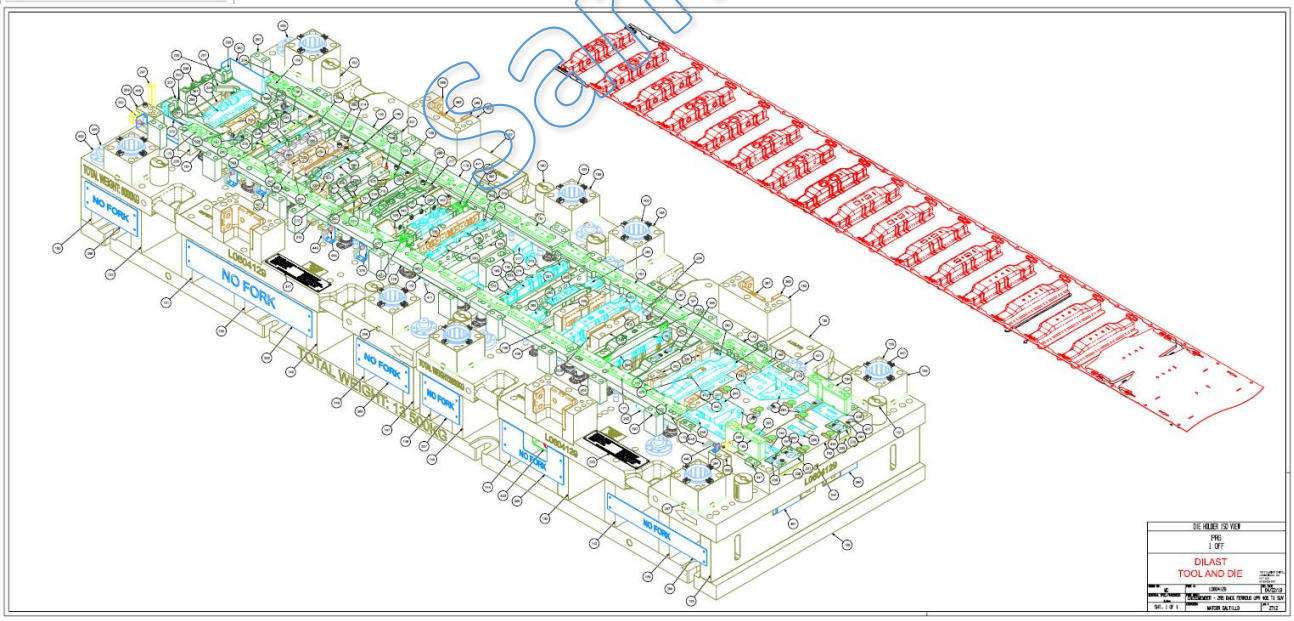


Sample

– 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.





Sample

– 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.

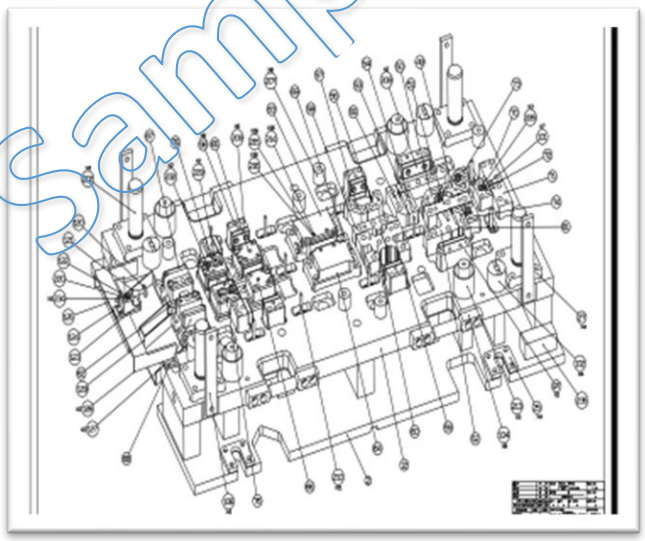
BOM: Must be included the bill of material authorized and updated die design, following this **EXCEL FORMAT**, with an explosion drawing with details number as a visual aid. (Include manufactured and standard parts).

