DIVERSIFIED TOOLING

G • R • O • U • P

PRESS HARDENED STEEL TOOLING AND PRODUCTION

Superior Cam

Midland Design

Bespro Pattern

American Tooling Center

DIVERSIFIED TOOLING
G • R • O • U • P

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.

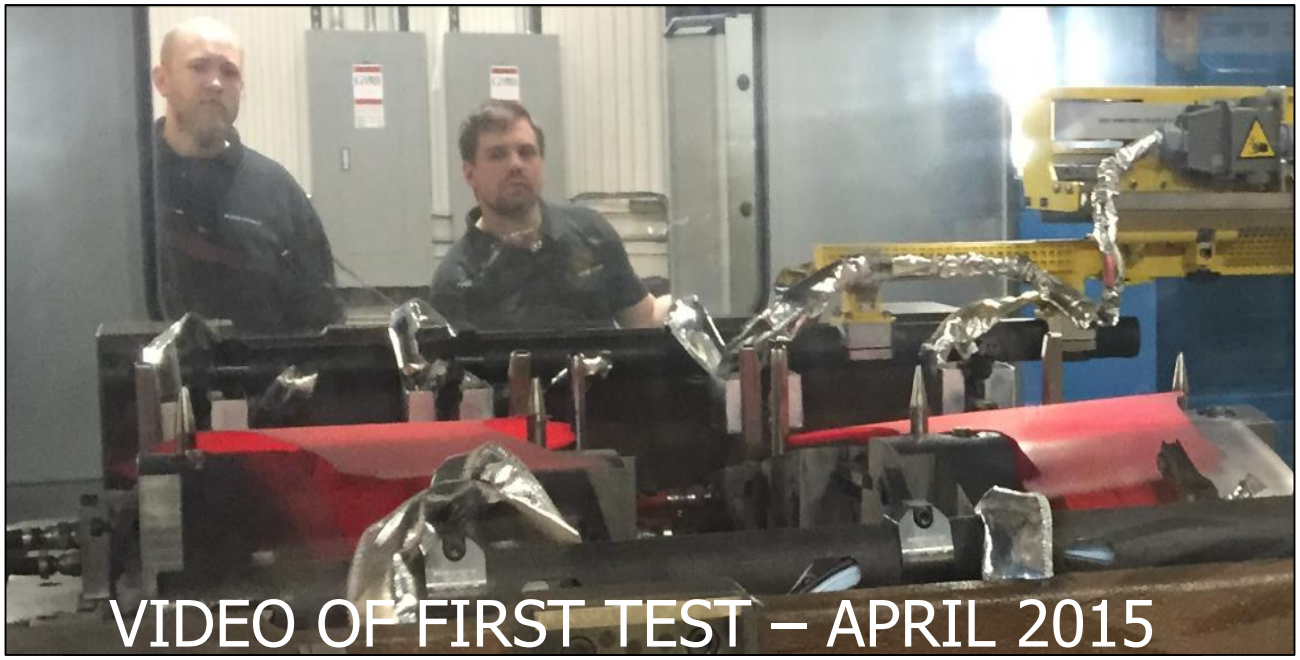
DIVERSIFIED TOOLING
G • R • O • U • P

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.

