



Formetrix L-40 Tool Steel Powder Enables 3D-Printing of Hot Stamping Dies & Inserts

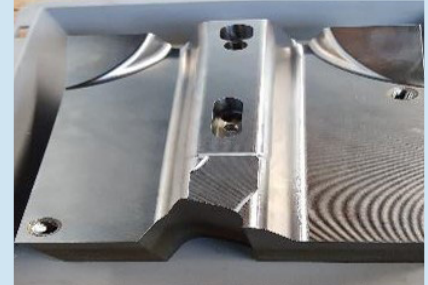
- L-40 Additive Manufactured (AM) Die delivered over 100,000 parts to date
- Comparable results to wrought H-13 steel
- Lower cost due to proven hybrid approach

CHALLENGE

Utilizing L-PBF Additive Manufacturing (AM) to build hot stamping dies presents many advantages including design freedoms, conformal cooling, lower part cycle times, longer die life, and streamlined tooling logistics. However, traditional tool steels tend to crack when printed via Laser Powder Bed Fusion (L-PBF).

Formetrix L-40 is an additive manufacturing material specifically designed for the demands of hot and cold tooling applications. L-40 provides the hardness and thermal stability required for hot stamping tools, while maintaining exceptional ductility and crack-free L-PBF printing. This combination *is not offered by any other* tooling material.

As an example, a Tier One Automotive supplier deployed a stamping die insert produced using L-40 and a L-PBF 3D printing process. This insert has produced over 100,000 parts to date meeting all quality and production requirements at equal or superior performance compared to conventional wrought steels (see details reverse). Since L-40 can be printed directly onto H-13 wrought material, toolmakers have the option to 3D print only certain portions of a tool, which can result in more favorable economics.



Stamping Die Cavity printed with Formetrix L-40 Tool Steel Powder

AM MATERIALS CHOICES

Formetrix L-40

Exceptional AM performance for Hot Stamping Application:

- Prints Easily & Crack-free
- Durable/Highest Hardness & Ductility combination
- Easy to Machine and Polish
- Higher Affordability via “hybridization” with base wrought materials

H13 and Traditional Tool Steels

Not Applicable - Impossible to print on L-PBF 3D Printers

M300 Maraging Steel

Not Applicable - Material properties insufficient for this application.



INDUSTRIAL EXAMPLE

- Automotive Tier One supplier deployed hot stamping die cavity 3D printed with Formetrix L-40.
- L-40 Die Cavity has produced over 100,000 parts to date with no production or quality issues.
- Performance measured against parallel line with wrought H13 die cavities.
- L-40 die cavity delivered equal or better results vs. wrought.

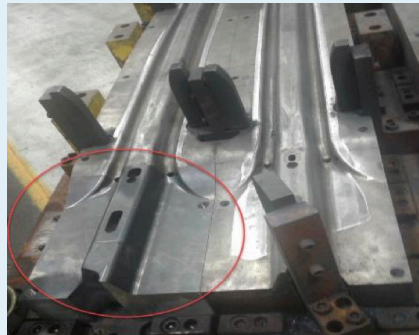


Figure 1: L-40 Hot Stamping Die Cavity (piece shown Page 1)

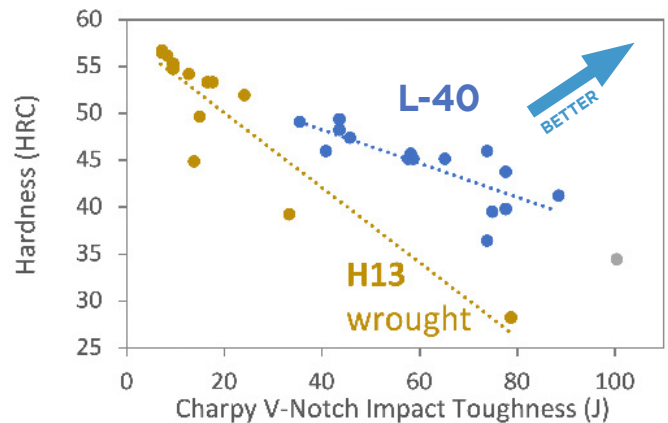


Figure 2: Automotive Door Beam Part (orange piece)

Figure 3: Formetrix L-40 Specifications

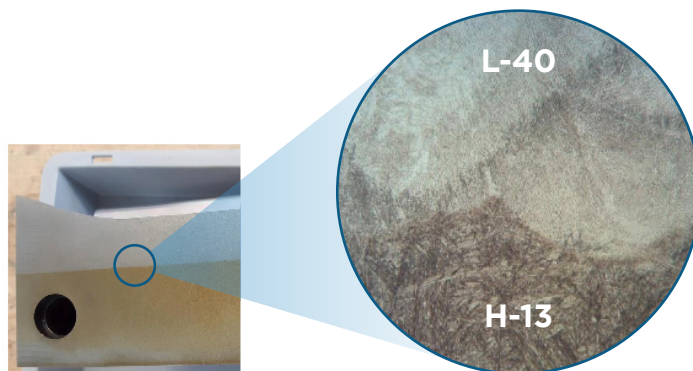
L-40 Property	As Printed	Heat Treated
Hardness (HRC)	46 - 50	50 - 52
Tensile Strength (MPa)	1500	1650
Yield Strength (MPa)	1300	1350
Elongation (%)	14 - 16	10 - 12

Figure 4: L-40 CVN Impact Toughness vs. Hardness



L-40 hardness and toughness combination delivers high crack-resistance.

Figure 5: L-40 Printed on Wrought H-13 Material



Interface between materials

Microstructure at interface

L-40 can be printed onto wrought H13 material for lower costs.



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