

We believe in **Quality**
and deliver the same

WEBER

NVD NICKEL SHELL TOOLING FOR AUTOMOTIVE INTERIORS

WEBER FACILITY ALSO IN GERMANY SINCE MID-2018!

WEBER FACILITIES LOCATED IN
MIDLAND, ONTARIO, CANADA

- HEAD OFFICES & ENGINEERING
- MOLD MANUFACTURING & ASSEMBLY
- 5-AXIS MACHINING
- NICKEL VAPOR DEPOSITION PLANT
- TOOLING SHIPPED & SERVICED TO MANY PARTS OF THE WORLD



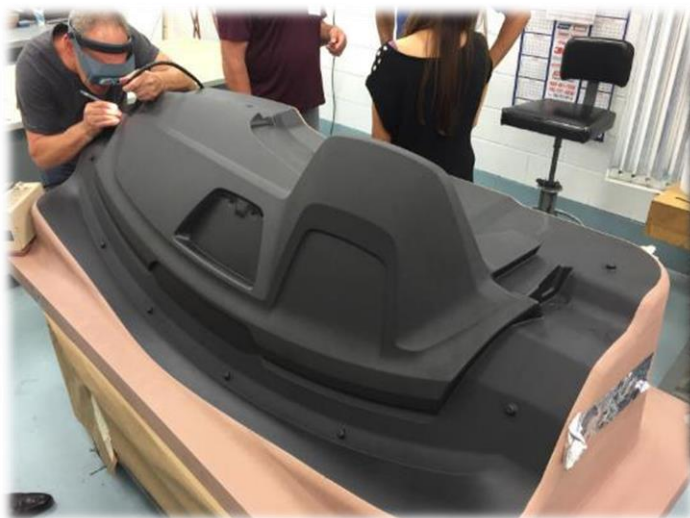
WEBER PROVIDES IN-HOUSE MODEL WRAPPING EXPERIENCE ON ALL INTERIOR PARTS



- HIGH ACCURACY 5-AXIS MACHINING & MANUFACTURING OF MASTER MODEL SUBSTRATES
- EXTENSIVE KNOWLEDGE OF MASTER MODEL APPROVAL REQUIREMENTS WITH OEM'S & TIER 1 SUPPLIERS IN BOTH NORTH AMERICA & EUROPE

FINAL EPOXY MASTER MOTHER MODELS

WEBER CREATES THE FINAL EPOXY MASTER MOTHER MODEL CASTS WHICH OUR NICKEL SHELL TOOLING WILL REPLICATE



- IN-HOUSE EPOXY MODEL CASTING TECHNOLOGY & EXPERTISE
- 5-AXIS MACHINING OF AIR-BAG LOGO LETTERING, RAISED OR POCKET STYLES
- HAND TEXTURING TO HIDE WRAP SEAMS
- 5-AXIS SCRIBING - EDGE OF PART LINES, TRIM LINES, OPENINGS, & PART OR CAVITY IDENTIFICATION AS REQUIRED

STEEL ETCHED OR LASER ENGRAVED MASTER MODELS

WEBER MACHINES STEEL MASTER MODELS FROM P20 TOOL
STEEL ON OUR PRECISION 5-AXIS MACHINING CENTERS

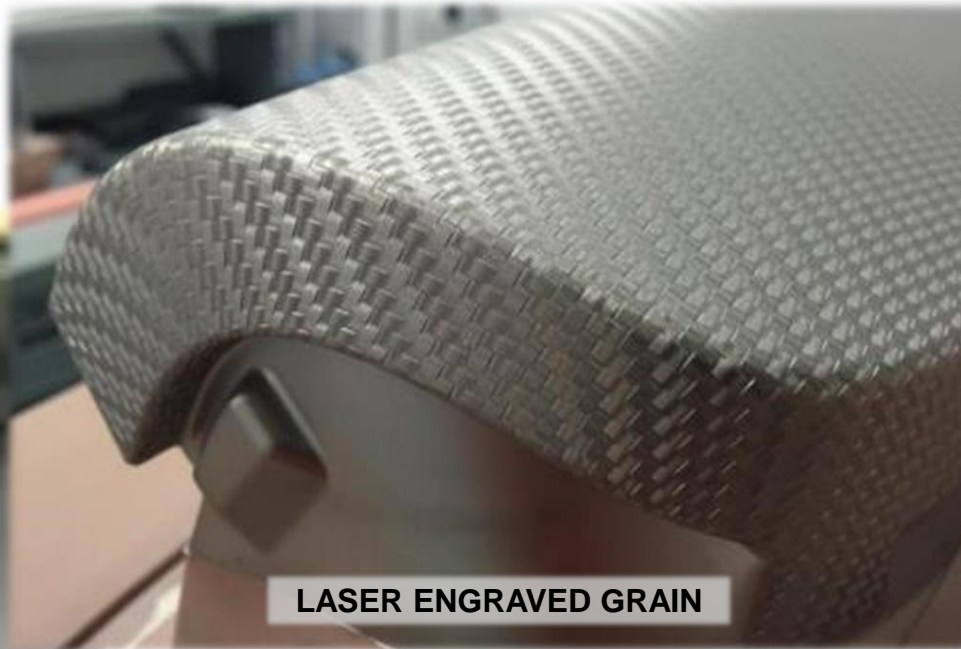
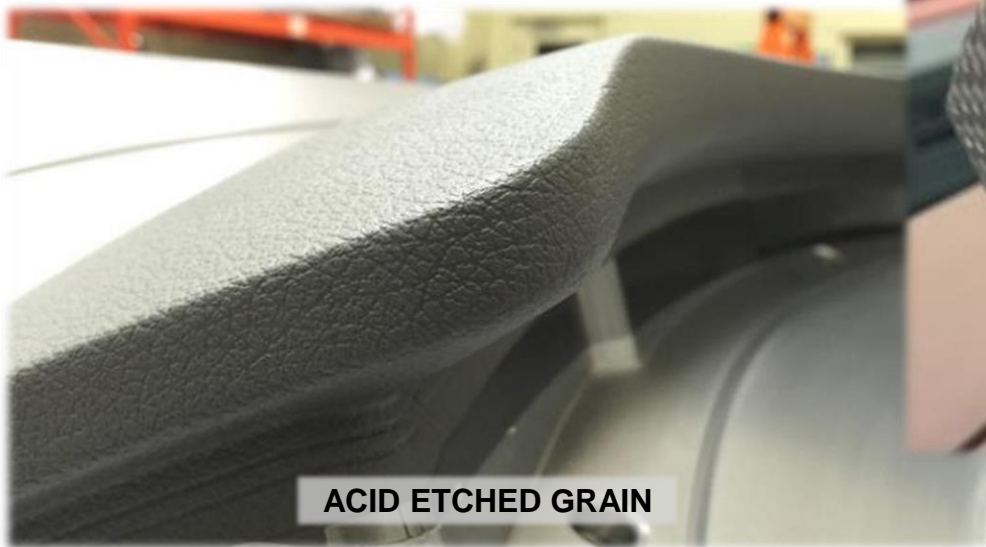


