

DIVERSIFIED TOOLING

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PRESS HARDENED STEEL TOOLING AND PRODUCTION



Superior Cam



Midland Design



Bespro Pattern



American Tooling Center

HOT STAMP PROCESS

Midland Design Service

- Part and Die Processing, CAE Simulation.
- Solid CAD Hot Stamping Die Design.

American Tooling Center

- CNC Programming and Machining of Dies.
- Die Assembly, Tryout and Early Parts.
- 5 Axis Laser Trim and Metallurgical Lab.
- Full Process Data Logging & Part Certification.



HOT FORM/QUENCH PRESS

- 1320 ton High Speed 3000mm x 2200mm Press.
- (6) Hydraulic Proportional Valves - Die Functions.
- (14) Furnace Shelves with Precise Temperature, Soak Time and Dewpoint Control.
- Full Process Control, Data Logging/Reporting.
- Dual Tri-Axis (Pick and Place) Feeders Front/Rear.
 - Tryout Tooling and Process at Full Production Rate
- Quick Die Change Cart with Prestaging.
- Programmable High Pressure Water Chiller.



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AUTOMATIC LOAD & UNLOAD FOURTEEN (14) SHELF FURNACE HOT FORM & QUENCH PRESS



VIDEO OF FIRST TEST – APRIL 2015



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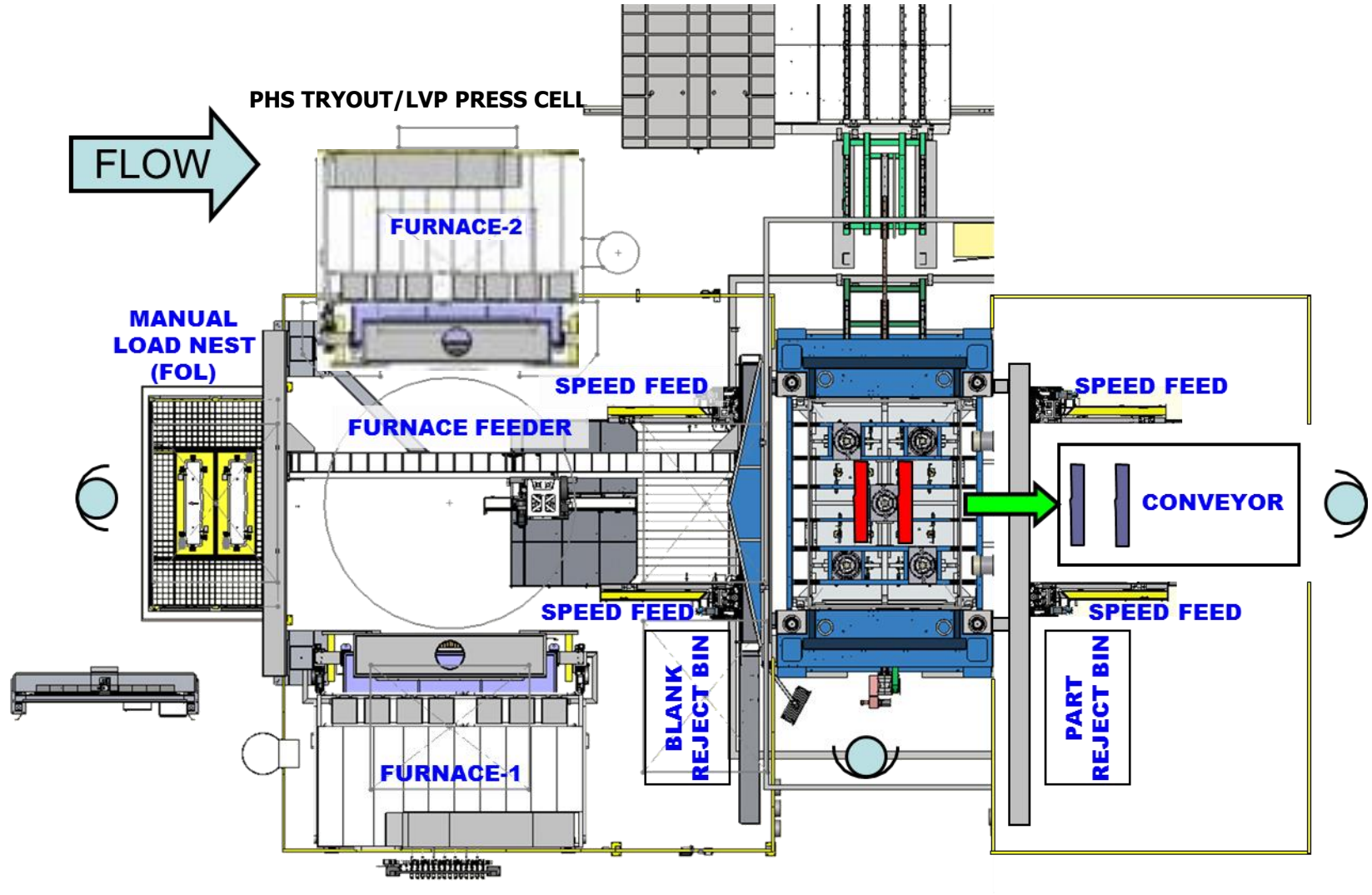


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AP&T HOT FORM PRESS LINE



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5 AXIS LASER CUTTING

- Prima LaserNext LN-1530 & LN-2130 Cells.
 - Medium & Large PHS & AL Parts (Door Rings)
 - Advanced High Speed Hole Generation Software
 - 4kW IPG Fiber Lasers Permit Aluminum Cutting
- NTC TLM-614 5 Axis Laser Cutting Machines.
 - Body Side Sized 4300mm x 1900mm Capacities
 - PRC CO2 Lasers
- Prima Rapido 5 Axis Laser Cutting Machine.
 - Medium Format 3000 mm x 1550 mm Capacity
 - PRC CO2 Laser



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PRIMA LASERNEXT LN-1530



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QUALITY CONTROL

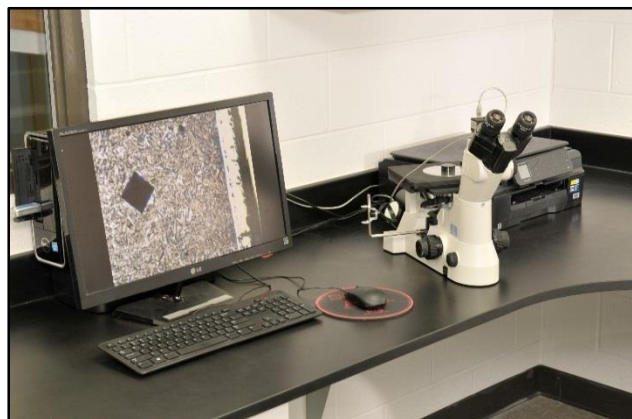
- Mechanical and Metallurgical Part Certification.
 - ISO 17025 and AIAG CQI-9 PHS Process
 - Full Process Control Record for Parts.
 - Blank & Part Temps, Furnace Temps, Furnace Cavity, Die Cavity, Water Temps, Tonnages, Pressure Drops, Time Cycles, Heat Ramps, Laser Records, Date/Time Stamp.
- Full A2LA Metallurgical Lab - Manager, Techs.
 - Tensile, Yield, Elongation, VDA-238 Bend, Hardness, Microhardness, Metallography, Coating Evaluations, Sample Preparation, Thermographs



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PHS METALLURGICAL LABORATORY



