MacLean ADDITIVE

L-40 for Printing Hot Stamping Dies

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

- L-40 Additive Manufacturing (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 LPBF Additive Manufacturing 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 (LPBF).

L-40 Tool Steel Powder 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 LPBF printing. This combination is not offered by any other tooling material.

As an example, a Tier 1 Automotive supplier deployed a stamping die insert produced using L-40 and LPBF 3D printing process. This tool 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 other side)*. Since L-40 can be built upon H-13 wrought material, an overall hot stamping tool can be built with more favorable economics.

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Let's redefine what's possible in additive manufacturing.
Talk to our experts today!

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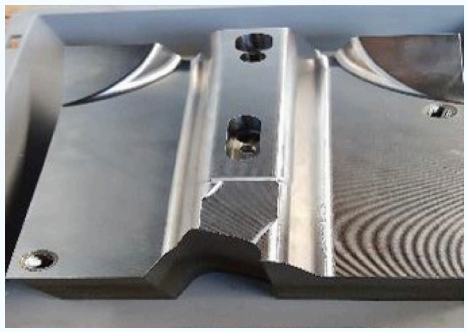


Stamping Die Cavity printed with L-40 Tool Steel Powder

MATERIALS SUMMARY

L-40 Tool Steel Powder

Exceptional AM performance for Hot Stamping Applications:

- **Reliability:** Prints easily & crack-free
- **Durability:** Highest Hardness & Ductility combination
- **Efficiency:** Easy to Machine and Polish
- **Sustainability/Safety:** No Cobalt
- **Value:** Affordability via "hybridization" with base wrought materials

H13 & Traditional Tool Steels

Not applicable -
Only very slow parameters,
not economical

M300

Not applicable - Material properties do not properly support this.

Case Study
L-40 for Printing Hot Stamping Dies

INDUSTRIAL EXAMPLE

- Automotive Tier 1 supplier deployed hot stamping die cavity 3D printed with L-40 Tool Steel Powder
- 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 H-13 die cavities
- L-40 die cavity delivered equal or better results vs. wrought

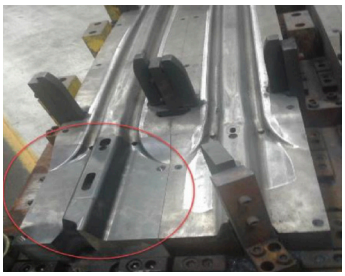


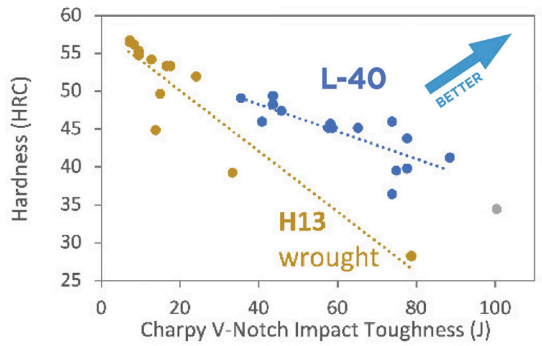
Figure 1: L-40 Hot Stamping Die Cavity (piece shown on reverse)

Figure 2: Automotive Door Beam Part (orange piece)

Figure 3: L-40 Specifications

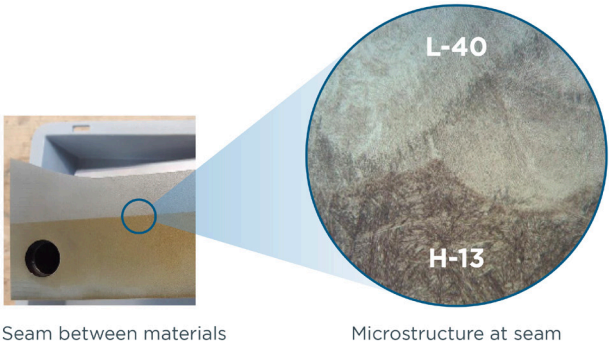
L-40 Property	As Printed
Hardness (HRC)	43 - 46
Tensile Strength (MPa)	1430
Yield Strength (MPa)	1180
Elongation (%)	15+

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



Seam between materials

Microstructure at seam

L-40 can be printed onto wrought H-13 material for lower costs

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