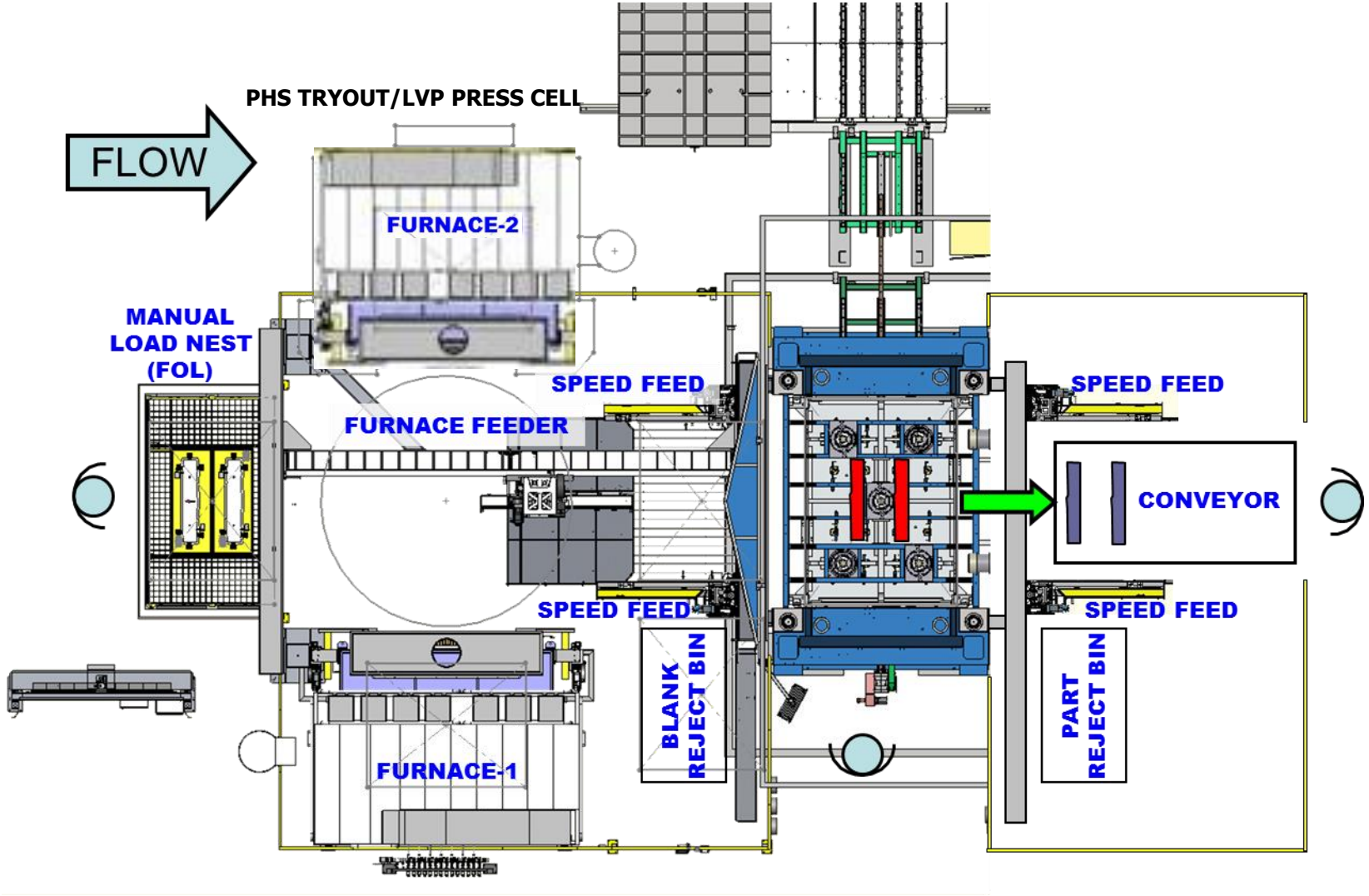
DIVERSIFIED TOOLING
G • R • O • U • P

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



Superior Cam | Midland Design | Bespro Pattern | American Tooling Center

AP&T HOT FORM PRESS LINE



DIVERSIFIED TOOLING
G • R • O • U • P

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 C02 Laser

DIVERSIFIED TOOLING

G • R • O • U • P

Superior Cam | Midland Design | Bespro Pattern | American Tooling Center

DIVERSIFIED TOOLING
G • R • O • U • P

PRIMA LASERNEXT LN-1530

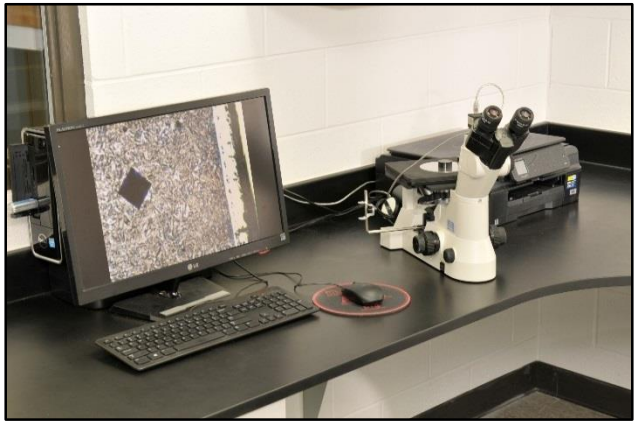
DIVERSIFIED TOOLING
G • R • O • U • P

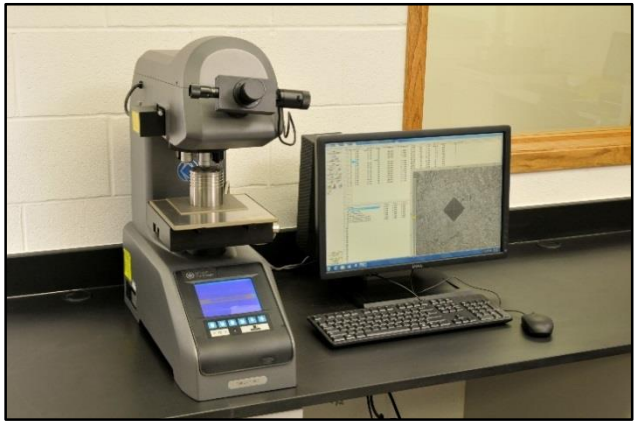
QUALITY CONTROL

- 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

DIVERSIFIED TOOLING
G • R • O • U • P

PHS METALLURGICAL LABORATORY

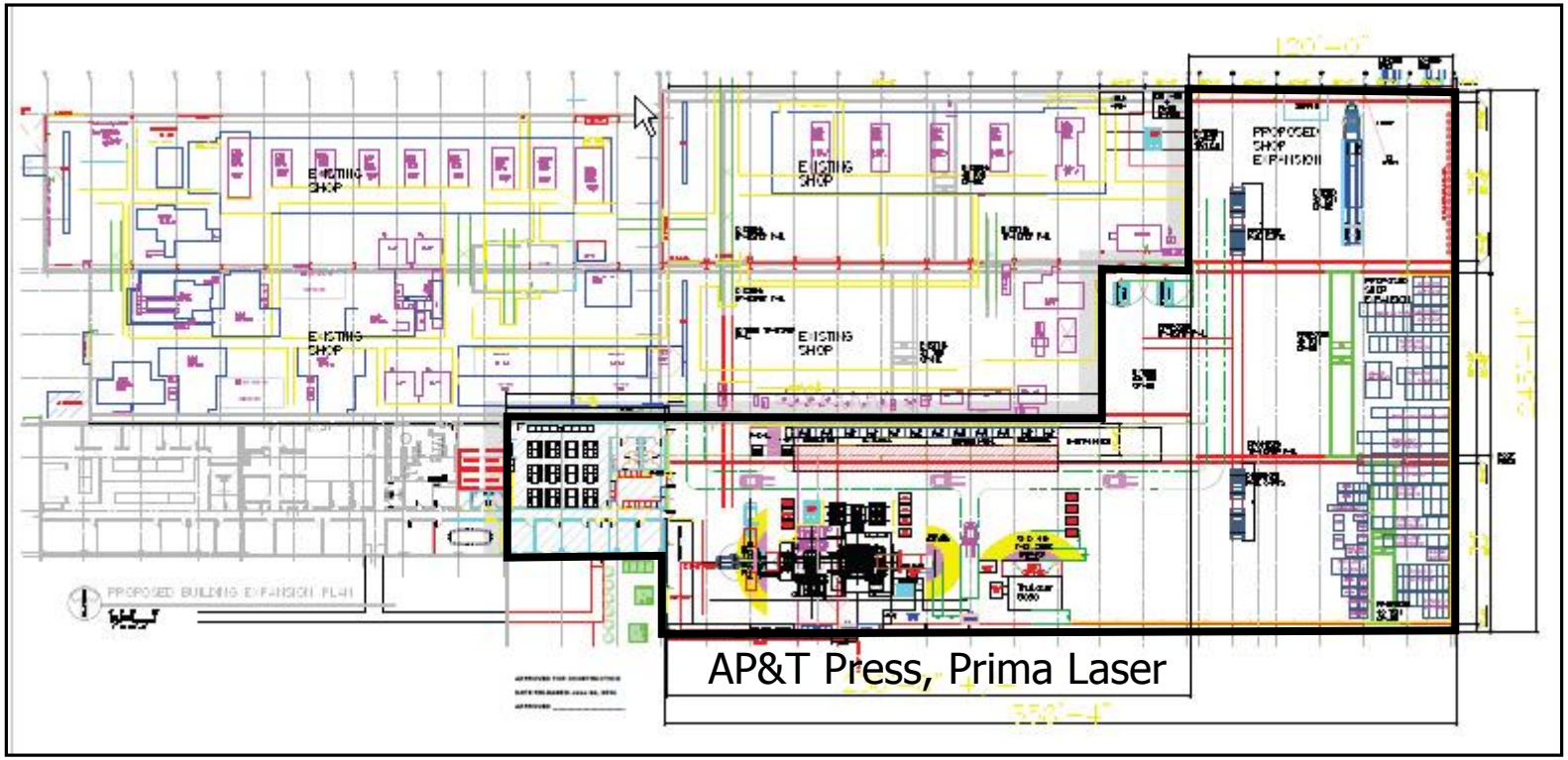




Superior Cam | Midland Design | Bespro Pattern | American Tooling Center

DIVERSIFIED TOOLING

G • R • O • U • P



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

Superior Cam | Midland Design | Bespro Pattern | American Tooling Center

DIVERSIFIED TOOLING
G • R • O • U • P

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.

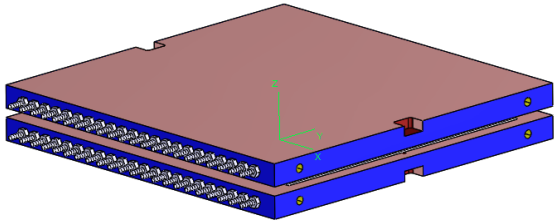
DIVERSIFIED TOOLING
G • R • O • U • P

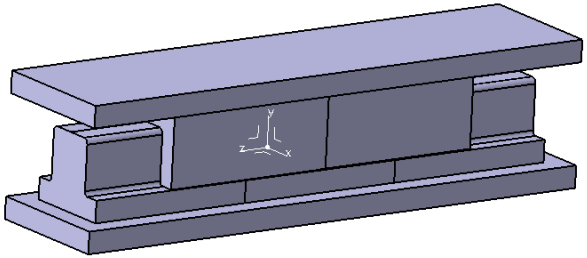
R&D AND PROTOTYPE PARTS

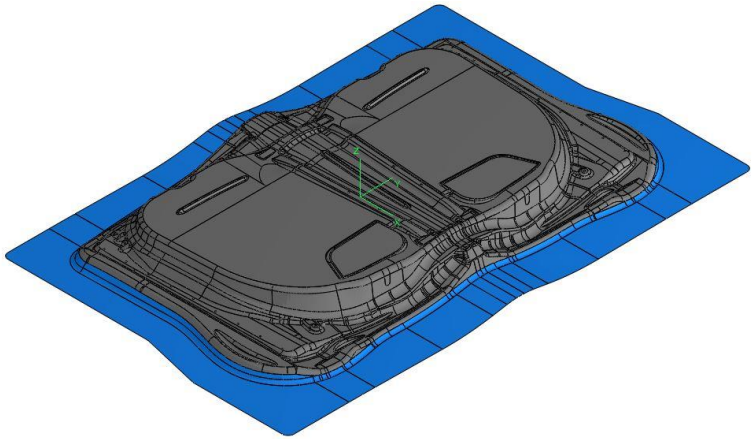
- Material Characterization, Trials, Evaluations.
- Process Development (Furnace Ramps, Blank Temperatures, Soak Times, Tonnages/Speeds)
- Tensile, Bend and Weld Coupons & Beams
- Press Hardened Steel & W/H Form AL Feasibility.
- Soft Tool Prove Outs and Blank Developments.
- Laser Cut Process & Programs,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