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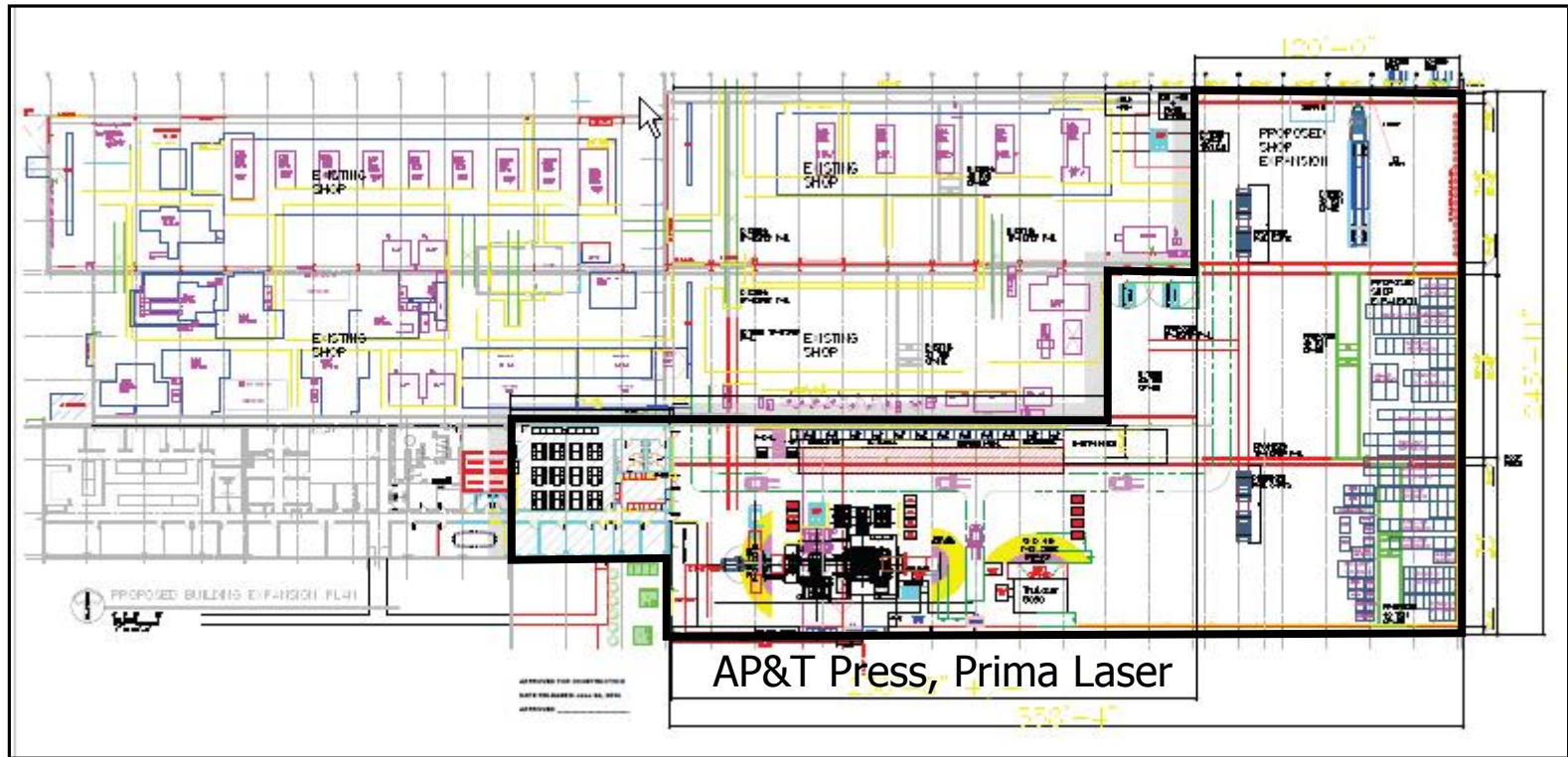
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American Tooling Center, Inc.

Grass Lake, Michigan

AP&T Hot Forming Press Line, Prima Laser Cutting, Met Lab
66,000 Square Foot Building Addition - 2015



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HOT STAMP PRODUCTS

- Research & Development of Press Hardened Steel and Warm/Hot Formed Aluminum Parts.
- Prototype Tooling for Metallurgically and Mechanically Certified Prototypes & Assemblies.
- Production Tooling, Tryout & Home Line Pilot.
- Low Volume Production of Parts and Assemblies.
- Production Tooling Revisions, Repair, Maintenance, Replacement, and Optimization.



R&D AND PROTOTYPE PARTS

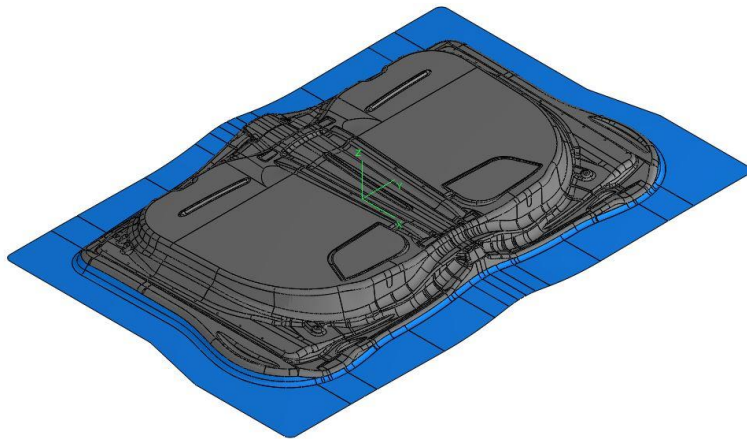
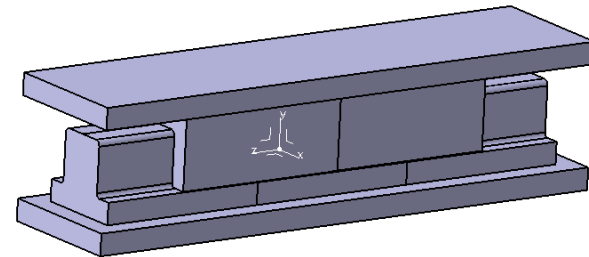
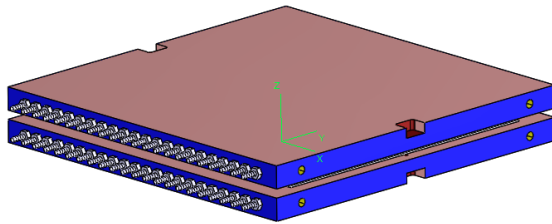
- Material Characterization, Trials, Evaluations.
- Process Development (Furnace Ramps, Blank Temperatures, Soak Times, Tonnages/Speeds)
- Tensile, Bend and Weld Coupons & Beams
- Press Hardened Steel & W/H Form AL Feasibility.
- Soft Tool Prove Outs and Blank Developments.
- Laser Cut Process & Programs, Developed Trim
- Production Intent Prototype Parts, Assemblies.
- Blank Sizes Up To 2300mm x 1800mm.



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RESEARCH AND DEVELOPMENT



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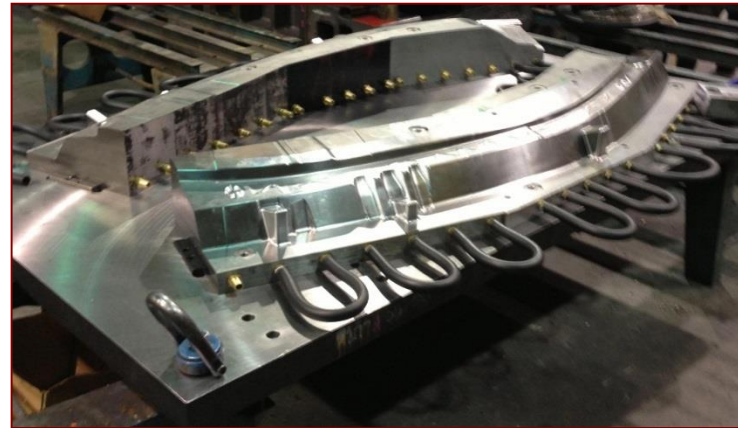