- MULTIPLE GRAIN TYPES & TEXTURE COMBINATIONS CAN BE INCORPORATED TOGETHER INTO STEEL MASTER MODELS
- HIGH ACCURACY - $\pm 0.1\text{mm}$



STEEL ETCHED OR LASER ENGRAVED MASTER MODELS

- MASTER MODELS ARE DIMENSIONALLY RE-INSPECTED AT WEBER AFTER ACID ETCHING OR LASER ENGRAVING
- A SILICONE NEGATIVE IS CAST OVER THE STEEL MASTER REPLICATING THE GRAINING AND GEOMETRY DETAIL FORWARD INTO OUR NVD NICKEL SHELL TOOLING



OVER 70 STEEL MASTER MODELS
PRODUCED TO DATE BY WEBER!

LASER SCANNING OF ALL MASTERING STEPS

- LASER SCANNING PROVIDES A ACCURATE AND COMPLETE PICTURE OF EACH STEP OF THE MASTERING PROCESSES WHEN COMPARED BACK TO THE CUSTOMERS NOMINAL PART CAD DATA



WEBER INVESTS IN THE LATEST 5-AXIS TECHNOLOGIES !

S A V I N G C O S T S :

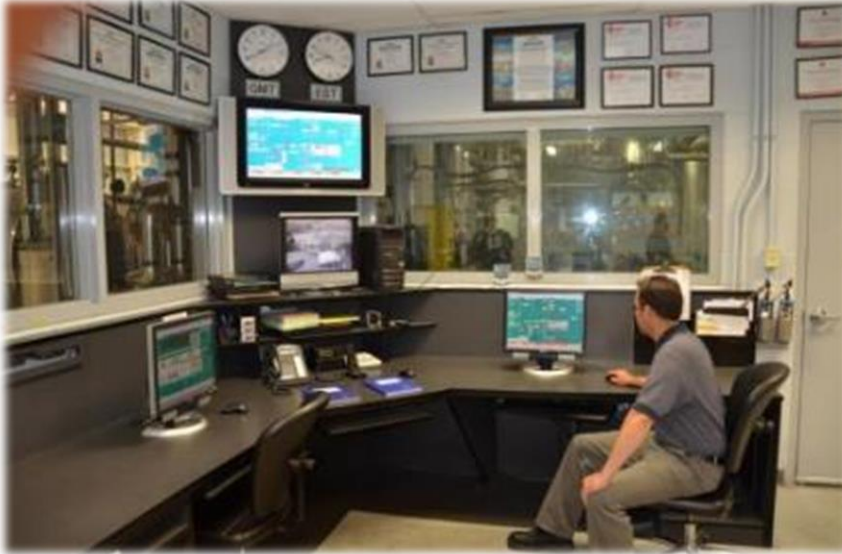
DEPOSITION MANDREL MANUFACTURING COSTS, AND MASTER MODEL MANUFACTURING COSTS ARE CONTINUALLY BEING REDUCED BY OUR INVESTMENTS IN THE LATEST 5-AXIS MACHINING TECHNOLOGY