DIVERSIFIED TOOLING
G • R • O • U • P

RESEARCH AND DEVELOPMENT







Superior Cam

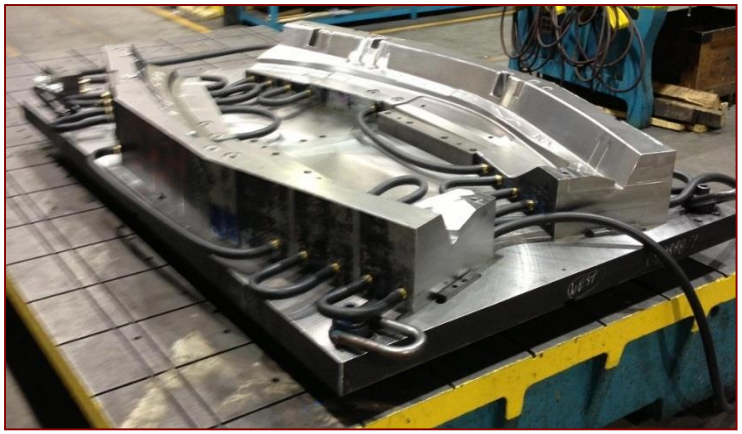
Midland Design

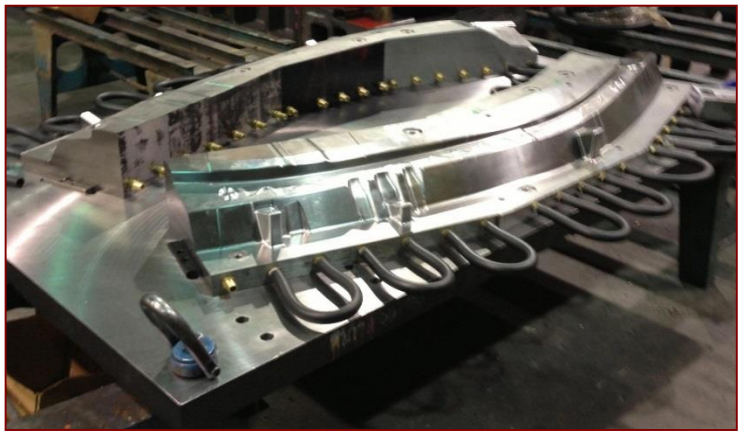
Bespro Pattern

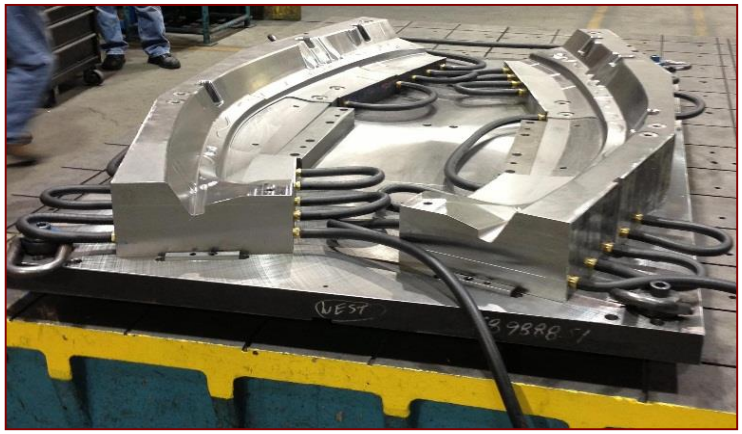
American Tooling Center

DIVERSIFIED TOOLING
G • R • O • U • P

DTG PHS PROTOTYPE TOOLING



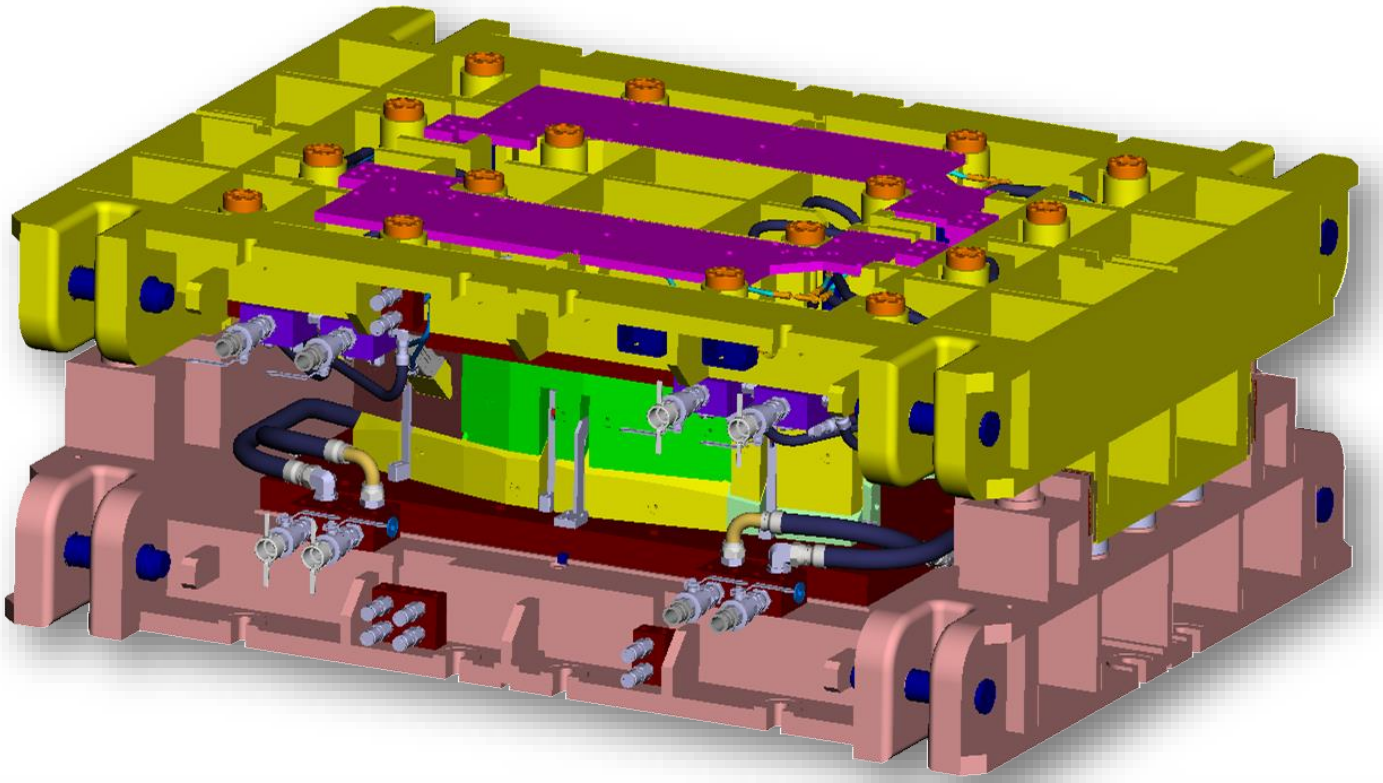




Superior Cam | Midland Design | Bespro Pattern | American Tooling Center

DIVERSIFIED TOOLING
G • R • O • U • P

DTG PHS PRODUCTION TOOLING



DIVERSIFIED TOOLING

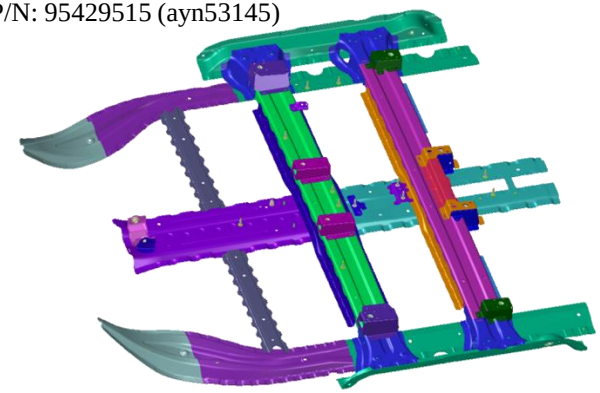
G • R • O • U • P

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

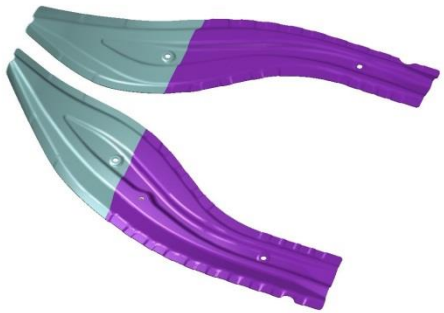
ASSEMBLY

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



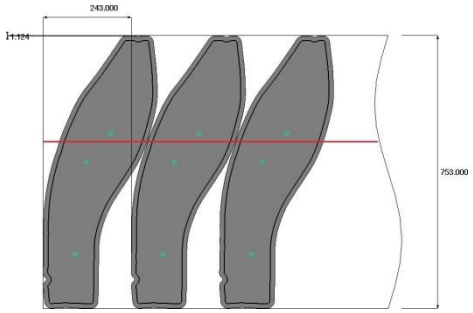
OP	DESCRIPTION
10	
20	
30	
40	
50	
60	
70	
80	
90	
100	
110	
120	
130	

PART VIEW



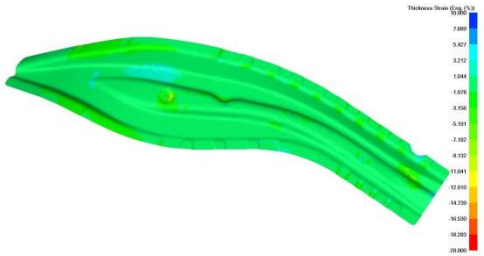
BLANK LAYOUT

Hot Stamping Blank



FORMABILITY SIMULATION

(Thickness Strain)