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DTG PHS PROTOTYPE TOOLING



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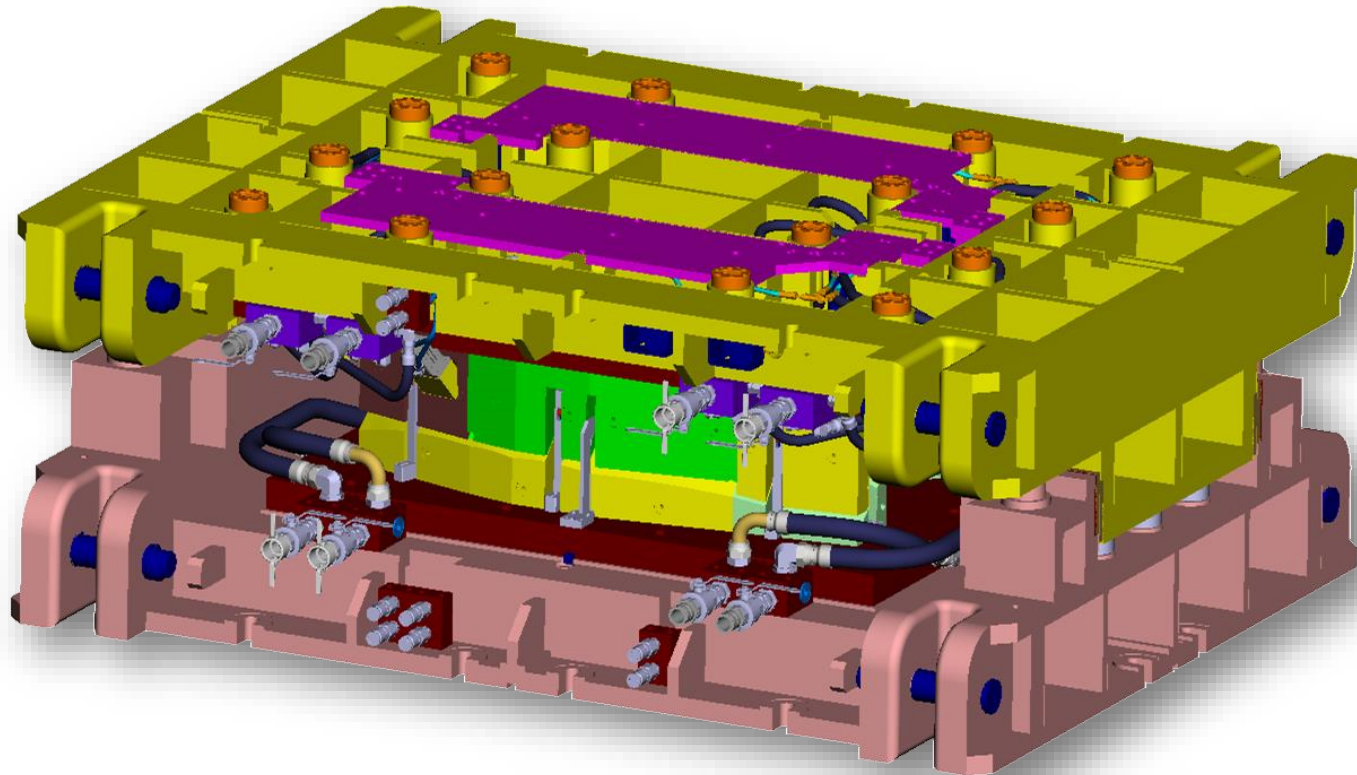


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DTG PHS PRODUCTION TOOLING



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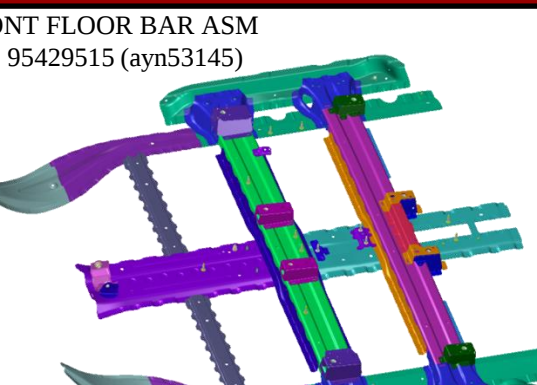
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PRESS HARDENING SIMULATION

DESCRIPTION	DETAIL
PART NAME:	REINF-F/FLR S/RL FRT LH/RH
PART NUMBER:	azm48687/azm49039 - 1.001009/10
MATERIAL:	GMW14400M-ST-S-HS1300T/950Y-MS-AS60G60G-U
THICKNESS:	1.8 / 2 mm TWB
GROSS WEIGHT:	2.7261 kg
NET WEIGHT:	1.6887 kg
BLANK SIZE:	753 x 243 mm
PROCESS:	1up Hot Stamping

ASSEMBLY

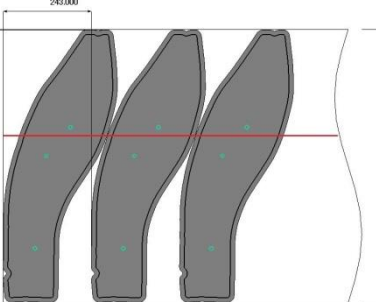
FRONT FLOOR BAR ASM
P/N: 95429515 (ayn53145)

[illegible]

PART VIEW

BLANK LAYOUT

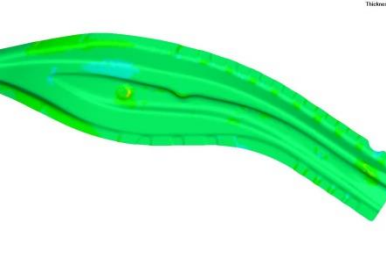
Hot Stamping Blank



The diagram illustrates the blank layout for three automotive components, likely side sills, arranged horizontally. Each component is a dark gray, elongated shape with a curved top and bottom. A horizontal red line runs through the center of all three components. Dimension lines indicate the overall width of the layout as 243.000 and the overall height as 753.000. A small dimension of 14.924 is shown at the top left, indicating the distance from the left edge to the start of the first component. Each component contains several small green circles, possibly representing punch holes or mounting points. The components are separated by narrow gaps, and the entire layout is enclosed in a rectangular frame.

FORMABILITY SIMULATION

(Thickness Strain)



Thickness Strain (%)

7.88
5.427
3.212
1.044
-1.078
-3.568
-5.561
-7.562
-9.552
-11.041
-12.819
-14.733
-16.535
-18.263
-20.005
-21.763
-23.535
-25.313
-27.095
-28.877
-30.659
-32.441
-34.223
-36.005
-37.787
-39.569
-41.351
-43.133
-44.915
-46.697
-48.479
-50.261
-52.043
-53.825
-55.607
-57.389
-59.171
-60.953
-62.735
-64.517
-66.299
-68.081
-69.863
-71.645
-73.427
-75.209
-76.991
-78.773
-80.555
-82.337
-84.119
-85.901
-87.683
-89.465
-91.247
-93.029
-94.811
-96.593
-98.375
-100.157
-101.939
-103.721
-105.503
-107.285
-109.067
-110.849
-112.631
-114.413
-116.195
-117.977
-119.759
-121.541
-123.323
-125.105
-126.887
-128.669
-130.451
-132.233
-134.015
-135.797
-137.579
-139.361
-141.143
-142.925
-144.707
-146.489
-148.271
-150.053
-151.835
-153.617
-155.399
-157.181
-158.963
-160.745
-162.527
-164.309
-166.091
-167.873
-169.655
-171.437
-173.219
-175.001
-176.783
-178.565
-180.347
-182.129
-183.911
-185.693
-187.475
-189.257
-191.039
-192.821
-194.603
-196.385
-198.167
-199.949
-201.731
-203.513
-205.295
-207.077
-208.859
-210.641
-212.423
-214.205
-215.987
-217.769
-219.551
-221.333
-223.115
-224.897
-226.679
-228.461
-230.243
-232.025
-233.807
-235.589
-237.371
-239.153
-240.935
-242.717
-244.499
-246.281
-248.063
-249.845
-251.627
-253.409
-255.191
-256.973
-258.755
-260.537
-262.319
-264.101
-265.883
-267.665
-269.447
-271.229
-273.011
-274.793
-276.575
-278.357
-280.139
-281.921
-283.703
-285.485
-287.267
-289.049
-290.831
-292.613
-294.395
-296.177
-297.959
-299.741
-301.523
-303.305
-305.087
-306.869
-308.651
-310.433
-312.215
-313.997
-315.779
-317.561
-319.343
-321.125
-322.907
-324.689
-326.471
-328.253
-330.035
-331.817
-333.599
-335.381
-337.163
-338.945
-340.727
-342.509
-344.291
-346.073
-347.855
-349.637
-351.419
-353.201
-354.983
-356.765
-358.547
-360.329
-362.111
-363.893
-365.675
-367.457
-369.239
-371.021
-372.803
-374.585
-376.367
-378.149
-379.931
-381.713
-383.495
-385.277
-387.059
-388.841
-390.623
-392.405
-394.187
-395.969
-397.751
-399.533
-401.315
-403.097
-404.879
-406.661
-408.443
-410.225
-412.007
-413.789
-415.571
-417.353
-419.135
-420.917
-422.699
-424.481
-426.263
-428.045
-429.827
-431.609
-433.391
-435.173
-436.955
-438.737
-440.519
-442.301
-444.083
-445.865
-447.647
-449.429
-451.211
-452.993
-454.775
-456.557
-458.339
-460.121
-461.903
-463.685
-465.467
-467.249
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-470.813
-472.595
-474.377
-476.159
-477.941
-479.723
-481.505
-483.287
-485.069
-486.851
-488.633
-490.415
-492.197
-493.979
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-499.325
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-502.889
-504.671
-506.453
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-510.017
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-515.363
-517.145
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-520.709
-522.491
-524.273
-526.055
-527.837
-529.619
-531.401
-533.183
-534.965
-536.747
-538.529
-540.311
-542.093
-543.875
-545.657
-547.439
-549.221
-551.003
-552.785
-554.567
-556.349
-558.131
-559.913
-561.695
-563.477
-565.259
-567.041
-568.823
-570.605
-572.387
-574.169
-575.951
-577.733
-579.515
-581.297
-583.079
-584.861
-586.643
-588.425
-590.207
-591.989
-593.771
-595.553
-597.335
-599.117
-600.899
-602.681
-604.463
-606.245
-608.027
-609.809
-611.591
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-622.283
-624.065
-625.847
-627.629
-629.411
-631.193
-632.975
-634.757
-636.539
-638.321
-640.103
-641.885
-643.667
-645.449
-647.231
-649.013
-650.795
-652.577
-654.359
-656.141
-657.923
-659.705
-661.487
-663.269
-665.051
-666.833
-668.615
-670.397
-672.179
-673.961
-675.743
-677.525
-679.307
-681.089
-682.871
-684.653
-686.435
-688.217
-690.000
-691.782
-693.564
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-702.474
-704.256
-706.038
-707.820
-709.602
-