THESE COST SAVINGS ARE PASSED ALONG TO OUR CUSTOMERS



NICKEL VAPOR DEPOSITION

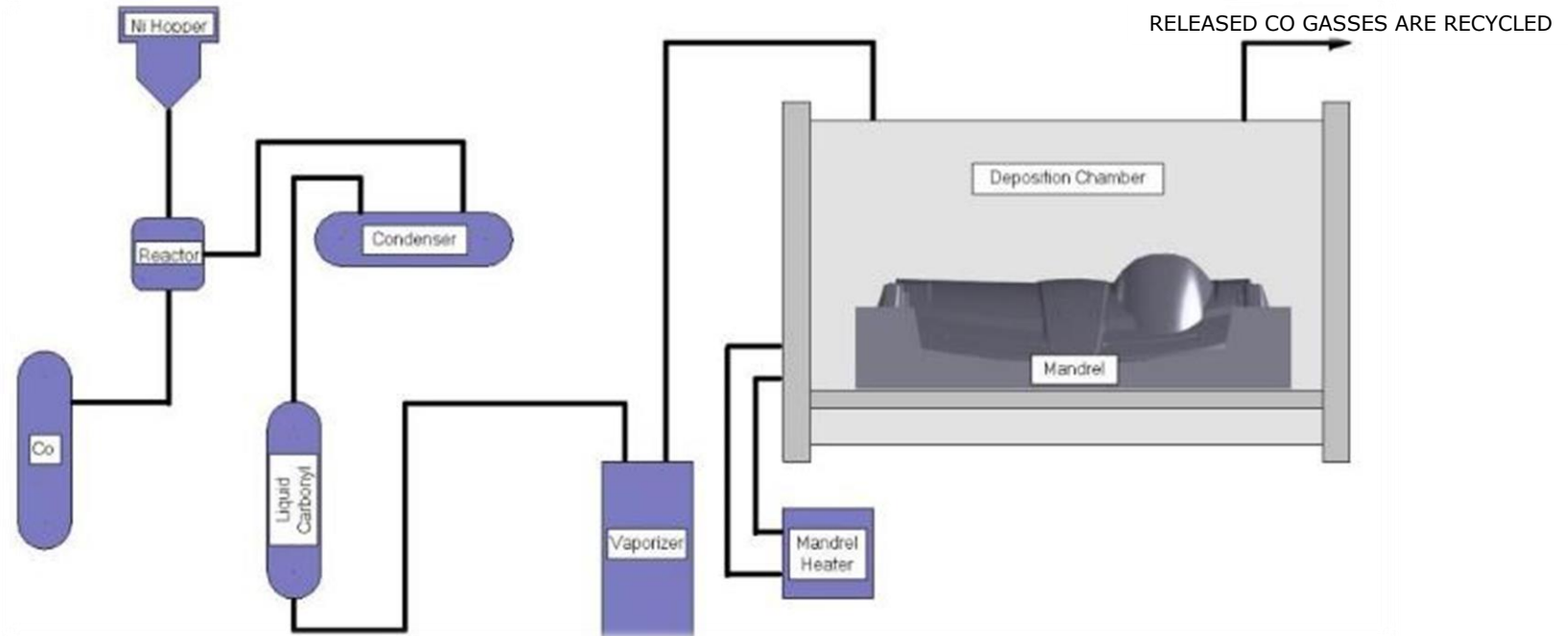
THE SUPERIOR ALTERNATIVE TO ELECTROFORMING



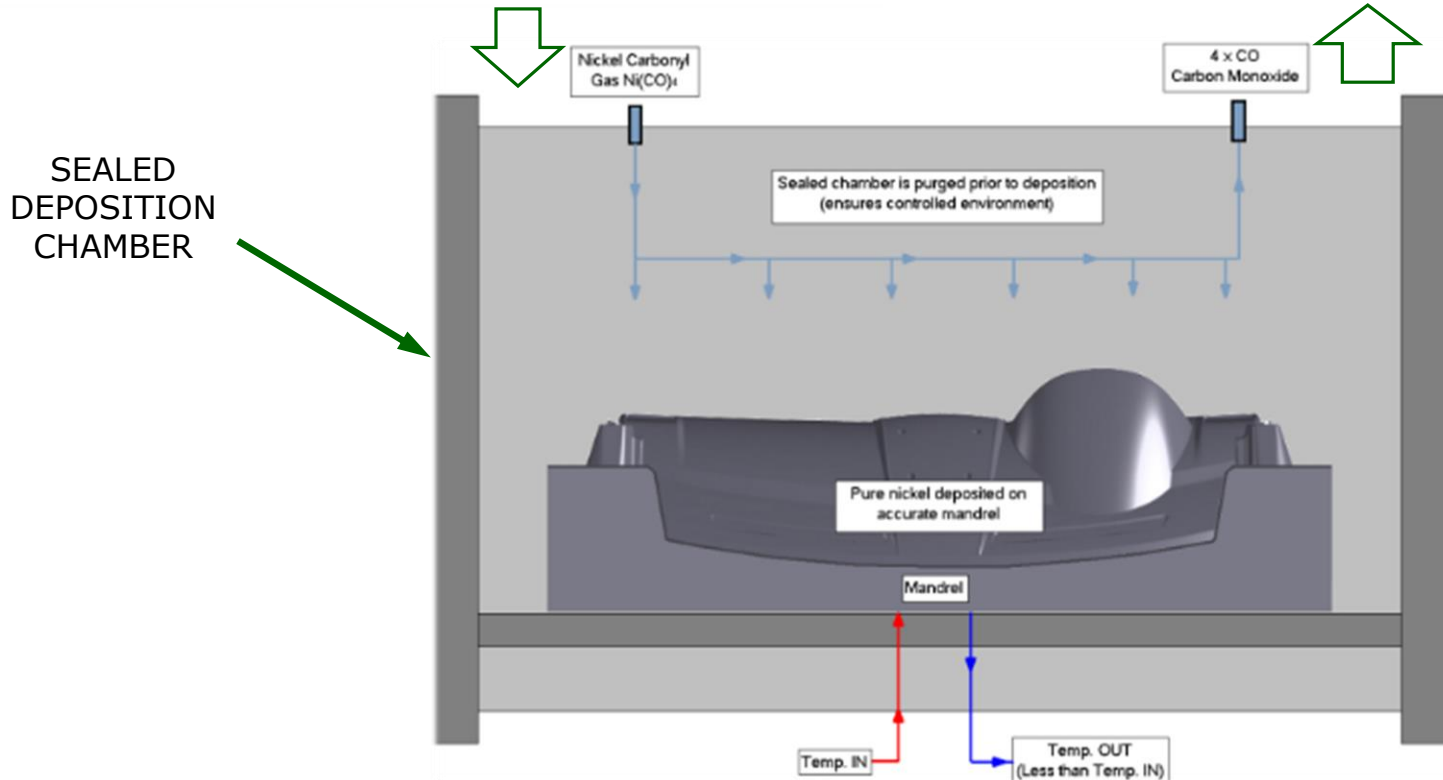
- STATE-OF-THE-ART NICKEL CARBONYL PLANT COMMISSIONED IN 2000
- NO ENVIROMENTAL IMPACT (CLOSED LOOP SYSTEM RECYCLES GASES)
 - MAXIMUM DEPOSITION SIZES = 66" x 183" or 90" x 120"
 - 400,000 LBS/YR NICKEL DEPOSITION CAPACITY
 - 4 PRODUCTION & 1 R&D CHAMBER
 - 24 x 7 OPERATION

NICKEL VAPOR DEPOSITION PROCESS

- RE-USABLE DEPOSITION MANDREL IS PLACED INTO THE DEPOSITION CHAMBER AND HEATED TO APPROXIMATELY 350°F (175°C)
- MULTIPLE NICKEL SHELLS ARE MADE SEQUENTIALLY FROM THE SAME DEPOSITION MANDREL
- DEPOSITION MANDREL IS CLEANED, RE-ASSEMBLED, & RE-PREPARED PRIOR TO EACH USE

