Stamping die precision

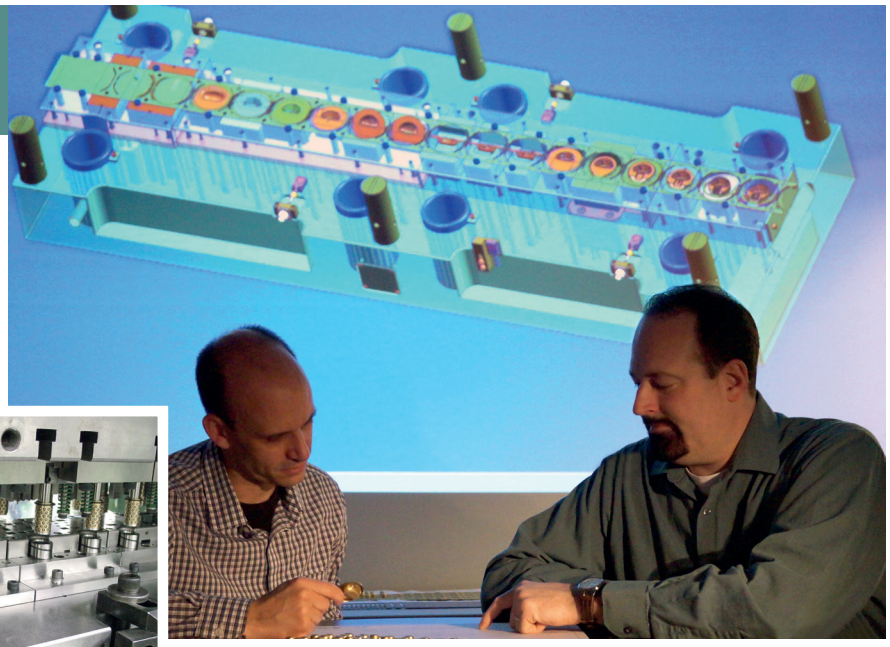
The design and production of highly complex stamping dies for ultra-thin laminations require special specification considerations from the OEM and its tooling partner

The use of precision laminations is a common requirement shared among electrified vehicles, no matter whether they're fully electric, hybrid or employ electrification as a stand-alone motor, in the drivetrain, in the axle or on the wheels.

Ultra-thin lamination sheets are stacked to form the motor's rotor and stator and, together, produce the power required to propel the vehicle as the magnetic field generated by the wires wound through the stator causes the magnetized bars in the rotor to spin.

Producing laminations for vehicle electrification requires an ultra-precision stamping die and, for an electric or hybrid vehicle application, more-efficient, thinner laminations are favored over those used in other motors of comparable size. The complexity of the stamping dies engineered to produce them is also much higher than a typical tool, as the length of these tools can reach 12ft (3.65m). A longer length tool requires greater dimensional accuracy due to tolerance buildup, which can occur over the length of the tool. The additional tooling size and complexity require that the tool not only meets the necessary lamination design requirements, but also matches the capabilities of the stamping press and the ability for toolmakers to maintain and service a stamping die of this size.

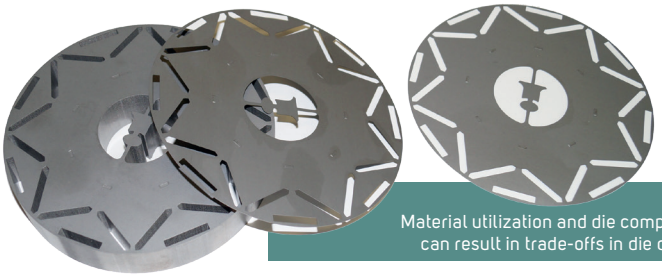
As with any stamping tool, there is also a trade-off between flat sheet material utilization and the complexity of the die. Tools can be designed to produce individual loose laminations and/or designed to stack laminations in the tool through mechanical interlocking or gluing.



Oberg has invested in specialized equipment to produce tools for the latest EV/HEVs

Tools can reach 12ft (3.65m) and require high accuracy due to tolerance build-up

With such a range of considerations associated with the development of an EV/HEV stamping die, it is essential to find a tooling partner who can collaborate with an OEM's engineering team to specify critical features needed in the tool, as well as the specialized design and manufacturing capabilities for producing this type of stamping die. This will ensure that the dies are capable of efficiently producing the end-product for the duration of the program.



Material utilization and die complexity can result in trade-offs in die design

Oberg Industries pioneered the use of tungsten carbide components in the manufacture of high-speed stamping dies over 70 years ago, designing and manufacturing lamination stamping dies. Oberg has invested heavily in specialized equipment to produce tools for the latest EV/HEV applications, including accurate and efficient surface grinding, jig grinding, and wire EDM machines. Proprietary to Oberg Industries, its surface grinding and jig grinding systems and techniques for the automotive industry have been developed by an internal automation group in conjunction with plant floor machine operators. A proprietary lift system was uniquely designed to support heavier interlocked stacks incorporating a mechanism to remove these completed stacks from the stamping die.

Oberg has added a dedicated cell in its tooling center that includes a state-of-the-art decoiler, feed, straightener, and EV press to develop and trial the stamping dies as part of customer acceptance.

Collaboration between the OEM and its tooling partner is critical to determining the right specifications for a long-lasting, high performance die. Providing an internal team and stamping die vendor the necessary time needed to correctly specify the stamping die helps achieve the desired motor performance while also helping meet cost and speed to market targets, complete with a tool that plant personnel can effectively run and service for years ahead.

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