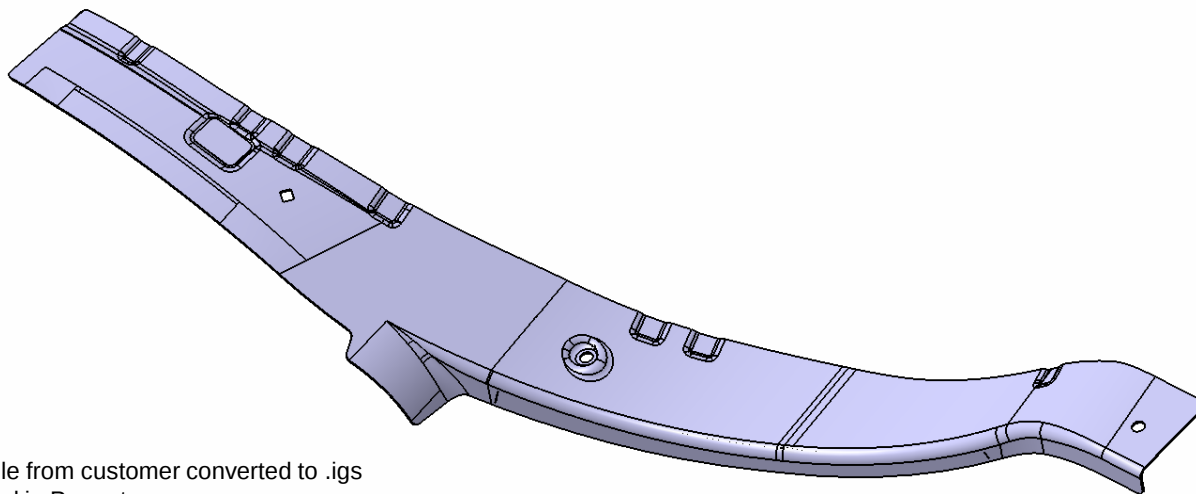
NOTES	TAILOR WELD HOT STAMP. MANUFACTURABILITY CONCERN.
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DTG SIMULATION REPORT

	x	Pass
		Danger
		Failure



- CATIA file from customer converted to .igs
- Simulated in Pam-stamp
- The material data used in the simulations are obtained from a similar boron steel
- Simulated at 750 degrees Celcius
- Loops:
- Changes:



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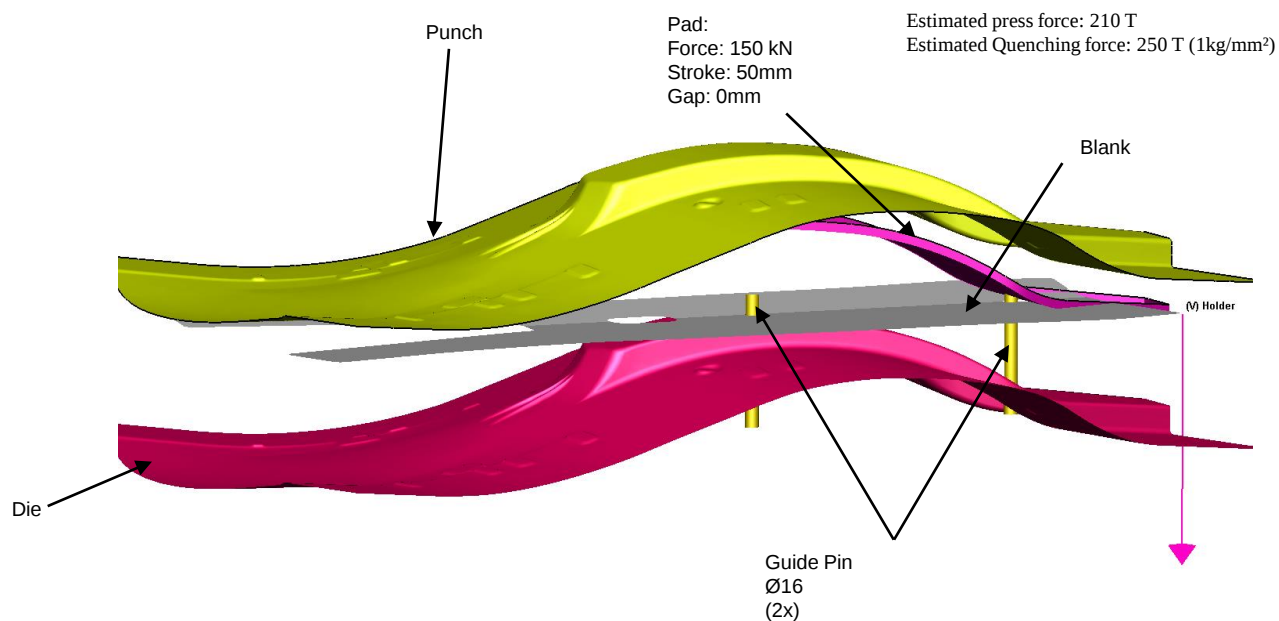
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DIE SETUP & TOOLS

Tools



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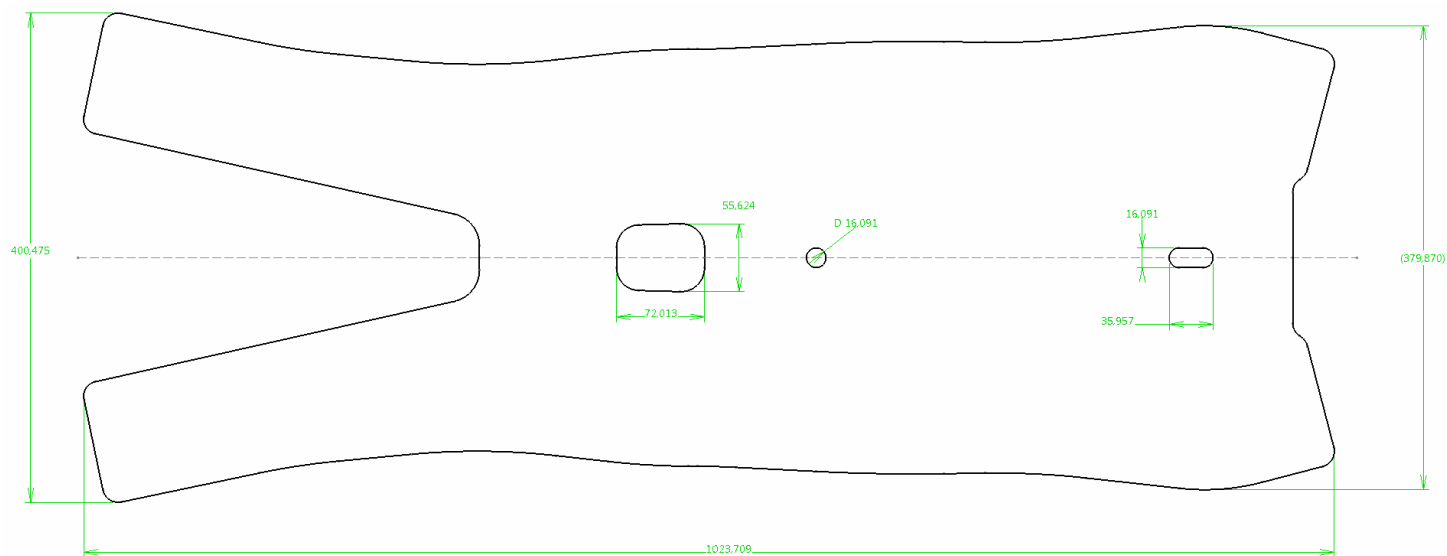
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BLANK & DETAIL