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

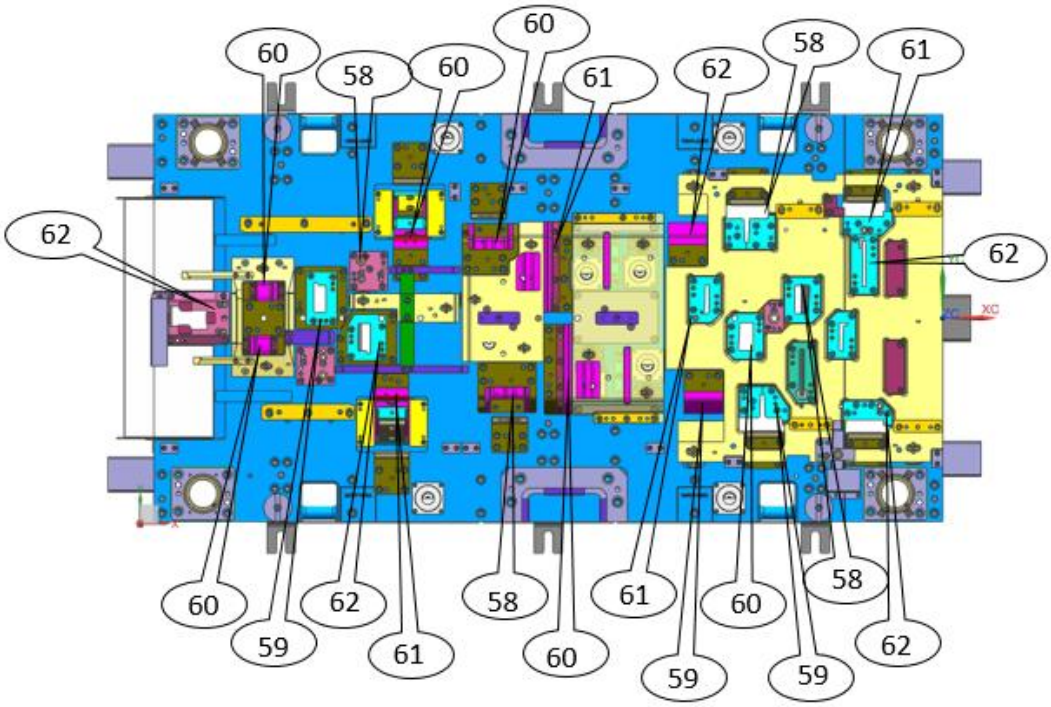
LISTO PROMEDIO: 50.5 RECUENTO: 100 SUMA: 5050



Sample

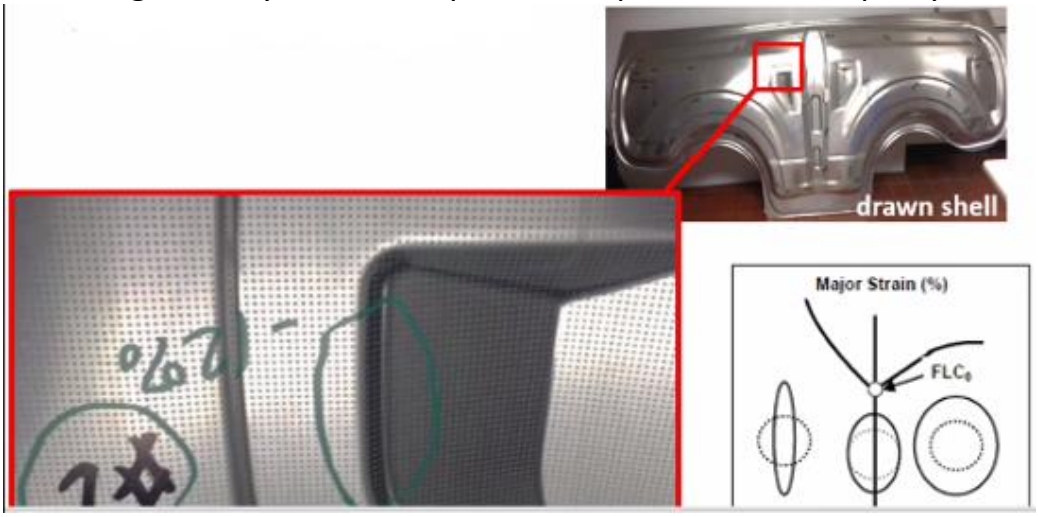
– HARDNESS ROAD MAPS FOR DIE OPERATIONS:

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



FORMABILITY STUDY ON DRAW PANEL:

Circle grid analysis of draw panel is required at die shop buyoff



– CAPABILITY STUDY (SUPPLIER):

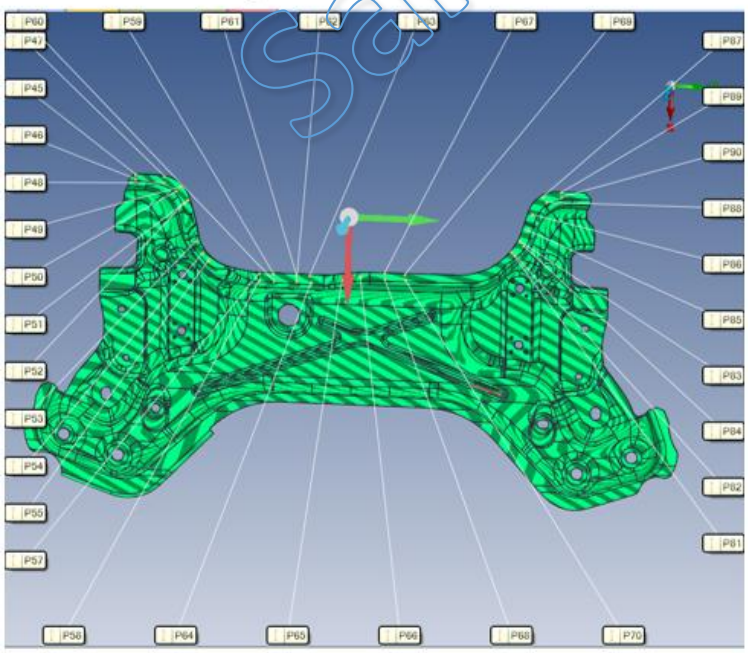
Part quality must be achieved 100% in the checking fixture, supplier must include the necessary documentation to prove the 30 pieces capability study obtaining at least a CP and CPK of 1.67, this result must be the same at final buyoff.

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**	**5.08**	**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.



Page Sample

– 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:

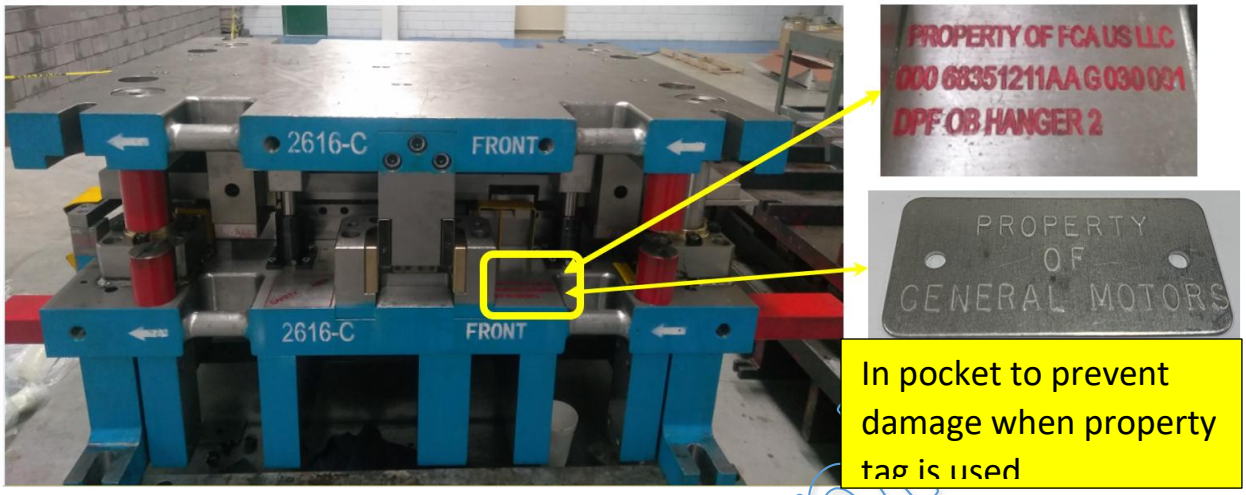
1	DYNAMIC	YES	NO	NOTES
	1.- HAS THE DIE PILOTS AND / OR LOCATORS IN EACH STATION ?			
	2.- HAS THE DIE FRENCH STOP (OR SIMILAR), SENSOR FINGERS AND FINAL SENSORS?			
	3.- ARE THE TRIM AND PIERCE HOLES FREE OF SCRAP ACCUMULATION?			
	4.- DOES THE DIE HAVE ENOUGH PLUNGERS AND EJECTORS TO AVOID PART BE 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 ?			