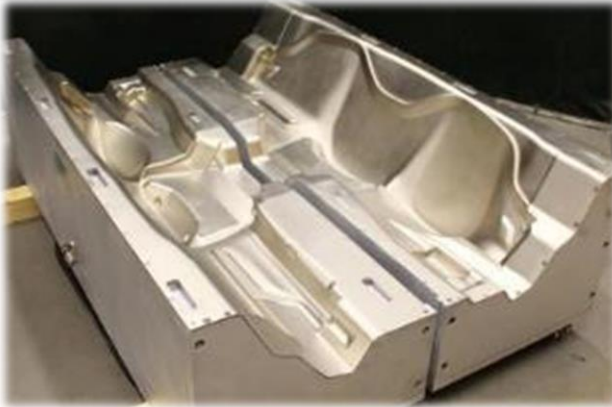


NICKEL VAPOR DEPOSITION PROCESS



THE NICKEL CARBONYL GAS FLOWS OVER A RE-USABLE DEPOSITION MANDREL CREATING A UNIFORM THICKNESS NICKEL SHELL AT A GROWTH RATE OF .010" (0.25mm) PER HOUR REGARDLESS OF THE PART SIZE

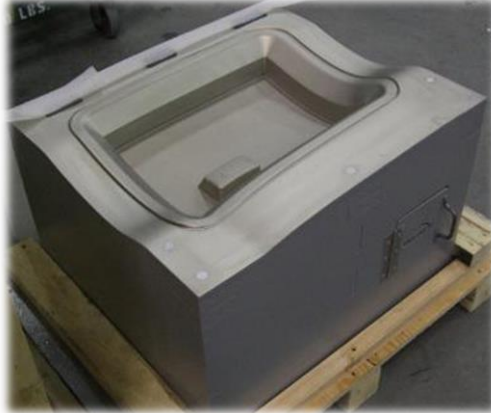
NVD NICKEL SHELL TOOLING APPLICATIONS



NEGATIVE VAC FORM IN-MOLD-GRAINING MOLDS (IMG, IMG/L)



NVD NICKEL SHELL TOOLING APPLICATIONS



SPRAY PU MOLDS – WITH TWO COLOR SPRAY MASKS
WATER HEATING or ELECTRICAL HEATING SYSTEMS



TEXTURED RIM OVERMOLDS
(NICKEL SHELL MOUNTED INTO A CAVITY)

NVD NICKEL SHELL TOOLING APPLICATIONS



EXTERNALLY HEATED SLUSH MOLDS
(All FORCED AIR METHODS, INFRA RED, SAND, ETC.)



3D CAST ALUMINUM POWDER TUBS, TOOL FRAMES,
POWDER BOX FRAMES

THE NICKEL VAPOR DEPOSITION PROCESS SAVES COST AND TIME

B E T T E R T I M I N G :

- 5-6 WEEK TIMING ADVANTAGE TO THE 1ST TOOL
- OVER 20 TIMES FASTER THAN THE ELECTROFORMING PROCESS, AND CREATES A SUPERIOR QUALITY NICKEL SHELL!
- CONSECUTIVE NICKEL SHELLS ARE CREATED AND SHIPPED IN 2-3 WEEK INTERVALS
- EMERGENCY REPLACEMENT NICKEL SHELLS CAN BE CREATED IN ONLY 3-4 WEEKS FROM NOTIFICATION



THE NICKEL VAPOR DEPOSITION PROCESS PROVIDES SUPERIOR QUALITY

S U P E R I O R N V D Q U A L I T Y :

- MUCH LESS DIMENSIONAL DEVIATION ACROSS MULTIPLE NICKEL SHELLS
- MUCH LESS STRESS AND THUS DISTORTION WITH NVD NICKEL SHELLS
- NO GROWTH LAYERS - ZERO RISK OF SURFACE DELAMINATION
- HIGHEST RESOLUTION REPLICATION OF ANY GRAIN DETAIL



ADVANTAGES OF THE NVD PROCESS...

- NICKEL SHELLS - 99.98% PURE NICKEL CONTENT
- CLEAN, CONSISTENT, AND VISUALLY MATCHING WELDING & GRAIN REPAIRS



- WEBER REPAIR TECHNICIANS ARE BOTH LASER WELDING & GRAIN REPAIR SPECIALISTS
- REPAIRS CAN BE PERFORMED IN CUSTOMERS PLANTS WORLD WIDE, OR IN-HOUSE AT WEBER



A detailed view of a Mercedes-Benz car's interior, focusing on the dashboard and center console. The steering wheel features the Mercedes-Benz logo and has perforated leather with red stitching. The dashboard is black with three circular air vents. A tablet is mounted on the dashboard displaying a climate control interface. The center console has a radio unit with a digital display and buttons for various functions. Below the radio is a climate control unit with two temperature dials and buttons for fan speed and air distribution. The seats are black with red stitching. A green banner with the word 'WEBER' is in the top left corner.

WEBER

AUTO INTERIOR PROGRAMS BY WEBER...

*VEHICLE INTERIORS MADE FROM NVD NICKEL
SHELL TOOLING...*



CURRENT TESLA M3



INSTRUMENT PANEL UPPER & LOWER



VEHICLE INTERIORS MADE FROM NVD NICKEL
SHELL TOOLING...



CURRENT FORD BRONCO



INSTRUMENT PANEL – SLUSH CAST SKIN



*VEHICLE INTERIORS MADE FROM NVD NICKEL
SHELL TOOLING...*



FORD ECOSPORT



INSTRUMENT PANEL – IMG VACUUM FORMING



*VEHICLE INTERIORS MADE FROM NVD NICKEL
SHELL TOOLING...*



TOYOTA CAMRY



INSTRUMENT PANEL - SLUSH CAST SKIN



*VEHICLE INTERIORS MADE FROM NVD NICKEL
SHELL TOOLING...*



BMW X5 (G05 PLATFORM)



INSTRUMENT PANEL - SLUSH CAST SKIN



VEHICLE INTERIORS MADE FROM NVD NICKEL SHELL TOOLING...