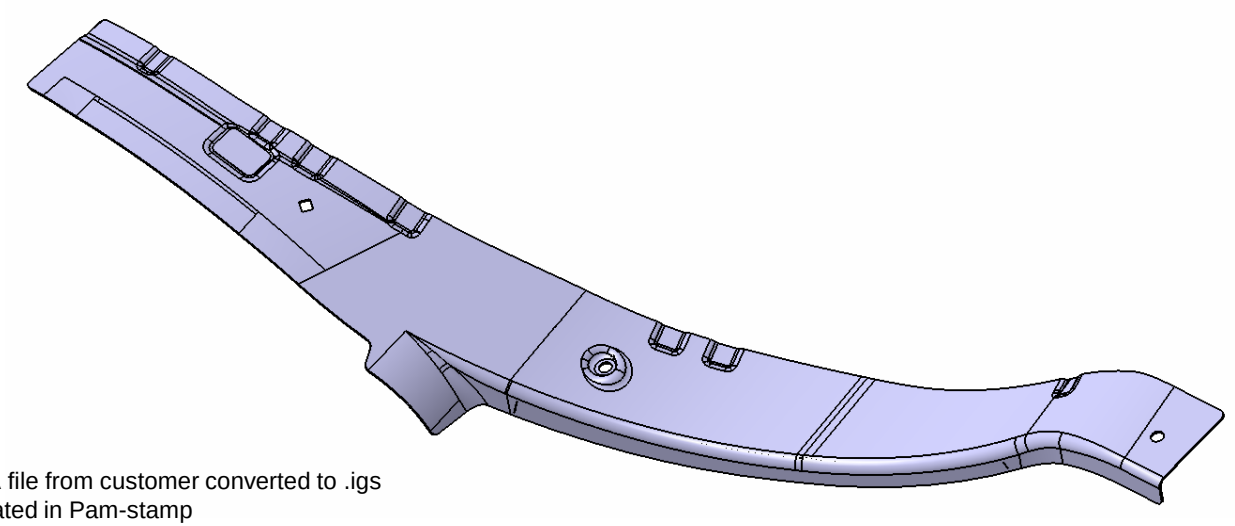


NOTES	**TAILOR WELD HOT STAMP. MANUFACTURABILITY CONCERN.**

DIVERSIFIED TOOLING
G • R • O • U • P

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:

Superior Cam

Midland Design

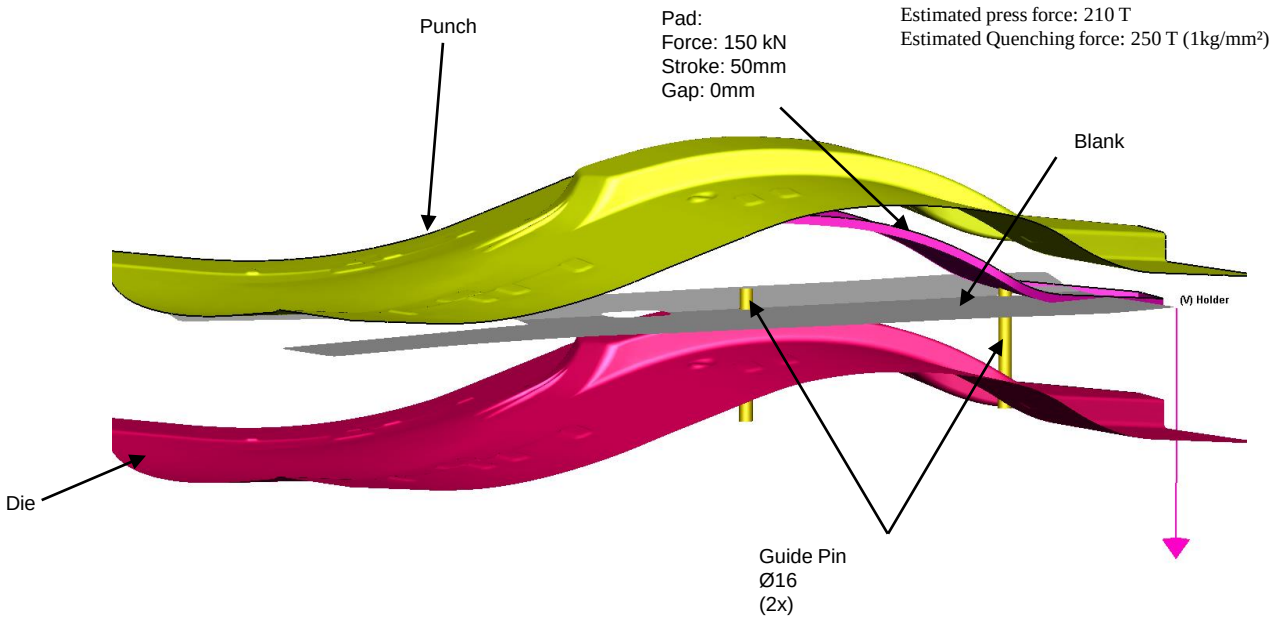
Bespro Pattern

American Tooling Center

DIVERSIFIED TOOLING
G • R • O • U • P

DIE SETUP & TOOLS

Tools



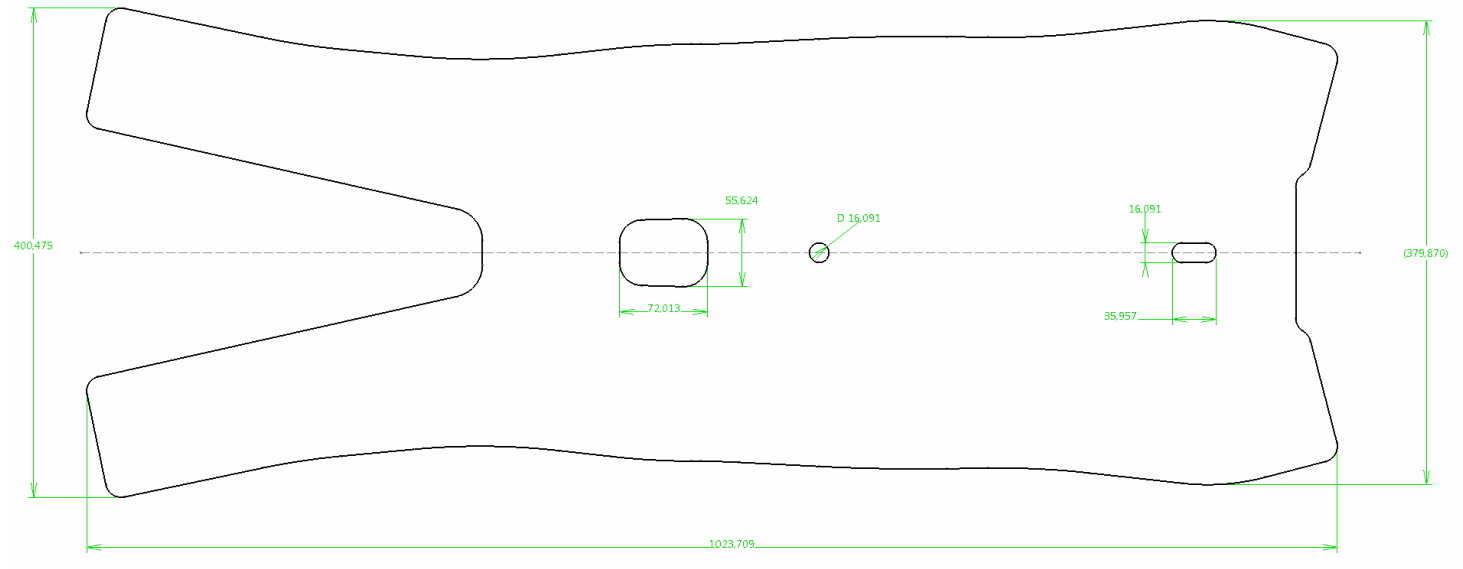
Superior Cam | Midland Design | Bespro Pattern | American Tooling Center