Weight of final blank	4.87 kg
Weight of final blank including waste	5.22 kg



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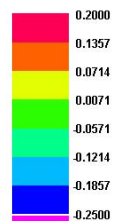
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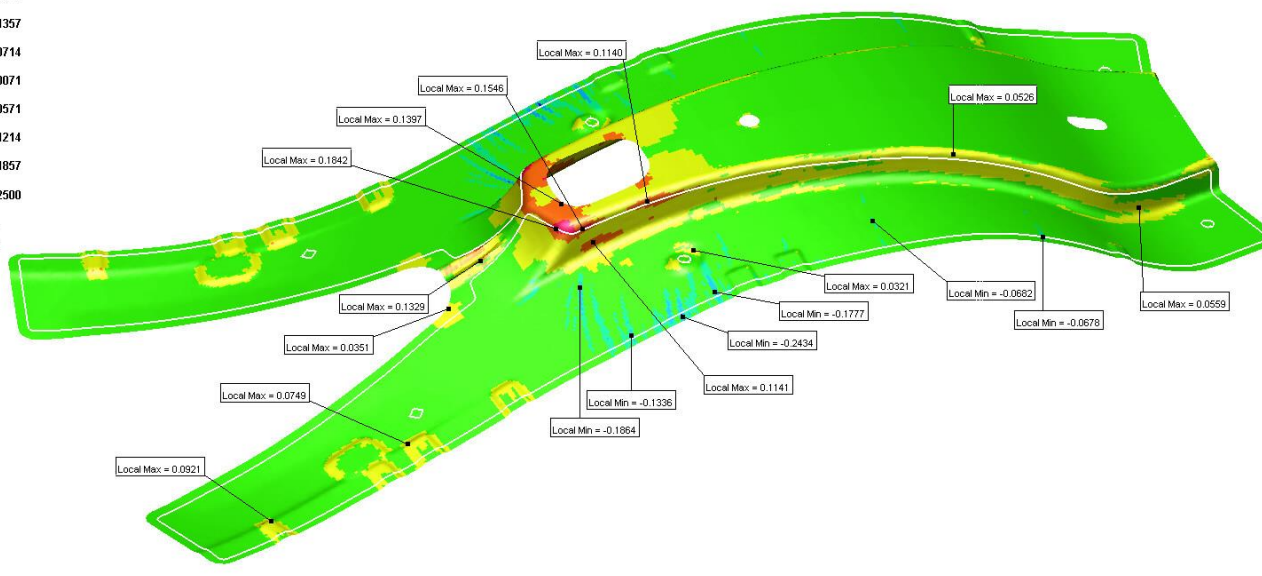
THINNING

Thinning (engineer value)



Min = -0.2434
Max = 0.1842

Project '6806-1-94623853_94623870_02_011_03_Stamping'
Module 'State 3/end : Prog. = 39.997204'



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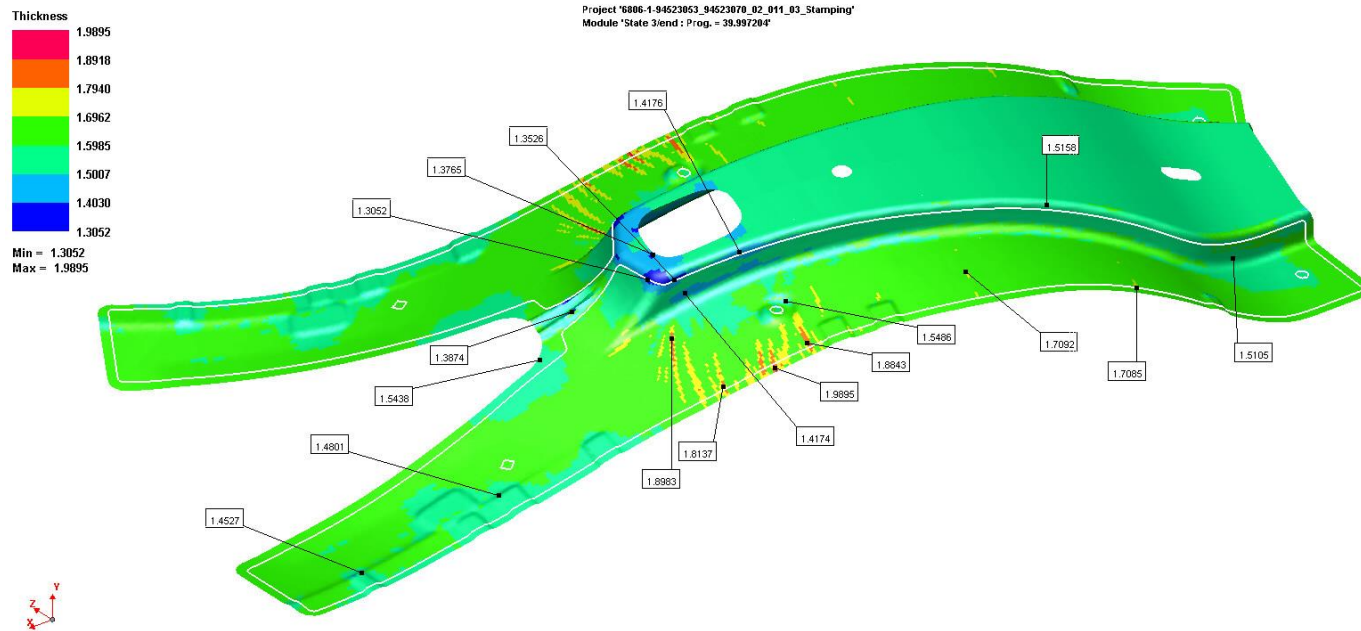


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THICKENING



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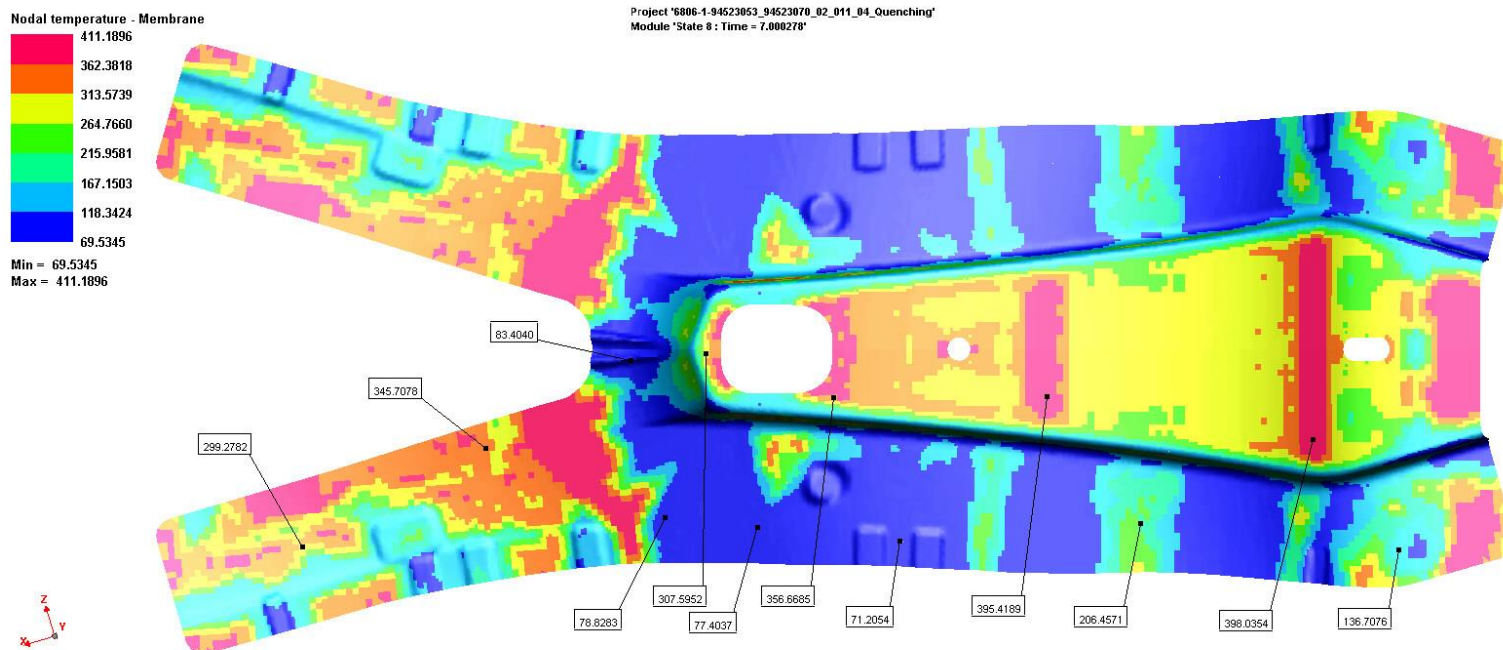


