TOOLING FOR AUTOMOTIVE INTERIOR
SOFT TOUCH TEXTURED SURFACES
WEBER FACILITIES ARE ALL 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
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 - +/-0.1mm
• 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 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

SAVING COSTS:

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.
STATE-OF-THE-ART NICKEL CARBONYL PLANT COMMISSIONED IN 2000

NO ENVIRONMENTAL 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
THE SUPERIOR ALTERNATIVE TO ELECTROFORMING
CHEMICAL VAPOR DEPOSITION

NICKEL VAPOR DEPOSITION
THE SUPERIOR ALTERNATIVE TO ELECTROFORMING

NICKEL POWDER

SOLID NICKEL SHAPE
**CHEMISTRY**

\[
\text{Ni} + 4\text{CO} \rightarrow \text{Ni(CO)}_4
\]

\[
\text{Ni(CO)}_4 \rightarrow \text{Ni} + 4\text{CO}
\]
• 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

RELEASED CO GASSES ARE RECYCLED
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
SPRAY PU MOLDS – WITH TWO COLOR SPRAY MASKS
WATER HEATING or ELECTRICAL HEATING SYSTEMS

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

TEXTURED RIM OVERMOLDS
(NICKEL SHELL MOUNTED INTO A CAVITY)
EXTERNALLY HEATED SLUSH MOLDS
(ALL FORCED AIR METHODS, INFRA RED, SAND, ETC.)

OIL HEATED SLUSH MOLDS
(OIL LINES SOLDERED ON SHELL BACKSIDE)

3D CAST ALUMINUM POWDER SAVERS

NVD NICKEL SHELL TOOLING APPLICATIONS
ADVANTAGES OF THE NVD PROCESS...

- UNSURPASSED REPRODUCTION OF ANY GRAIN OR SURFACE TEXTURE WITH MOLECULAR LEVEL VAPOR DEPOSITION
- NO BATHMASTER WITH A CONDUCTIVE COATING REQUIRED
ADVANTAGES OF THE NVD PROCESS...

- 20x FASTER GROWTH COMPLETED ALL IN ONE STEP
- MUCH MORE UNIFORM SHELL GROWTH
- NO GROWTH LAYERS - 0% RISK OF NICKEL SHELL DELAMINATION FAILURES
- NO RESIDUAL STRESS = NO SHELL DISTORTION
ADVANTAGES OF THE NVD PROCESS...

CREATES A NICKEL SHELL, OF SUPERIOR QUALITY, 20 TIMES FASTER THAN THE ELECTROFORMING PROCESS!

PROVIDES A 5-6 WEEK TIMING ADVANTAGE TO THE 1st TOOL
CONSECUTIVE NVD TOOLS TYPICALLY DELIVERED IN 2-3 WEEK INTERVALS AFTER TOOL #1
EMERGENCY REPLACEMENT OR NEW CAPACITY TOOLS ARE TYPICALLY DELIVERED 3-4 WEEKS FROM KICK-OFF

ADVANTAGES OF THE NVD PROCESS...
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
AUTO INTERIOR PROGRAMS BY WEBER...
LATEST VEHICLE INTERIORS WITH TEXTURED SURFACES FROM NVD NICKEL SHELL TOOLING...

2018 FORD ECOSPORT

INSTRUMENT PANEL – IMG VACUUM FORMING
LATEST VEHICLE INTERIORS WITH TEXTURED SURFACES FROM NVD NICKEL SHELL TOOLING...

2018 TOYOTA CAMRY

INSTRUMENT PANEL – SLUSH SKIN PROCESS
LATEST VEHICLE INTERIORS WITH TEXTURED SURFACES FROM NVD NICKEL SHELL TOOLING...
LATEST VEHICLE INTERIORS WITH TEXTURED SURFACES FROM NVD NICKEL SHELL TOOLING...
LATEST VEHICLE INTERIORS WITH TEXTURED SURFACES FROM NVD NICKEL SHELL TOOLING...

CURRENT DODGE CHALLENGER

INSTRUMENT PANEL - SLUSH SKIN PROCESS

DOOR PANEL UPPERS – NEGATIVE VAC FORM / IMGL PROCESS
CURRENT OPEL ASTRA

INSTRUMENT PANEL – SLUSH SKIN PROCESS

LATEST VEHICLE INTERIORS WITH TEXTURED SURFACES FROM NVD NICKEL SHELL TOOLING...
CURRENT TOYOTA AVALON

LATEST VEHICLE INTERIORS WITH TEXTURED SURFACES FROM NVD NICKEL SHELL TOOLING...

INSTRUMENT PANEL – SLUSH SKIN PROCESS
LATEST VEHICLE INTERIORS WITH TEXTURED SURFACES FROM NVD NICKEL SHELL TOOLING...