DIVERSIFIED TOOLING

G • R • O • U • P

BLANK & DETAIL

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



Superior Cam

Midland Design

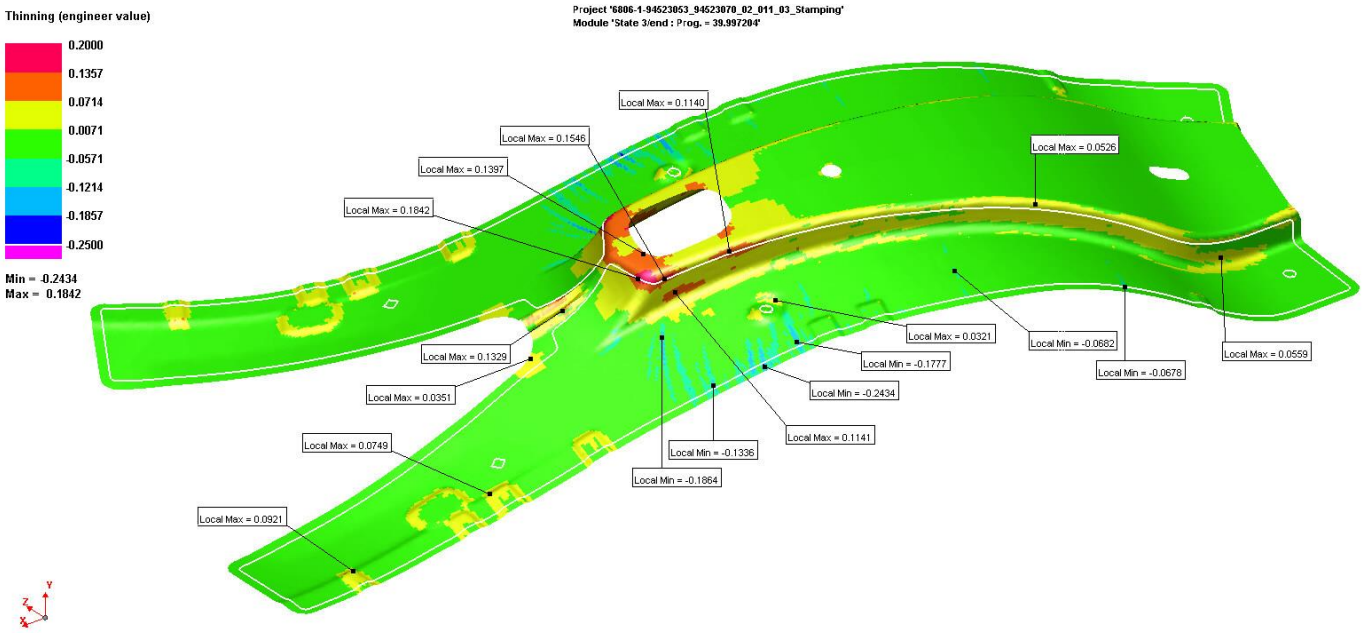
Bespro Pattern

American Tooling Center

DIVERSIFIED TOOLING

G • R • O • U • P

THINNING



Superior Cam

Midland Design

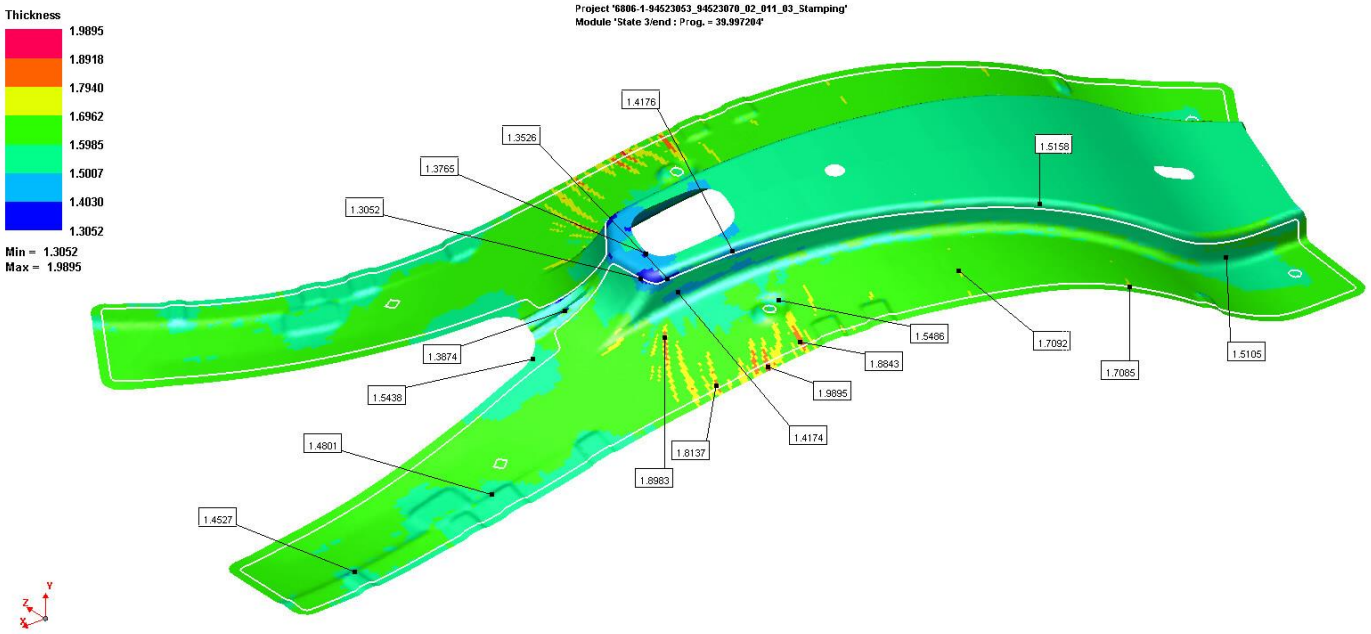
Bespro Pattern

American Tooling Center

DIVERSIFIED TOOLING

G • R • O • U • P

THICKENING



Superior Cam

Midland Design

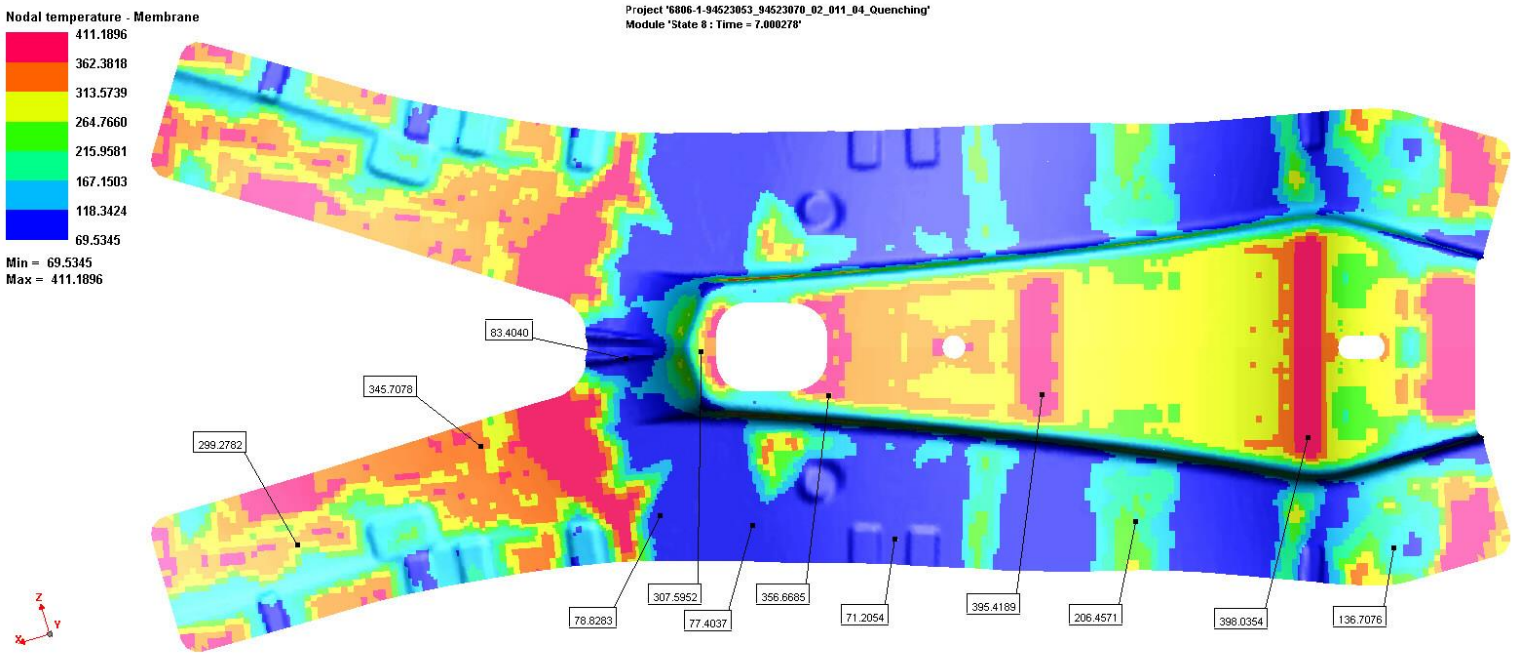
Bespro Pattern

American Tooling Center

DIVERSIFIED TOOLING

G • R • O • U • P

TEMP QUENCHING 7s



Superior Cam

Midland Design

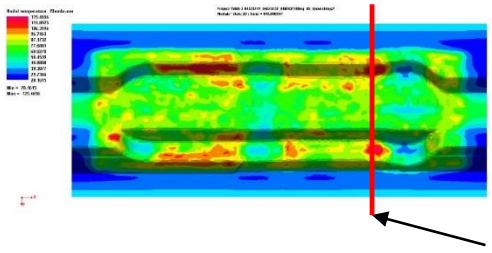
Bespro Pattern

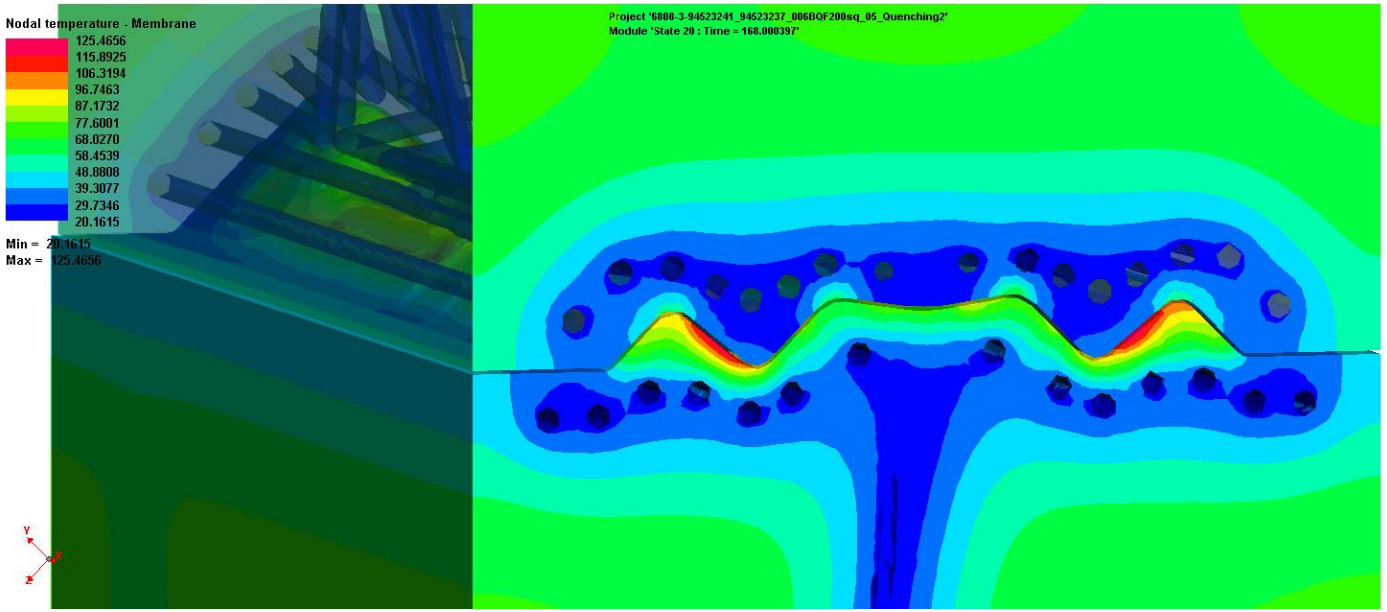
American Tooling Center

DIVERSIFIED TOOLING

G • R • O • U • P

QUENCHING SIMULATION





Superior Cam

Midland Design

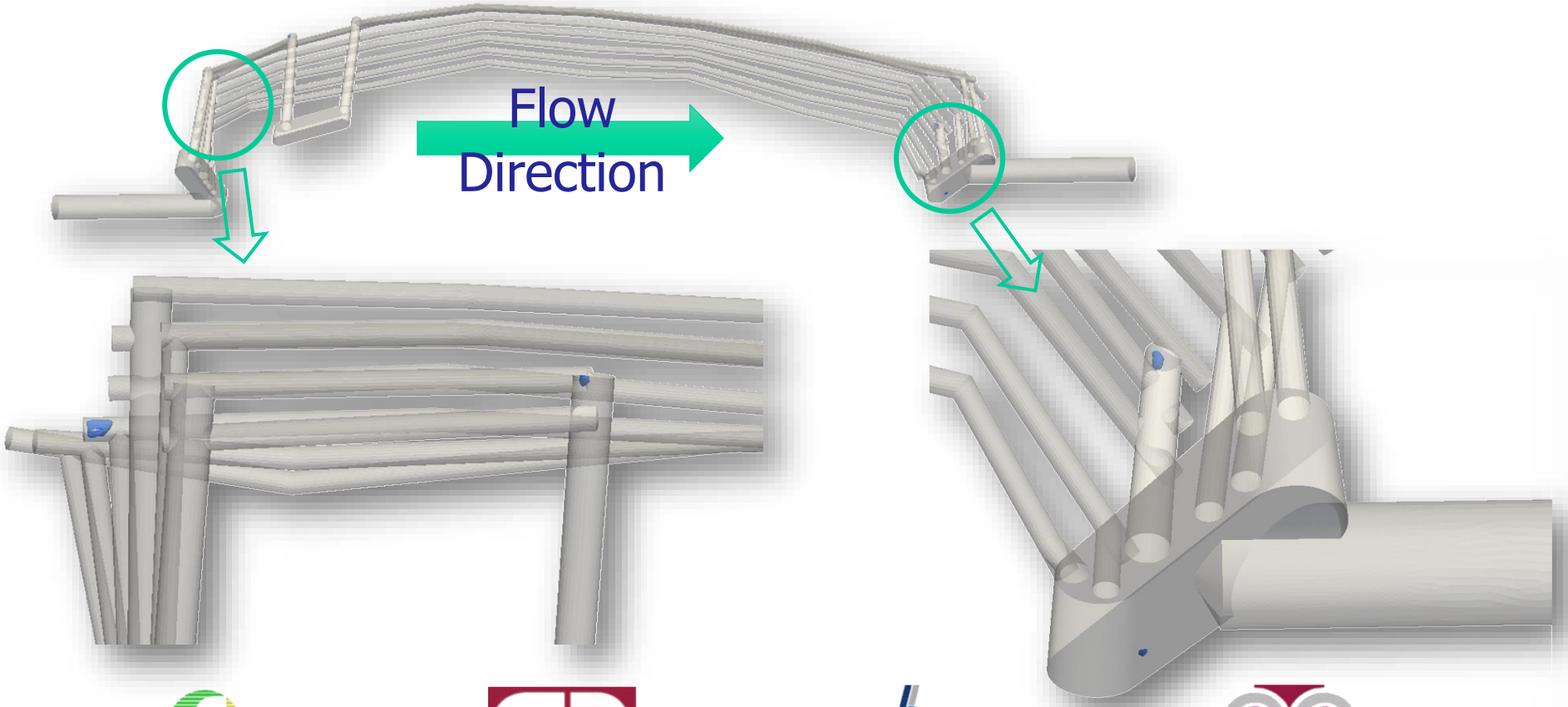
Bespro Pattern