CURRENT JEEP GRAND CHEROKEE



INSTRUMENT PANEL - SLUSH CAST SKIN



*FRONT & REAR DOOR
PANEL UPPERS
IMGL VACUUM FORMING*



*VEHICLE INTERIORS MADE FROM NVD NICKEL
SHELL TOOLING...*



CURRENT DAIMLER "B" CLASS (W, X, H 247 PLATFORM)



INSTRUMENT PANELS – SLUSH CAST SKIN



*VEHICLE INTERIORS MADE FROM NVD NICKEL
SHELL TOOLING...*



CURRENT DAIMLER "C" CLASS (W206 PLATFORM)



INSTRUMENT PANEL – SLUSH CAST SKIN



*VEHICLE INTERIORS MADE FROM NVD NICKEL
SHELL TOOLING...*



SKODA CAMIQ



INSTRUMENT PANEL - SLUSH CAST SKIN



VEHICLE INTERIORS MADE FROM NVD NICKEL
SHELL TOOLING...



CURRENT FORD MACH - E



FRONT & REAR DOOR PANELS – NEGATIVE VAC FORM / IMGL PROCESS



VEHICLE INTERIORS MADE FROM NVD NICKEL
SHELL TOOLING...



CURRENT JEEP WAGONEER



FRONT & REAR DOORS – IMG VACUUM FORMING



*VEHICLE INTERIORS MADE FROM NVD NICKEL
SHELL TOOLING...*



TOYOTA HIGHLANDER



INSTRUMENT PANEL – SLUSH CAST SKIN



*VEHICLE INTERIORS MADE FROM NVD NICKEL
SHELL TOOLING...*



GM BOLT



INSTRUMENT PANEL – SLUSH CAST SKIN



VEHICLE INTERIORS MADE FROM NVD NICKEL SHELL TOOLING...



DODGE CHALLENGER – CURRENT MODEL

Instrument Panel & Door Panels
Process – Slush Cast Skins



FORD F150

Front & Rear Door Panel Uppers
Process – IMGL Vacuum Forming



MERCEDES GLE COUPE

Front & Rear Door Panel Uppers
Process – Slush Cast Skin



GM SILVERADO PICK-UP

Front & Rear Door Panel Uppers
Process – IMG Vacuum Forming



TOYOTA AVALON

Instrument Panel
Process – Slush Cast Skin



DODGE CHARGER – CURRENT MODEL

Instrument Panel
Front & Rear Door Panel Uppers
Console Side Panels
Process – Slush Cast Skin

WEBER IR HEATED SLUSH TOOLING AND EQUIPMENT BUILD EXAMPLES



INFRA RED HEATED NVD IP SLUSH TOOLING AND MODULAR
TOOL CARRIER FRAME ASSEMBLY BUILT BY WEBER

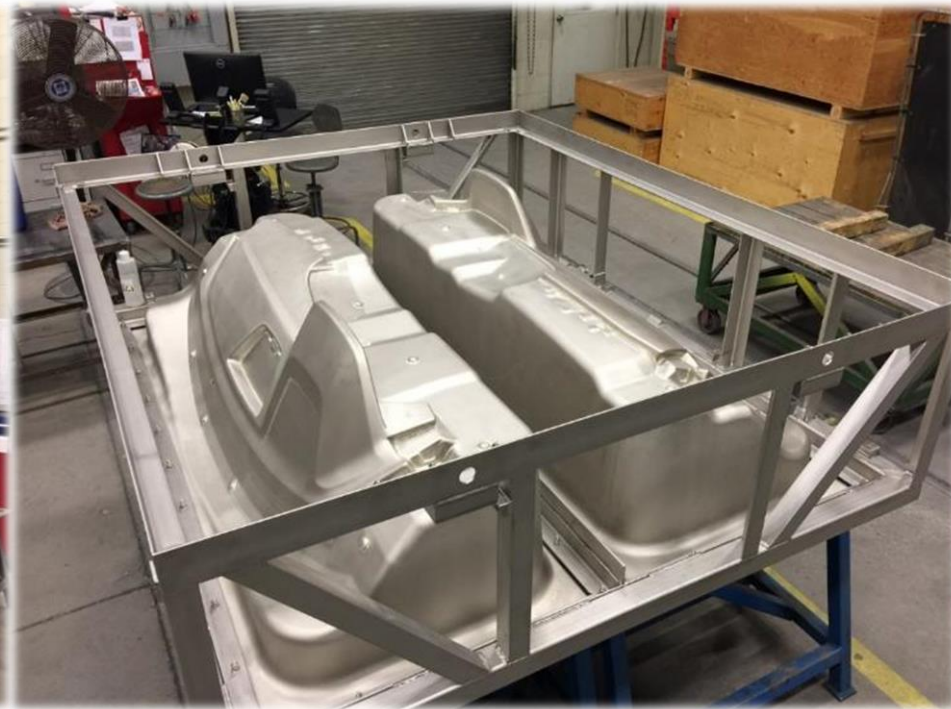


INFRA RED HEATED NVD IP SLUSH TOOLING AND MODULAR
TOOL CARRIER FRAME ASSEMBLY WITH TEMPERATURE
THERMOCOUPLES BUILT BY WEBER