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TEMP QUENCHING 7s



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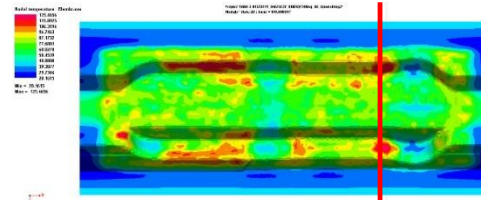


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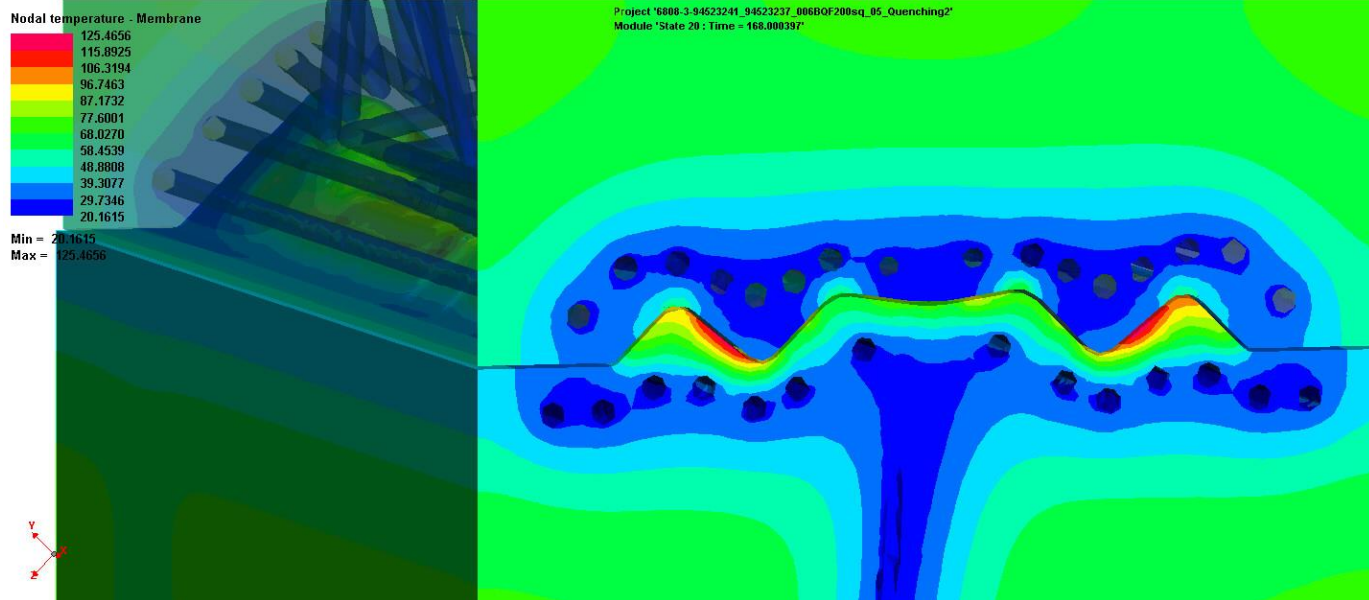
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QUENCHING SIMULATION



Section line



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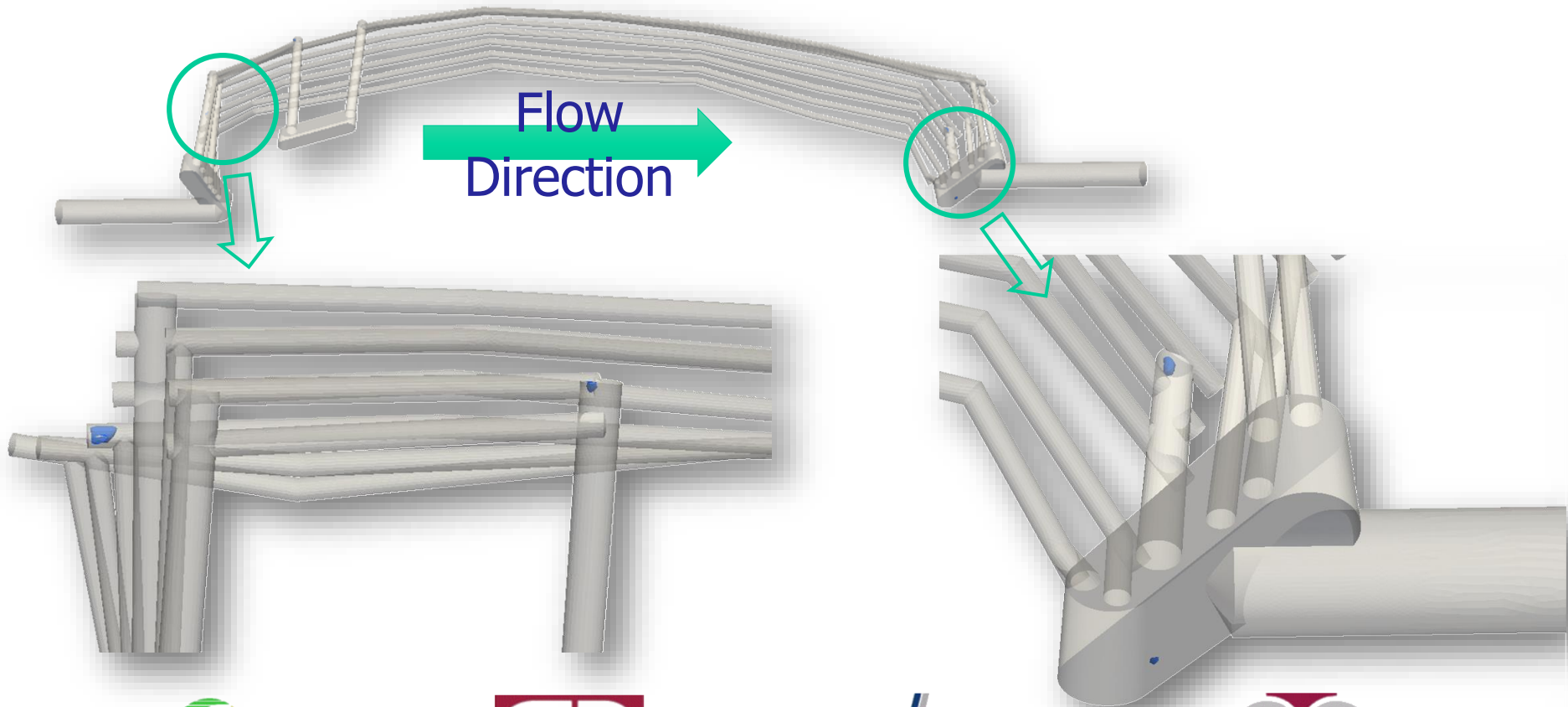
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QUENCHING SIMULATION

