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TRENDS IN AUTOMOTIVE DESIGN ARE CHANGING THE SURFACES OF FORMING TOOLS

Duplex-VARIANTIC®-1400 is setting new standards in AHSS sheet steel forming

voestalpine eifeler Coating GmbH
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The automotive industry is using ever-more resilient steels in order to save on weight, fuel consumption and emissions. AHSS (Advanced High Strength Steel) parts are placing ever-increasing requirements on forming tools and their surface coatings. But which surface solutions are up to the task?

THE CHALLENGE

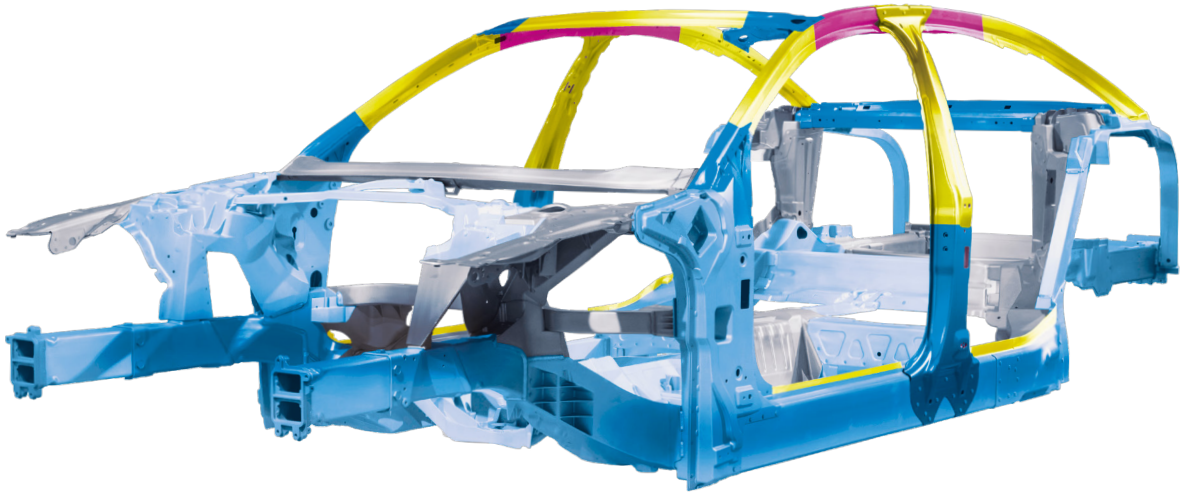
Whether electric or petrol, cars are only getting lighter. High-strength and ultra-high-strength steel is intended to help reduce vehicle weight while retaining the same stability properties.

That's why more than 25 % of a modern vehicle's parts are made of high-strength steel qualities. These steels, particularly those designated as AHSS varieties, demand a lot from machining tools.

AHSS steel has a tensile strength of between 1,000 MPa and 1,350 MPa. Forming tools must overcome these tensile strengths in order to shape car chassis and body parts.

Conventional PVD-based tool coatings are not equipped for this. The tool layer bonding wears too quickly and must be replaced and refurbished more frequently.

More wear-resistant PVD-based coating solutions are necessary for a more cost-effective forming of high-strength and ultra-high-strength steel qualities.



Use of steel qualities in car bodies

- 1,350 Mpa
- 1,180 Mpa
- 980 Mpa
- 590 Mpa
- 440 Mpa

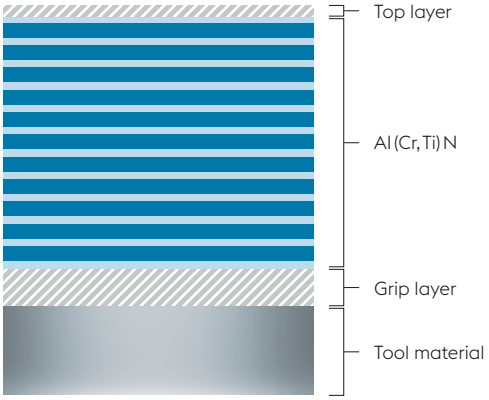
THE SOLUTION

With Duplex-VARIANTIC®-1400, voestalpine eifeler has designed a coating solution specifically for steel varieties with tensile strengths of up to 1,400 MPa. It can only be produced in PVD coating systems from voestalpine eifeler.

It's a multi-layer Al (Cr, Ti) N-based functional coating with a specifically adapted grip and top layer. It offers optimum resistance against abrasive and adhesive wear while at the same time optimising friction characteristics.

The developmental phase for Duplex-VARIANTIC®-1400 included an intensive test phase at the site in Düsseldorf. Testing was carried out on several tool models under real conditions in relevant production facilities.

The test results obtained were used to optimise the coating solution. The result exceeded all expectations.

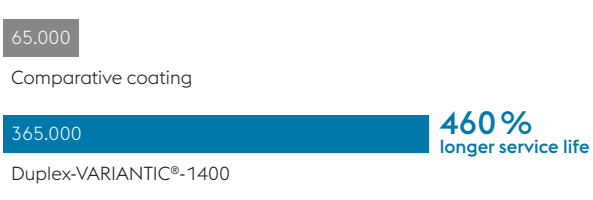


Section through a coated tool

THE RESULT

New Duplex-VARIANTIC®-1400 can handle all the demands of ultra-high-strength steel forming. It increases the wear resistance of the tools used and leads to a significant increase in the quality of the workpiece.

Analyses of the tests indicated an increase in service life of up to 460 % thanks to the new coating; a key time and cost benefit, crucial to the cost-efficient production of vehicles.



Comparison of the number of tool strokes in machining:
Cutting / punching workpiece: CP1400 / 1.5 mm thick
Lubricant: none

"Perfectly coordinated layers make Duplex-VARIANTIC®-1400 extremely wear-resistant and durable. That makes it an outright premium solution on the market for PVD coatings for ultra-high-strength forming."

Dr Farwah Nahif, Head of Research & Development, voestalpine eifeler Vacotec GmbH

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