2018 JEEP WRANGLER

FRONT & REAR DOOR UPPERS – IMGL VACUUM FORMING
GMC ACADIA – CURRENT MODEL
Instrument Panel
Process – IMG Vacuum Forming

FORD F150 – CURRENT MODEL
Front & Rear Door Panel Uppers
Process – IMGL Vacuum Forming

MERCEDES GLE COUPE – CURRENT MODEL
Front & Rear Door Panel Uppers
Process – Slush Cast Skin

CHRYSLER 300 – CURRENT MODEL
Instrument Panels - LHD & RHD
Front & Rear Door Panel Uppers
Console Side Panels
Process – Slush Cast Skin

FORD EXPLORER – CURRENT MODEL
Instrument Panel / Front & Rear Door Uppers
Process – Slush Cast Skin

DODGE CHARGER – CURRENT MODEL
Instrument Panel
Front & Rear Door Panel Uppers
Console Side Panels
Process – Slush Cast Skin

LATEST VEHICLE INTERIORS WITH TEXTURED SURFACES FROM NVD NICKEL SHELL TOOLING...
NEW INTERIOR TOOLING PROJECTS AT WEBER

- **BMW G05** LHD & RHD INSTRUMENT PANEL TOPPER
  Process – Slush Cast Skin

- **FORD U625** LHD & RHD INSTRUMENT PANELS
  Process – Slush Cast Skin

- **FCA DT** FRONT & REAR DOOR PANEL UPPERS
  Process – IMG & IMGL Negative Vac-Form Skin

- **FCA DJ** INSTRUMENT PANEL, GAUGE CLUSTER HOOD, IP MID-PANEL, FRONT & REAR DOOR PANEL UPPERS
  Process – IMG & IMGL Negative Vac-Form Skin

- **MERCEDES W/X/H247** LHD & RHD INSTRUMENT PANELS
  Process – Slush Cast Skin

- **FCA LD** LHD INSTRUMENT PANEL, FRONT & REAR DOOR PANEL UPPERS, CONSOLE PANELS
  Process – Slush Cast Skin

- **SKODA SK370** LHD & RHD INSTRUMENT PANELS
  Process – Slush Cast Skin

- **MERCEDES TRUCK 43N** LHD & RHD INSTRUMENT PANELS
  Process – Slush Cast Skin
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!
NVD NICKEL SHELL TOOLING
BENEFITS FOR THE IMG/L PROCESS

- 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 VERY STRONG, SOLID NICKEL SHELL THAT HAS ONLY THE VACUUM HOLES PASSING THROUGH THE SHELLS THICKNESS

- VACUUM HOLE LAYOUT IS 100% REPEATABLE FOR ANY QUANTITY OF NICKEL SHELL CAVITIES OR SPARE
- EACH CAVITY PROCESSES IDENTICALLY
NVD NICKEL SHELL TOOLING
BENEFITS FOR THE IMG/L PROCESS

SOLID, UN-DESTORTED 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
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 REPLICAATION 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 4-CAVITY DOOR UPPER

DELIVERED 16 WEEKS AFTER KICK-OFF!
NVD IMGL PROCESS NICKEL SHELL & VACUUM BOX ASSEMBLY FOR A 4-CAVITY DOOR UPPER

DELIVERED 17 WEEKS AFTER KICK-OFF!
NVD IMG PROCESS NICKEL SHELLS & VACUUM BOX ASSEMBLIES FOR 2-CAVITY I.P. TOPPER PANEL – WITH PART UNDERCUTS

DELIVERED 18 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!
Weber Supplied IMG/L Negative Vacuum Form Tooling & Assists

• WEBER OBTAINS IMG PART ORIENTATION & RUN-OFF CAD DATA

• WEBER DESIGNS AND CONSTRUCTS THE WRAPPED MODEL SUBSTRATE, PERFORMS WRAPPING OF MASTER MODELS AND ALL APPROVALS

• WEBER PERFORMS THE CASTING WORK TO CREATE THE FINAL HARD EPOXY MASTER MOTHER MODELS

• WEBER COMPLETES THE SEAM ENHANCING, SCRIBING WORK, AIR BAG LOGO DETAILS AND THE FINAL APPROVAL OF EPOXY MASTER MOTHER MODELS

• WEBER DEPOTS THE NVD IMG/L NICKEL SHELLS AND PERFORMS ANY REQUIRED MACHINING WORK FOR MOUNTING ON THE VACUUM BOX ASSEMBLY

• WEBER DOES THE INSTALLATION, SET-UP & TESTING OF THE IMG/L NICKEL SHELL BACKSIDE WATER HEATING SYSTEM

• WEBER DOES MANUFACTURES THE CAVITY VACUUM BOX ASSEMBLY, THE NICKEL SHELL INSTALLATION, AND VACUUM PERFORMANCE VERIFICATION
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