WEBER AIR HEATED SLUSH TOOLING AND EQUIPMENT BUILD EXAMPLES



AIR HEATED NVD IP SLUSH TOOLING, TOOL CARRIER FRAME, POWDER TUBS, AND PT CARRIER FRAME ALL BUILT BY WEBER

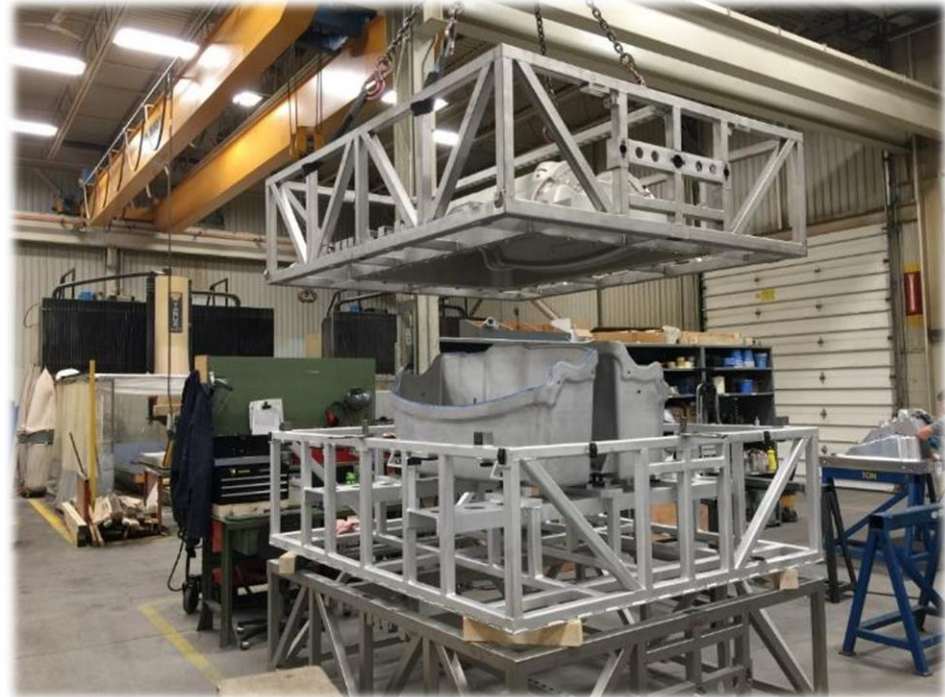


AIR HEATED NVD IP SLUSH TOOLING AND TOOL CARRIER FRAME ASSEMBLY BUILT BY WEBER

WEBER AIR HEATED SLUSH TOOLING AND EQUIPMENT BUILD EXAMPLES



AIR HEATED NVD IP SLUSH TOOLING, TOOL CARRIER FRAME, POWDER TUBS, AND PT CARRIER FRAME ALL BUILT BY WEBER



AIR HEATED NVD IP SLUSH TOOLING, TOOL CARRIER FRAME, POWDER TUBS, AND PT CARRIER FRAME ALL BUILT BY WEBER

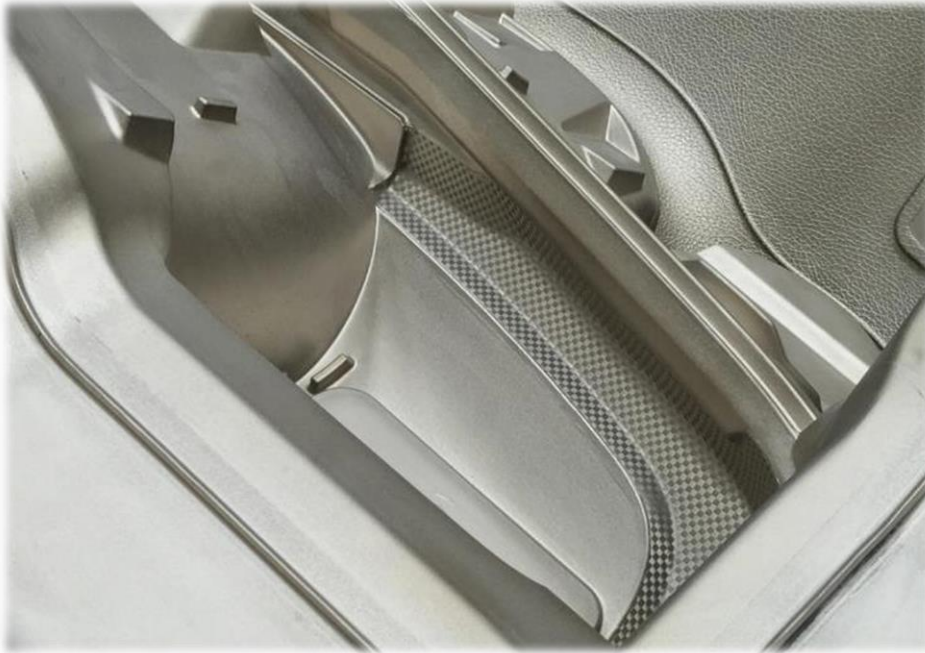
WEBER AIR HEATED SLUSH TOOLING AND EQUIPMENT BUILD EXAMPLES



POWDER BOX TOP PLATE INCORPORATING 2D
POWDER ADAPTORS BUILT BY WEBER

AIR HEATED NVD NICKEL SHELL SLUSH TOOLING AND TOP
TOOLING MOUNTING PLATE ASSEMBLY BUILT BY WEBER

WEBER AIR HEATED SLUSH TOOLING AND EQUIPMENT BUILD EXAMPLES



AIR HEATED NVD I.P. SLUSH TOOLING WITH
DUAL TEXTURE BUILT BY WEBER



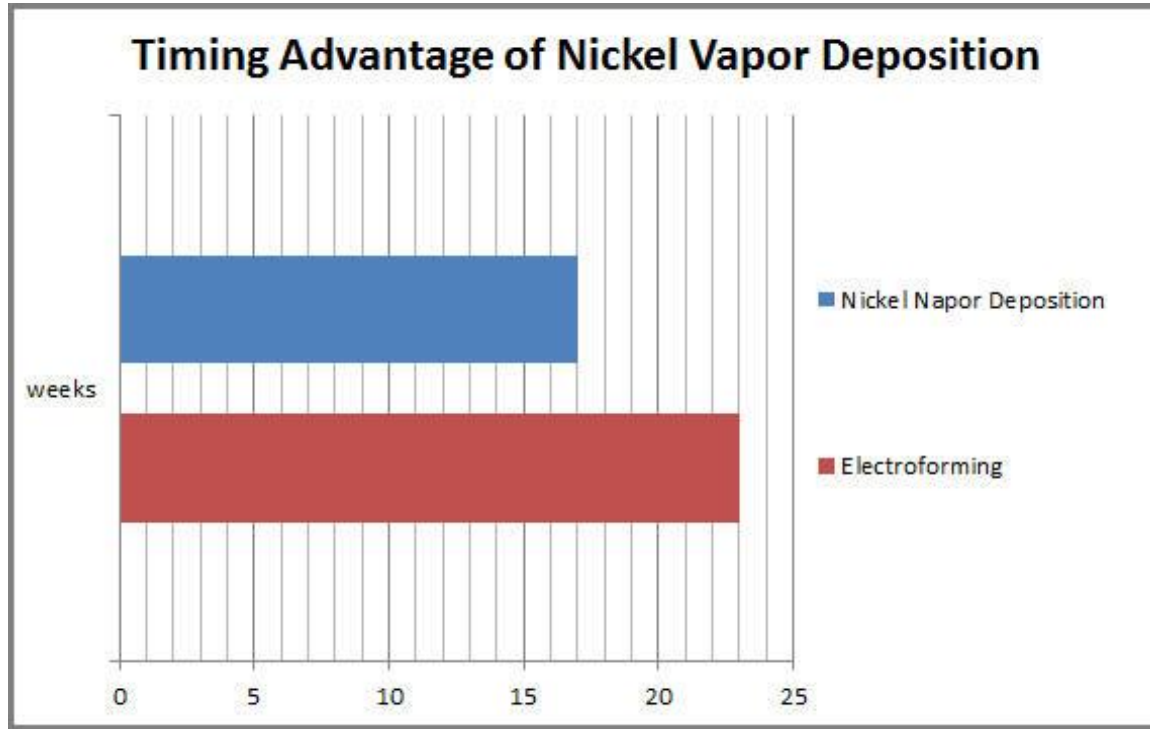
AIR HEATED NVD IP SLUSH TOOLING BUILT BY
WEBER WITH FULLY INTEGRATED STITCH SEAM



NVD NICKEL SHELL TOOLING
BENEFITS FOR THE IMG/L PROCESS

NVD NICKEL SHELL TOOLING BENEFITS FOR THE IMG/L PROCESS

THE SAME 5-6 WEEK TIMING ADVANTAGE TO THE 1ST IMG/L NICKEL SHELL
COMPLETION DUE TO THE VERY FAST NVD DEPOSITION RATE



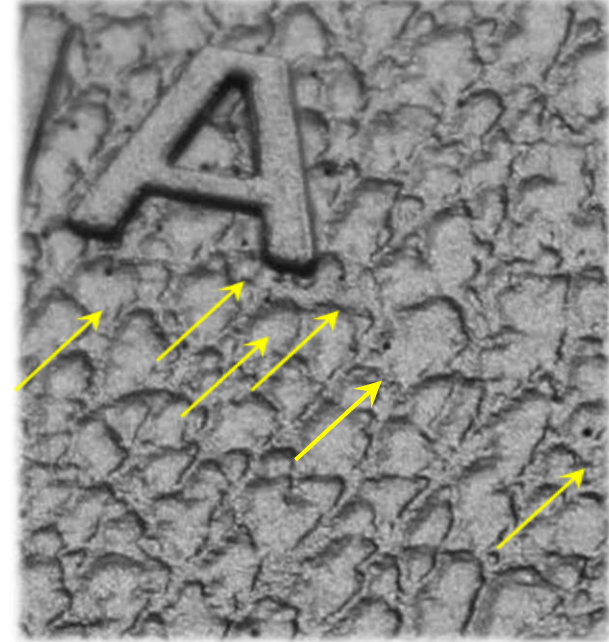
SUPERIOR NVD QUALITY