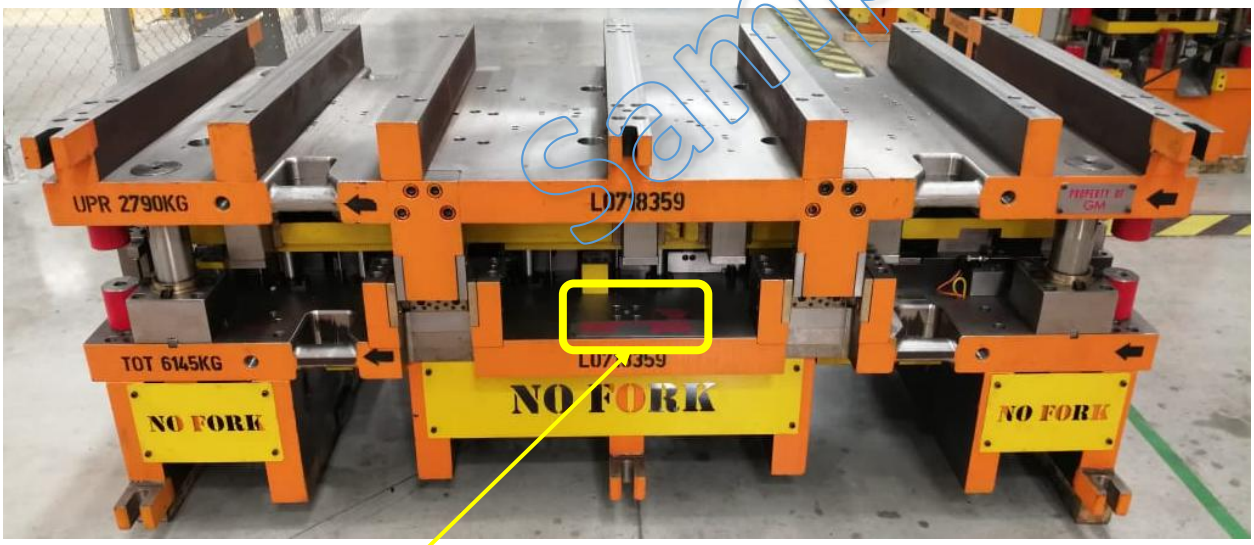
Sample

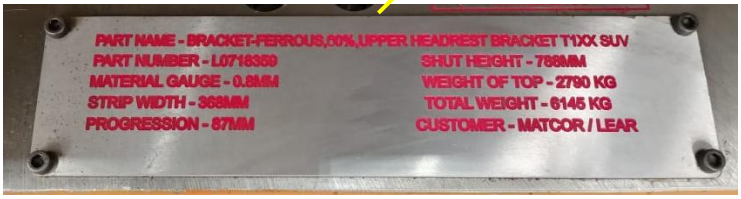
- INFO PLATE:

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

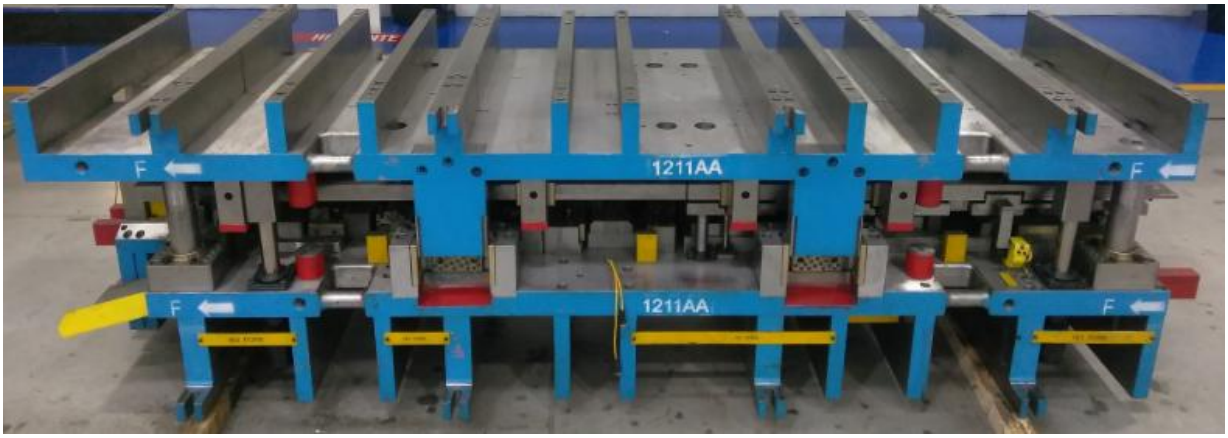
When Propety of Tag is used, pocket is needed to prevent tag from damage.