American Tooling Center

DIVERSIFIED TOOLING
G • R • O • U • P

QUENCHING SIMULATION

- Air Pocket in Lower die circuit



Superior Cam

Midland Design

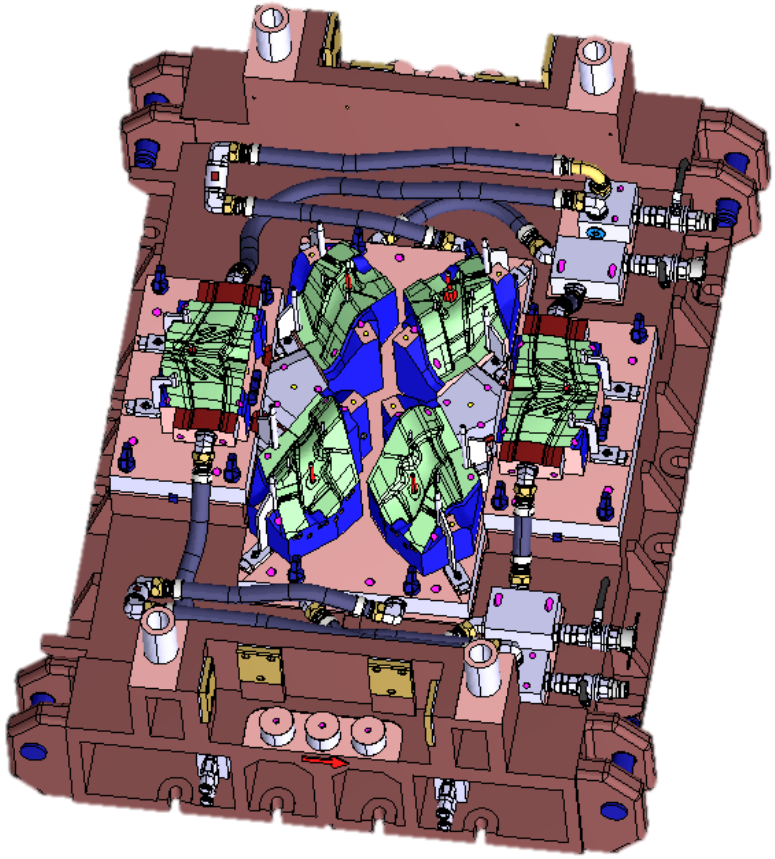
Bespro Pattern

American Tooling Center

DIVERSIFIED TOOLING

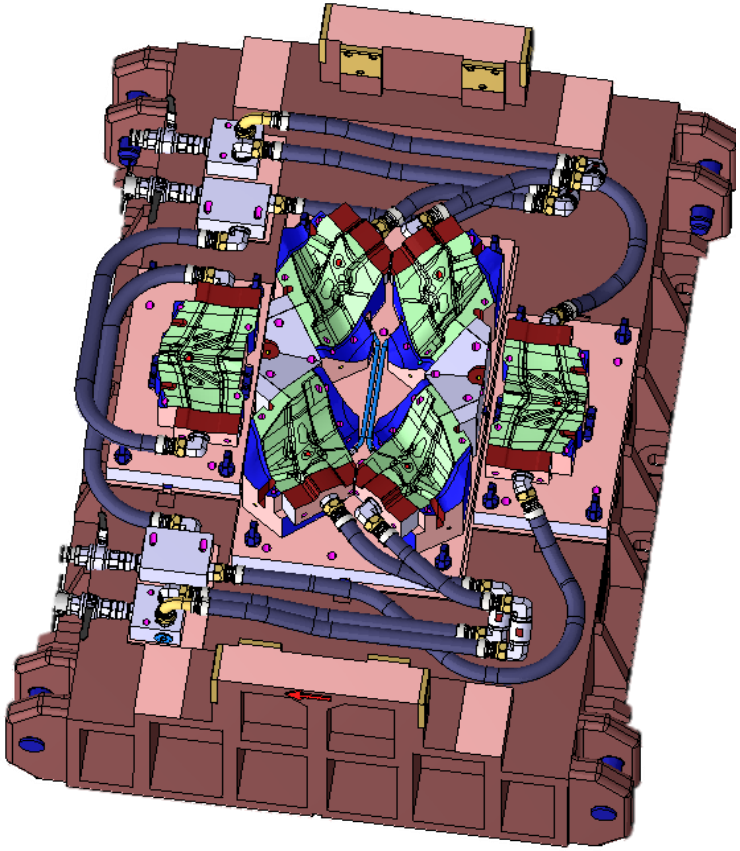
G • R • O • U • P

PRESS HARDENED DIE DESIGN



LOWER DIE

6 - CAVITYS



UPPER DIE

Superior Cam

Midland Design

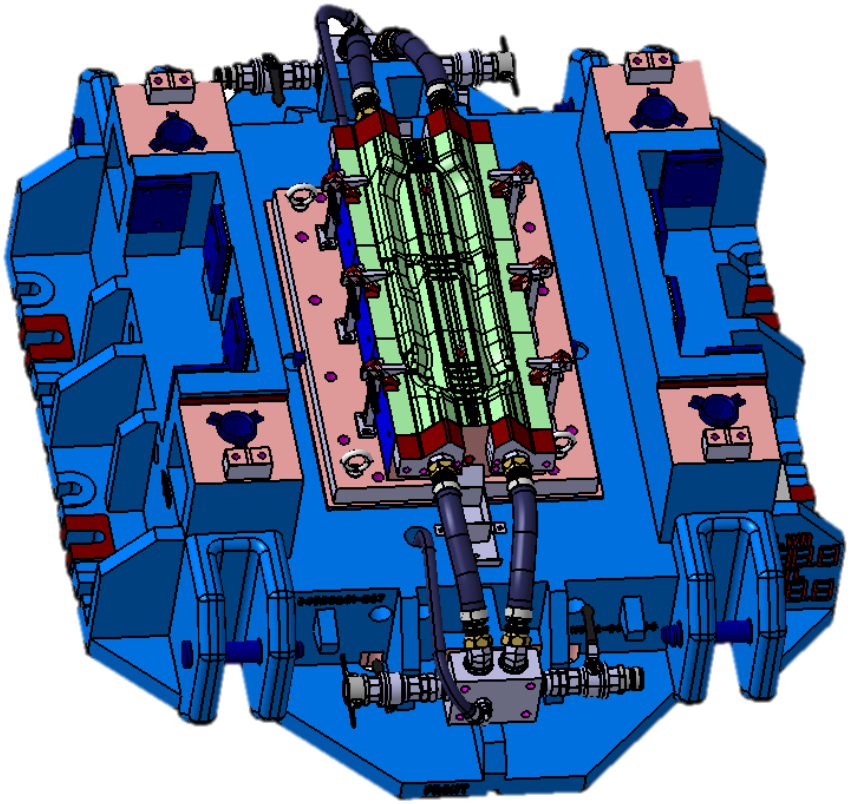
Bespro Pattern

American Tooling Center

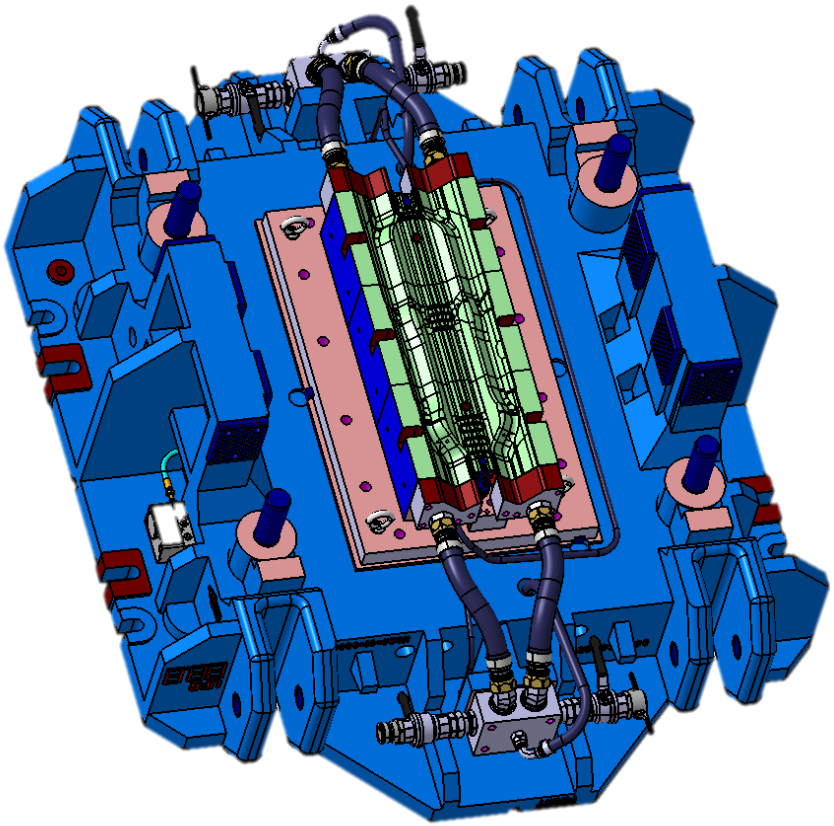
DIVERSIFIED TOOLING

G • R • O • U • P

PRESS HARDENED DIE DESIGN



LOWER DIE



UPPER DIE

Superior Cam

Midland Design

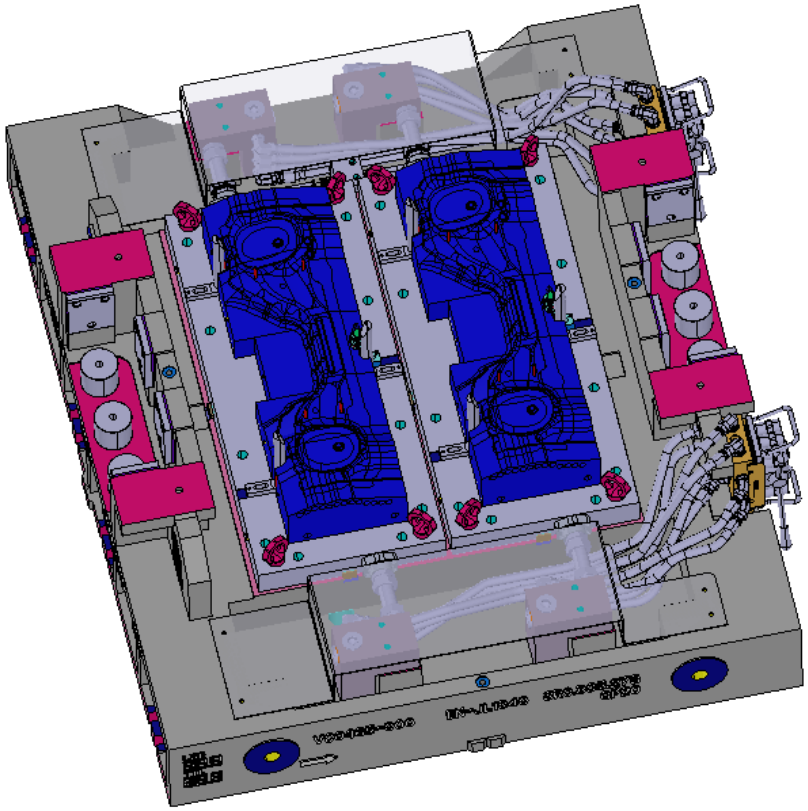
Bespro Pattern

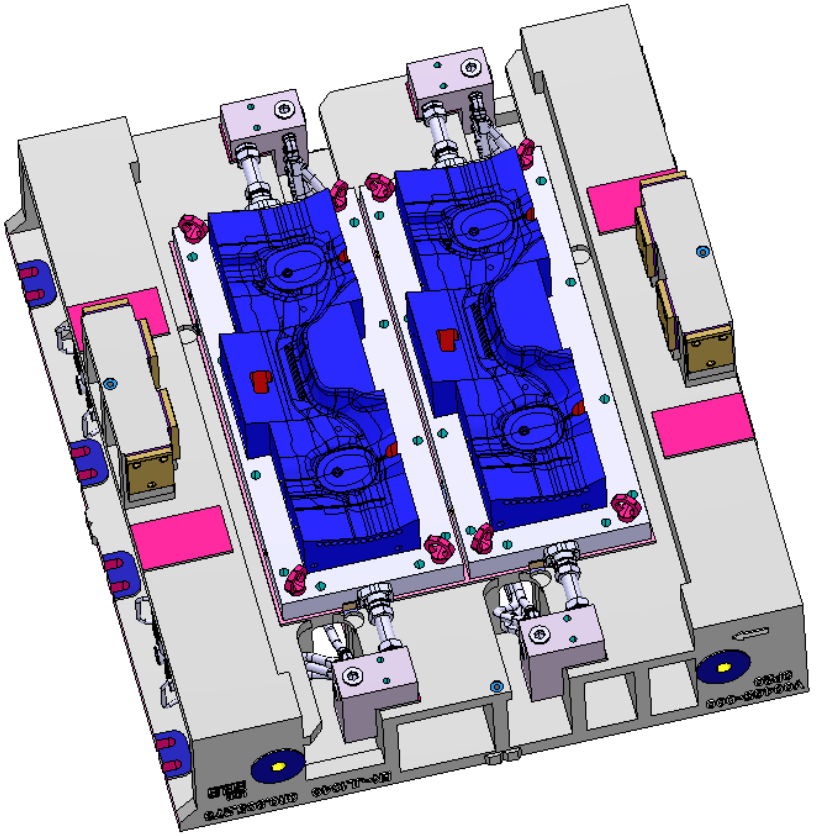
American Tooling Center

DIVERSIFIED TOOLING

G • R • O • U • P

PRESS HARDENED DIE DESIGN





LOWER DIE

2 CAVITYS SAME PART

UPPER DIE

Superior Cam

Midland Design