with a

= 20x FASTER GROWTH RATE!





ELECTROFORM Ni SHELL VACUUM HOLE EXAMPLE



NVD Ni SHELL & LASER DRILLING EXAMPLE

- CONSISTANT 0.18mm (.007") VACUUM HOLES
- PROGRAMED LASER DRILLING = REPEATABILITY
- MULTIPLE CAVITIES PROCESS IDENTICALLY
- EXCELLENT VACUUM PULL & PERFORMANCE
- IDEAL VACUUM = OPTIMUM GRAIN REPLICATION

NVD NICKEL SHELL TOOLING BENEFITS FOR THE IMG/L PROCESS

NVD IMG/L NICKEL SHELL EXAMPLE

A side cross-section view of a nickel shell, showing its curved, dome-like shape and the surrounding tooling structure. The shell is light-colored and appears to be made of a solid material.

SIDE CROSS-SECTION

A close-up view of the backside of a nickel shell, showing a textured surface with numerous small, dark, circular vacuum holes. The surface has a mottled appearance with some orange and blue tones.

SHELL BACKSIDE

WITH OR WITHOUT BACKSIDE VACUUM HOLE POCKETING

- VACUUM HOLE LAYOUT IS 100% REPEATABLE FOR ANY QUANTITY OF NICKEL SHELL CAVITIES OR SPARE
- EACH CAVITY PROCESSES IDENTICALLY

A close-up view of the backside of a nickel shell, showing a regular, grid-like pattern of small, circular vacuum holes. The surface is dark and metallic.

SHELL BACKSIDE

NVD NICKEL SHELL TOOLING BENEFITS FOR THE IMG/L PROCESS

SOLID, UN-DEFORMED NICKEL SHELLS ALLOW ACCURATE
MACHINING OF FEATURES FOR MODULAR STYLE MOUNTING &
VACUUM BOX SEALING OPTIONS