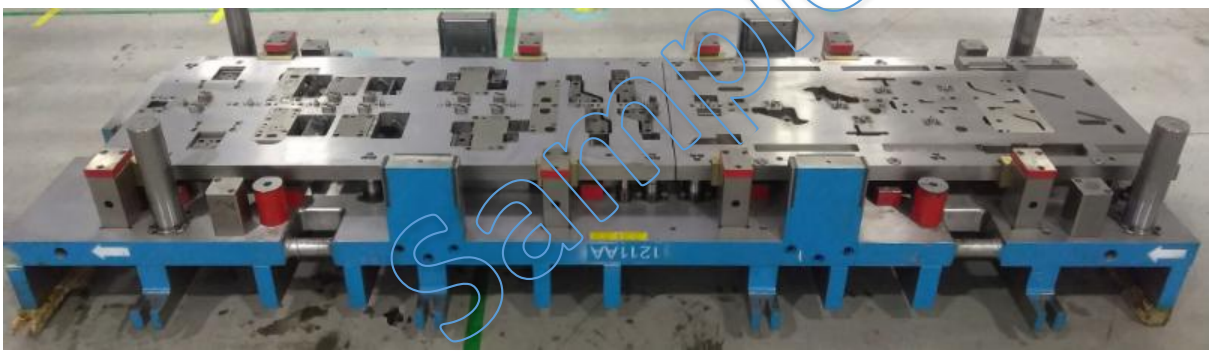






Sample



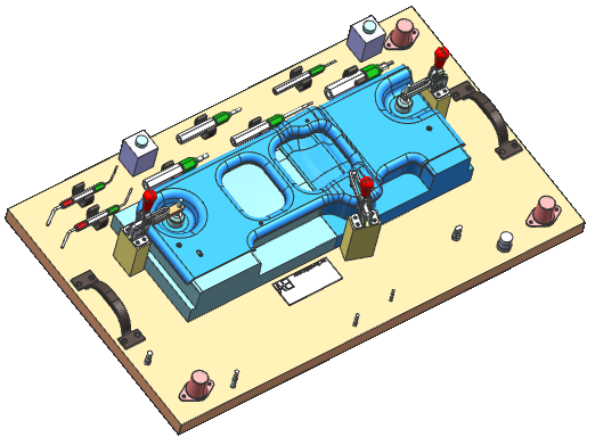


Sample

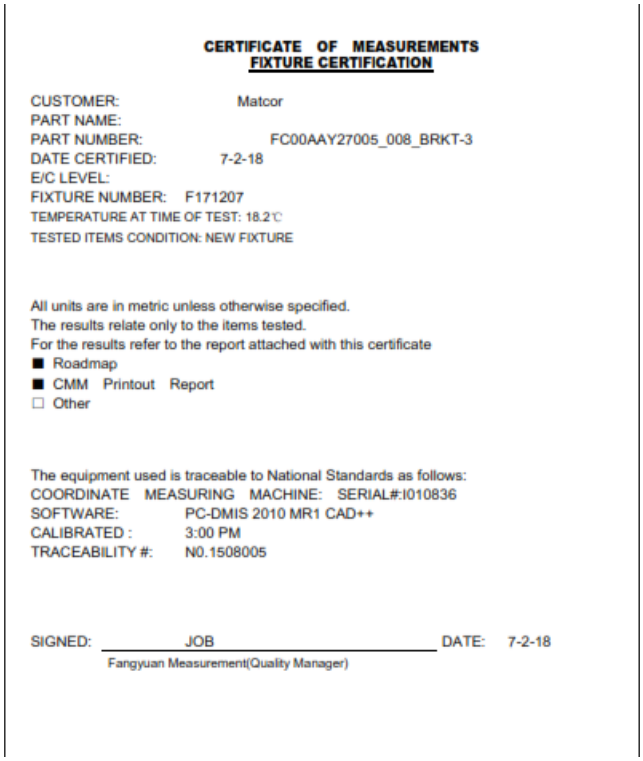


– CHECKING FIXTURE:

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

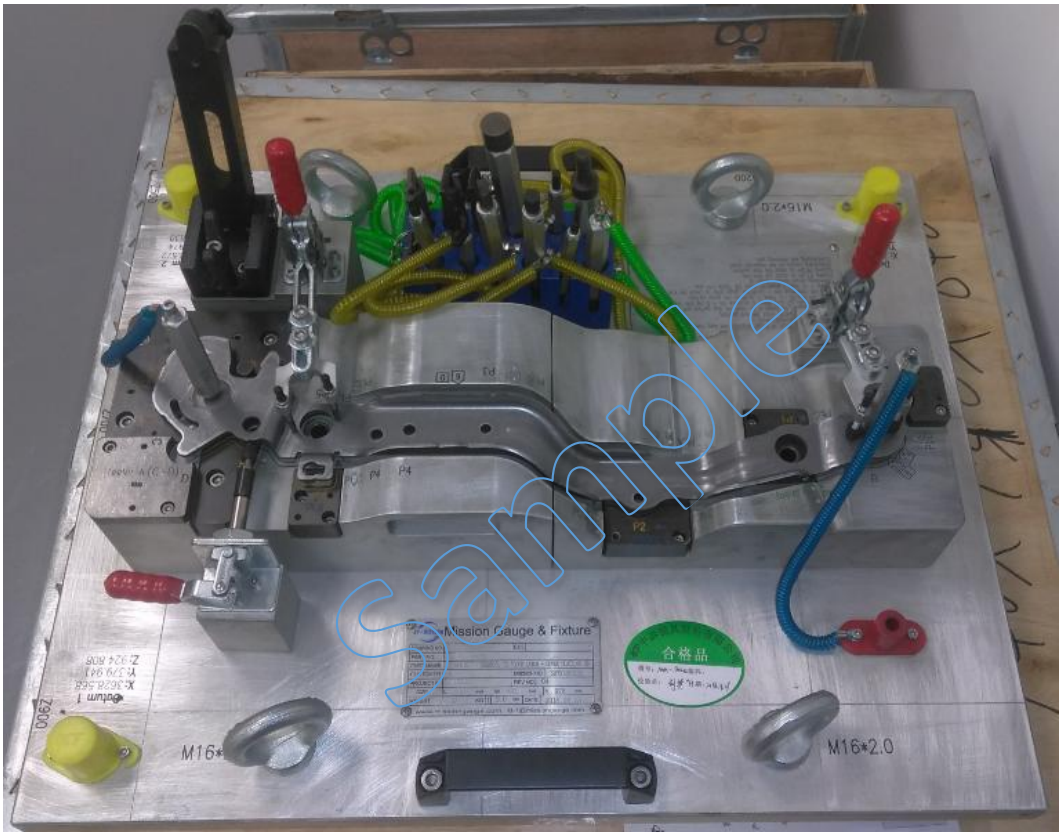
CUSTOMER: Matcor
PART NAME:
PART NUMBER: FC00AAY27005_008_BRKT-3
DATE CERTIFIED: 7-2-18
E/C LEVEL:
FIXTURE NUMBER: F171207
TEMPERATURE AT TIME OF TEST: 18.2℃
TESTED ITEMS CONDITION: NEW FIXTURE