- Air Pocket in Lower die circuit



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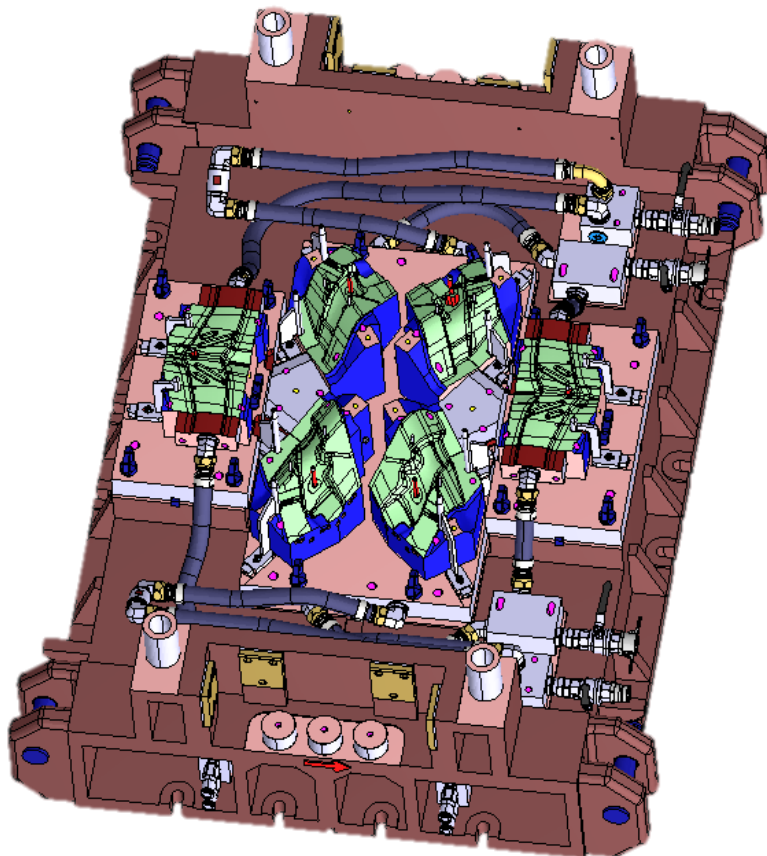


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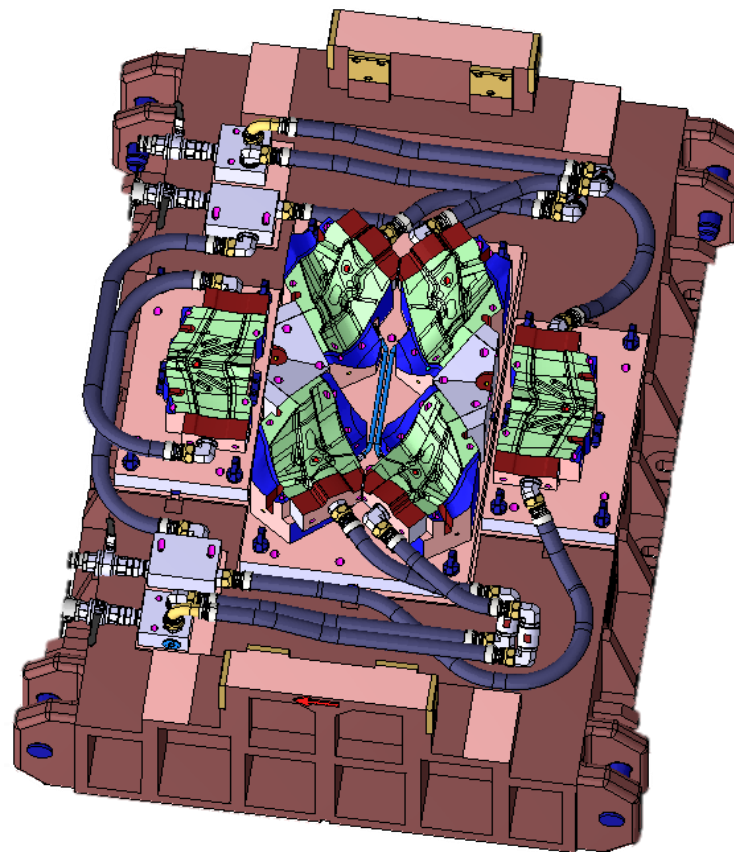
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PRESS HARDENED DIE DESIGN



LOWER DIE



UPPER DIE

6 - CAVITYS



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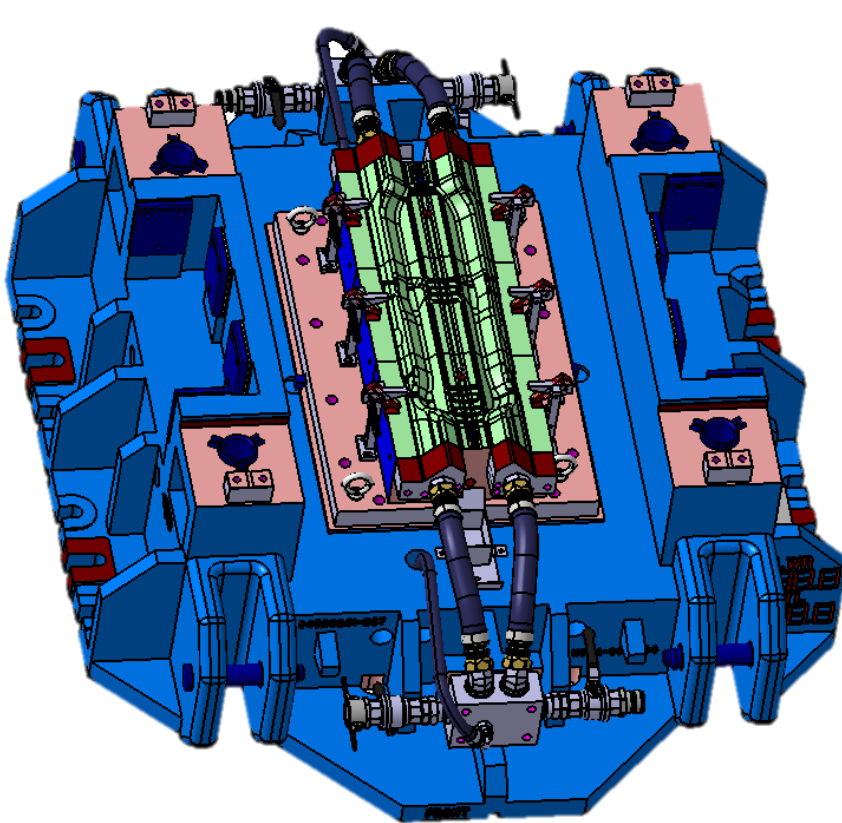


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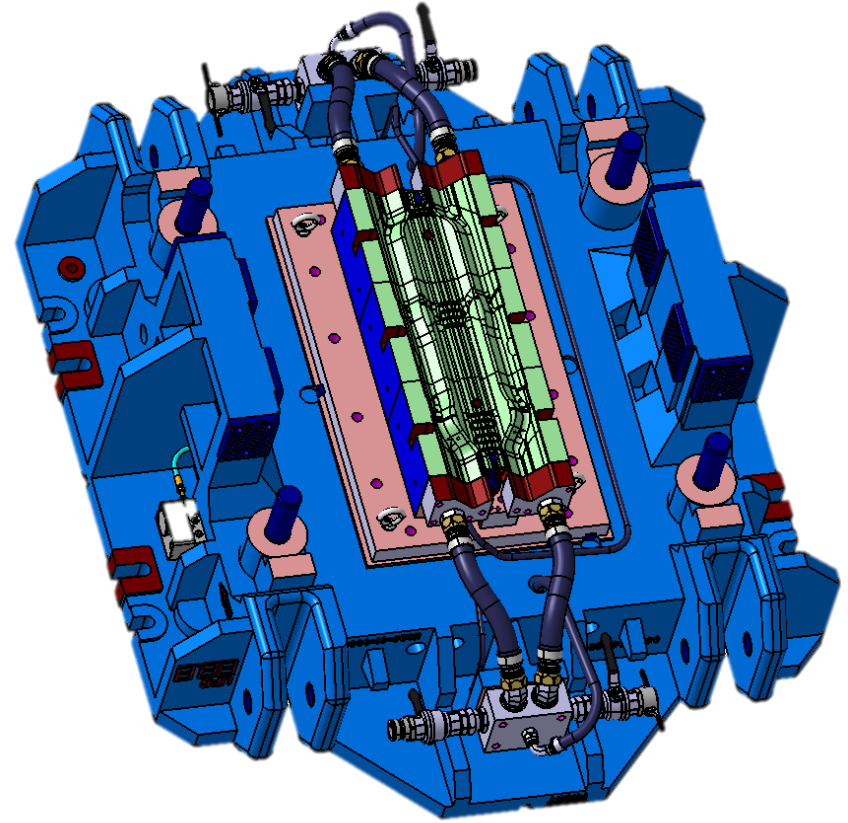
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PRESS HARDENED DIE DESIGN