NVD NICKEL SHELLS CAN BE EASILY, QUICKLY
REMOVED AND RE-MOUNTED ONTO THE VACUUM
BOX ASSEMBLY

NVD NICKEL SHELL TOOLING BENEFITS FOR THE IMG/L PROCESS

ELECTROFORMED POROUS NICKEL SHELL EXAMPLE

SIDE CROSS-SECTION

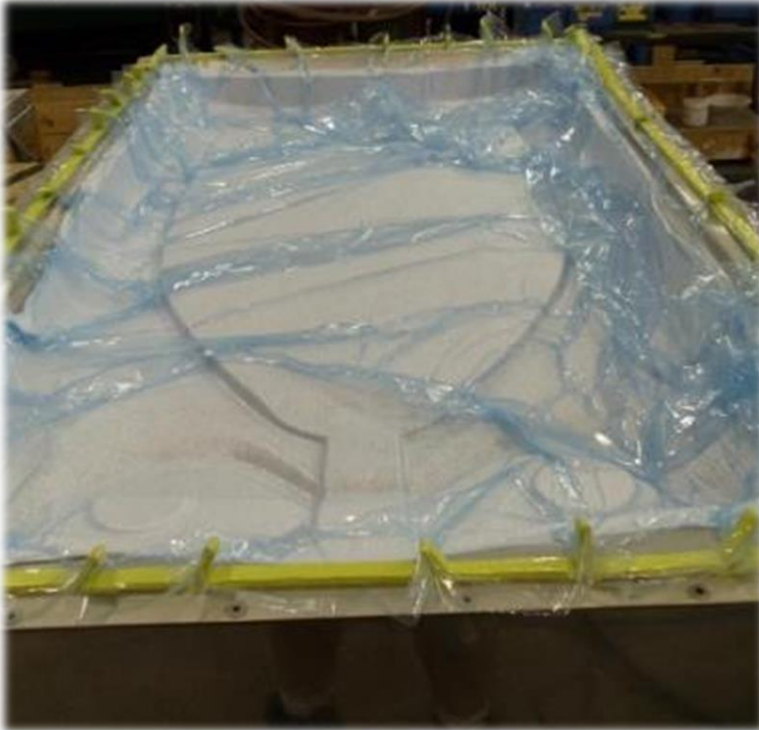


- IMPOSSIBLE TO CREATE A MODULAR NICKEL SHELL MOUNTING METHOD WITH THESE TYPE OF SHELLS
- MUST RETURN TO SUPPLIER FOR ANY NICKEL SHELL MAINTENANCE - LEADS TO LONGER DOWN TIME PERIODS
- NO TWO NICKEL SHELL CAVITY'S ARE THE SAME!



NVD NICKEL SHELL TOOLING BENEFITS FOR THE IMG/L PROCESS...

PRIOR TO SHIPMENT, NICKEL SHELL & VACUUM BOX ASSEMBLIES ARE VACUUM BAGGED TESTED TO VERIFY MAXIMUM VACUUM PULL

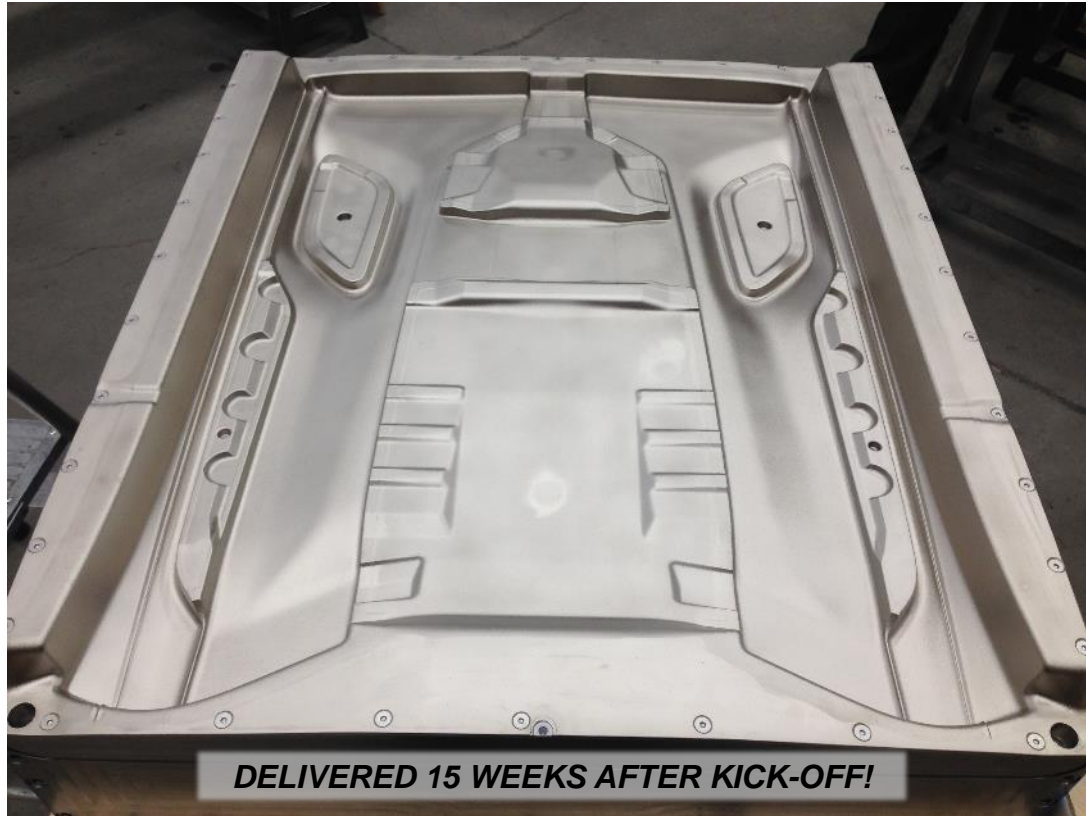


- SUPERIOR GRAIN REPLICATION AS COMPARED TO OTHER NICKEL SHELL PRODUCERS
- SUPERIOR QUALITY AND DURABILITY, ALONG WITH THE FASTEST DELIVERY TIMING
- COMPETITIVELY PRICED, BUT BUILT TO LAST THE LIFE OF THE INTERIOR PROJECT

NVD IMGL PROCESS NICKEL SHELL & VACUUM BOX ASSEMBLY FOR A 2-CAVITY DOOR UPPER



NVD IMGL PROCESS NICKEL SHELL & VACUUM BOX ASSEMBLY FOR A 2-CAVITY DOOR UPPER



DELIVERED 15 WEEKS AFTER KICK-OFF!

NVD IMG PROCESS NICKEL SHELLS & VACUUM BOX
ASSEMBLIES FOR 2-CAVITY I.P. TOPPER PANEL



DELIVERED 18 WEEKS AFTER KICK-OFF!

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