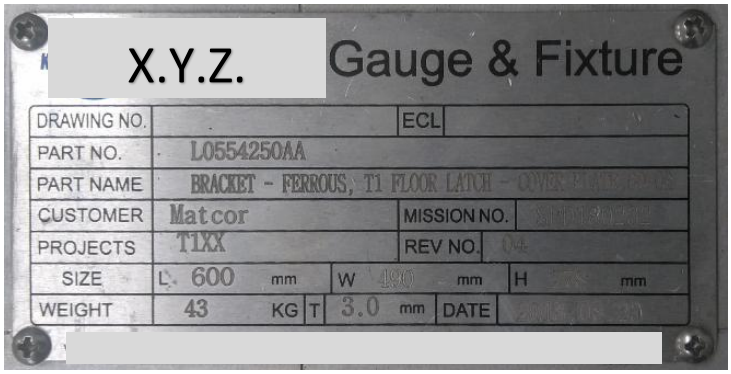
All units are in metric unless otherwise specified.
The results relate only to the items tested.
For the results refer to the report attached with this certificate
■ Roadmap
■ CMM Printout Report
□ Other

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)

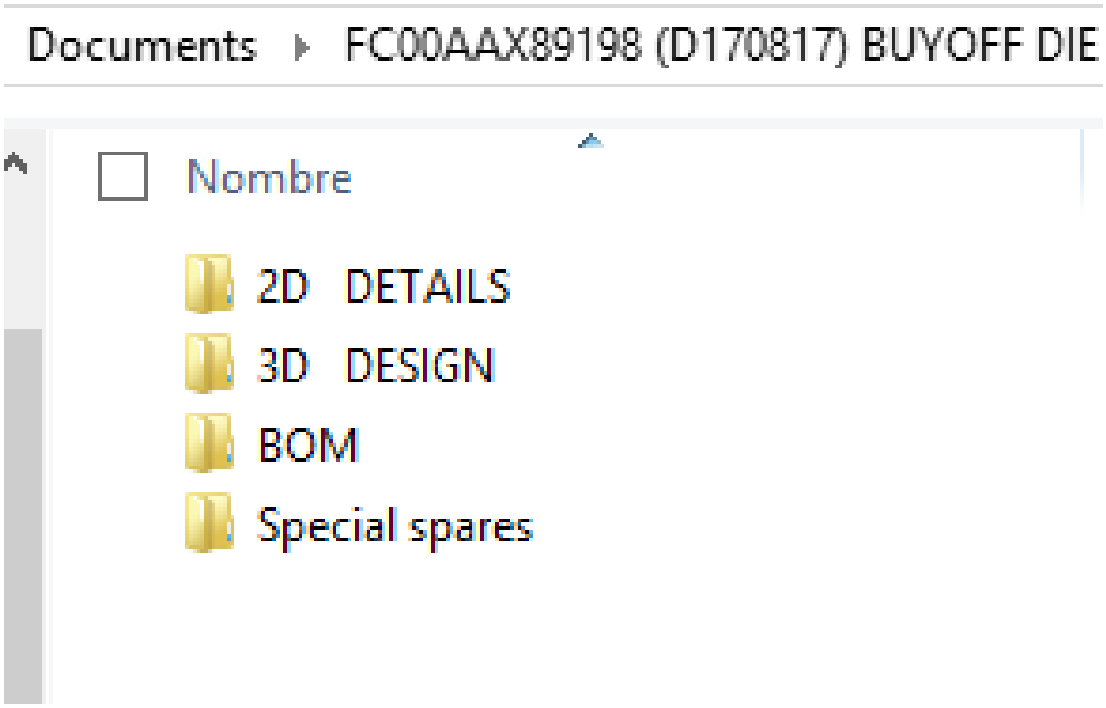
Checking fixture.





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 GENERAL REVIEW	YES	NO	COMMENTS / NOTES

Sample

11.SPARE PARTS

- Cost of one set of standard punches, Buttons and Trim Steels ,Trim Punches, 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.