LOWER DIE



UPPER DIE



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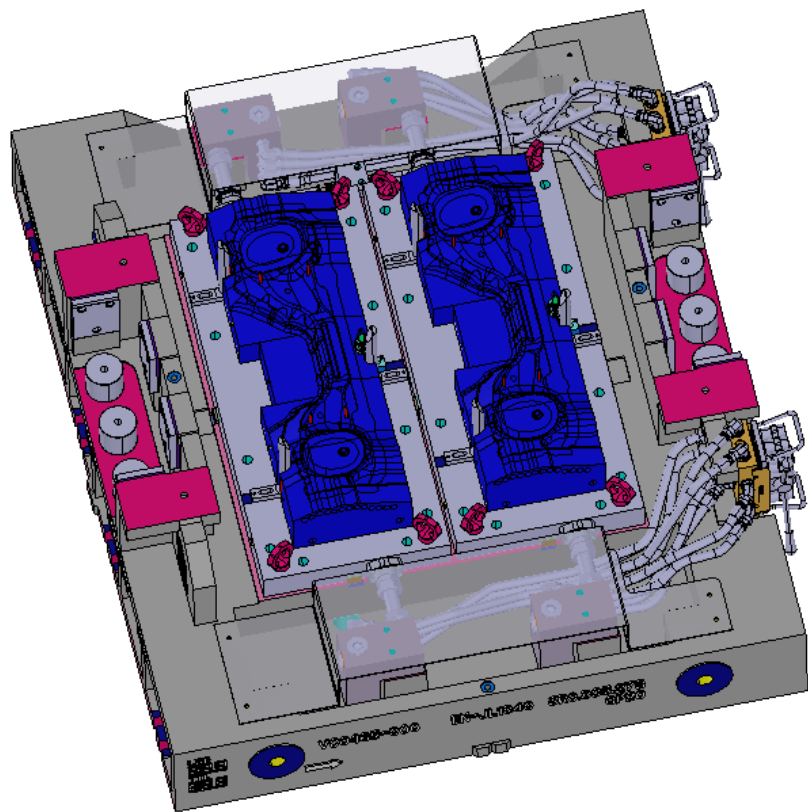


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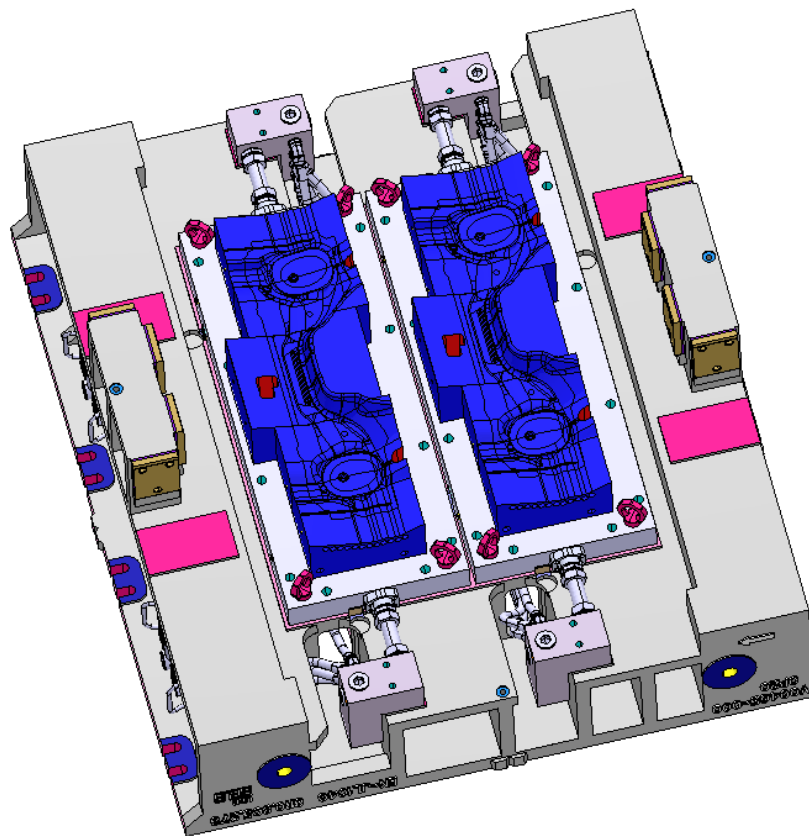
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PRESS HARDENED DIE DESIGN



LOWER DIE



UPPER DIE

2 CAVITYS SAME PART



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DTG PHS PRODUCTION TOOLING



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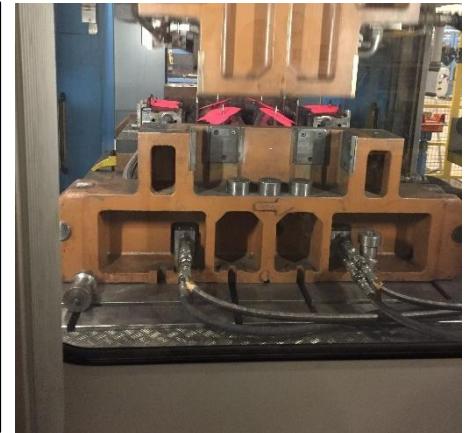
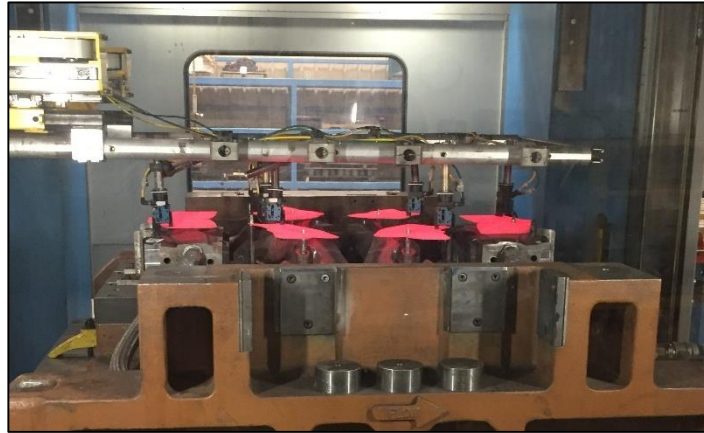


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LOW VOLUME PRODUCTION OF HOT STAMPINGS AND ASSEMBLIES



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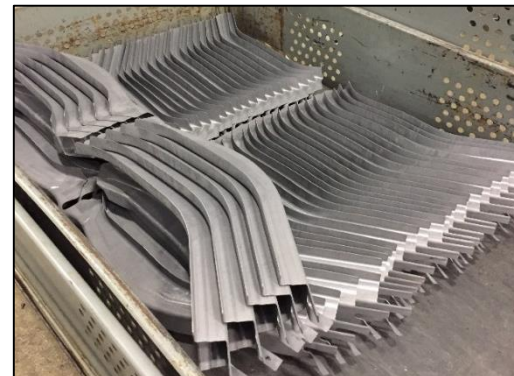
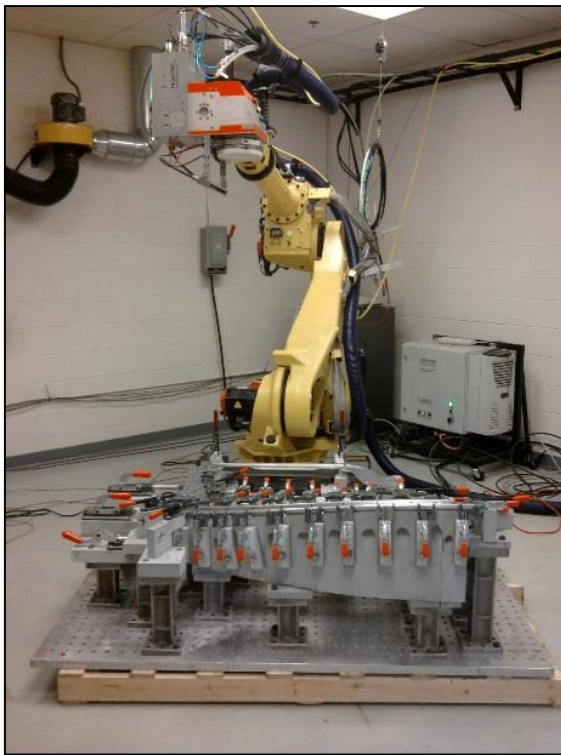


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LOW VOLUME PRODUCTION OF HOT STAMPINGS AND ASSEMBLIES



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Contact Information

Sales Team

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