



Charting New Roads to Cost and Weight Reduction



Since the introduction of safety and emission requirements, the automotive industry has been constantly looking for new materials and technologies. With a number of materials having been tested and adopted, automotive manufacturers have a plethora of material types and variants to choose from, including: aluminium, magnesium, carbon fibre, plastic, steel.

To satisfy the safety and emissions requirements of both today and the future, Aperam introduces new solutions for Advanced High Strength Stainless Steels (AHSSS) that offer weight reduction and safety performance at a competitive cost. But as the automotive industry continues to evolve, a new generation of vehicles is demanding new material solutions to reduce weight, improve safety performance and lower costs. To meet this demand, Aperam has launched MaX – a new grade of Advanced High Strength Stainless Steels.

Aperam works hand-in-hand with specialised partners to identify how stainless steel can be strategically placed and leveraged to improve the mass/performance/ cost ratio of Body-in-White design.

MaX: the result of working with automotive manufacturers



Aperam is committed to ensuring you have the tools and materials you need to overcome your biggest challenges. As nobody understands these challenges better than you, Aperam is an adamant supporter of co-development. By listening to your demands and working in close collaboration, together we can develop the high quality, innovative products you need to stay at the forefront of an always-evolving industry.

Our engineers assist you in the design and execution of new medium- to long-term projects. For example, in the automotive sector, where new environmental standards demand innovative new solutions, our team will work with you to find the best grade for your project.

MaX performance vs competing material

Grades	YS (MPa)	UTS (MPa)	EL (%) ISO A80	V-Bending (°)*	Fracture strain	KCV@-40°C (J/cm²)**	KCV@20°C (J/cm²)**
22MnB5	≥1000	≥1400	≥ 5	50	0.3	60	75
MaX1.2HY	≥850	≥1100	<u>></u> 7	> 80	0.76	> 80	80
MaX1.6	≥1000	≥1400	≥6	> 60	0.4*	> 20	> 40

These properties are only indicative because they depend on the hot stamping process. Mechanical properties after paint baking simulation: 170°C heat treatment for 20 minutes.

* According to VDA 238-100 / ** For 1.5mm thickness

MaX, Aperam's new family of AHSS grades, is available in two grades: MaX1.2HY and MaX1.6. These grades are ferritic stainless steels that, after the hot stamping process, achieve a martensite phase, thus giving them an extremely high strength (until 1 600 MPa). MaX1.2HY is mainly designed for chassis applications and MaX1.6 for Body In White applications. These grades are available in a wide range of thicknesses, from 0.5 mm to 5 mm, and up to 1 500 mm width.

Customers are already testing and qualifying this cost-effective material for reducing the weight of targeted parts.



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ODB 40 %
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FFB 100 %

Side Oblique Pole

Side MDB

Rear MDB 70 %

Roof Crash

MaX performance validation

Crash: MaX exceeds baseline measurements





MaX1.6 redefines how to design a vehicle's under body, resulting in a better crash performance and maintaining NVH versus baseline measurements.

NVH: MaX maintains baseline level

	Set-up	Results		
Domain	Performance	Unit	Baseline	MaX
	Torsion	Hz	50	 Image: A set of the set of the
Modal	First Order Bending	Hz	43	 Image: A set of the set of the
MUUdi	Second Order Bending	Hz	37	 Image: A set of the set of the
	Front End Lateral Bending	Hz	34	 ✓
Static	Torsion	kNm/°	22.0	 Image: A set of the set of the
	Bending	kN/mm	15.9	~





Dashboard - Front floor - Rear floor



Dashboard

Dashboard + reinforcement integration

From 6 parts to 1 using patch technology



and decrease intrusions into the safety cage during an ODB front crash. Due to its excellent formability, local reinforcements of the baseline are directly integrated into the dashboard panel as a patch. This eliminates packaging constraints in the baseline and improves the position of the patch, resulting in an even further reduction in intrusions.

The dash panel is completed in two steps. The first step involves cold stamping, which assures the tunnel area. Next, the part is stamped in a hot stamping die with movable pads. This process is a hybrid of indirect and direct press hardening.

Front floor Right and Left + tunnel integration From 7 parts to 1 using TWB technology



Although not traditionally an energy absorbing part during a crash, using MaX in the front floor panel improves side pole crash performance while also reducing the overall thickness of the floor. With MaX, the entire floor panel is active during a crash and the stiffness of the tunnel is increased. This results in a more even distribution of the impact in the floor, and leads to lower intrusions on the side.

As more and more manufacturers use hot stamping parts, we propose the innovative concept of joining a low thickness part and a TWB. By taking advantage of reinforcement integration, there's only need to produce one part.

Rear floor + spare wheel housing integration From 6 parts to 1 using TWB technology



MaX's excellent properties allow for the use of thin panels and the integration of all reinforcements into a single part. As a result, not only are rear crash requirements fully met, the overall weight is also reduced. Despite its slenderness, the floor helps absorb energy during a crash, allowing the fuel tank to remain intact.

The part can be stamped in a die using multiple movable pads, to be drawn in a certain sequence. The market uses a single die on current hot stamping lines for this process.

Partnership

Aperam goes beyond material development. By working directly with car manufacturers, we understand their challenges and find solutions to satisfy actual application needs. As a result, Aperam is able to offer solutions for the automotive market. We work with specialised partners to test MaX in terms of simulation, crash resistance and feasibility.



A World-class Leader in Stainless and Specialty Steels



Aperam is the leading Stainless and Specialty Steels company in South America and the second largest in Europe. We are also a leading manufacturer of high value added specialty products, including electrical steels and nickel alloys.

From machinery to cutlery, we take pride in manufacturing products that last a lifetime, offering great strength and versatility to our industrial customers and end users.

Together with our values of Leadership, Ingenuity and Agility, we aim to reshape the future of our industry by creating products that solve global challenges and serve as catalysts for change.

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