Bespro Pattern

American Tooling Center

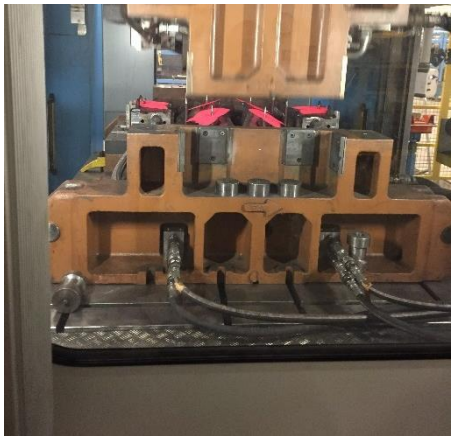
DIVERSIFIED TOOLING
G • R • O • U • P

DTG PHS PRODUCTION TOOLING

DIVERSIFIED TOOLING

G • R • O • U • P

LOW VOLUME PRODUCTION OF HOT STAMPINGS AND ASSEMBLIES



Superior Cam

Midland Design

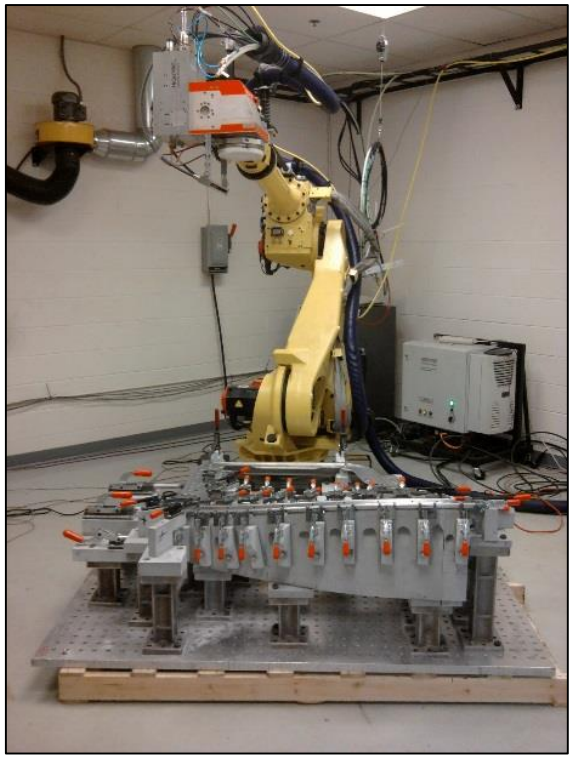
Bespro Pattern

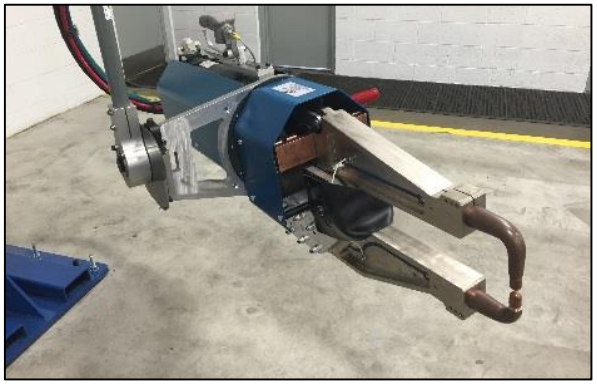
American Tooling Center

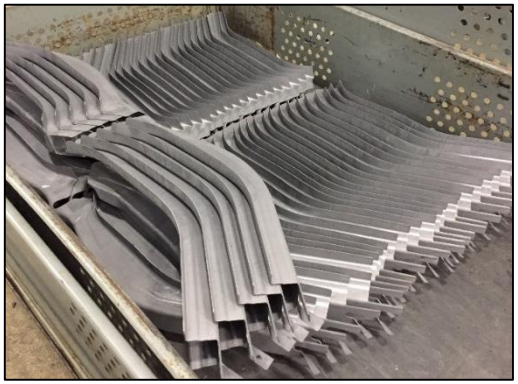
DIVERSIFIED TOOLING

G • R • O • U • P

LOW VOLUME PRODUCTION OF HOT STAMPINGS AND ASSEMBLIES







Superior Cam

Midland Design

Bespro Pattern

American Tooling Center

DIVERSIFIED TOOLING
G • R • O • U • P

Contact Information

Sales Team

Mike Austin Sales Engineer Office: 248-588-1100 Cell: 248-703-8452 Fax: 248-588-1104 maustin@diversifiedtoolinggroup.com	**Mark Dembowski** Sales Engineer Office: 248-588-1100 Cell: 586-255-3057 Fax: 248-588-1104 mdembowski@diversifiedtoolinggroup.com	**Joe Meyecic** Sales Engineer Office: 248-588-1100 Cell: 248-207-8759 Fax: 248-588-1104 jmeyecic@diversifiedtoolinggroup.com
Evan Ericson Sales Engineer Office: 248-588-1100 Cell: 313-670-0839 Fax: 248-588-1104 eericson@diversifiedtoolinggroup.com	**Steve Doolan** Sales Engineer Office: 248-588-1100 Cell: 248-497-1207 Fax: 248-588-1104 sdoolan@diversifiedtoolinggroup.com	**Sales Office** Diversified Tooling Group 31435 Stephenson Highway Madison Heights, MI 48071 Office: 248-588-1100 Fax: 248-588-1104 www.diversifiedtoolinggroup.com

General Inquiries

Superior Cam, Inc. Office: 248-588-1100 Fax: 248-588-1104 info@SuperiorCAM.com	**Midland Design Service, Inc.** Office: 248-588-8833 Fax: 248-588-0558 info@MidlandDesignService.com
Bespro Pattern, Inc. Office: 586-268-6970 Fax: 586-268-7433 rfq@bespropattern.com	**American Tooling Center, Inc.** Office: 517-522-8411 Fax: 517-522-8078 info@AmericanToolingCenter.com