

VANADIUM IN AUTOMOTIVE STEELS:

Driving the future of safer, lighter, climate-friendly vehicles

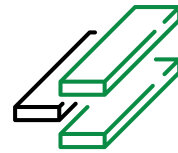


Sustainable cities and communities

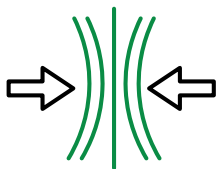
FACT 1



Today's vehicles comprise up to **60%** of advanced high-strength steel (AHSS), making them **LIGHTER, STRONGER, SAFER AND MORE FUEL EFFICIENT.**



Press hardened steel or hot formed steel is an AHSS used to make safety-critical vehicle crash components within the vehicle's body structure.



The higher strength and bendability of press hardened steel components provides better energy absorption, **IMPROVING VEHICLE CRASHWORTHINESS**



VANADIUM improves the properties of press hardened steels and **ENABLES HIGHER LEVELS OF STRENGTH AND DUCTILITY** to be achieved.

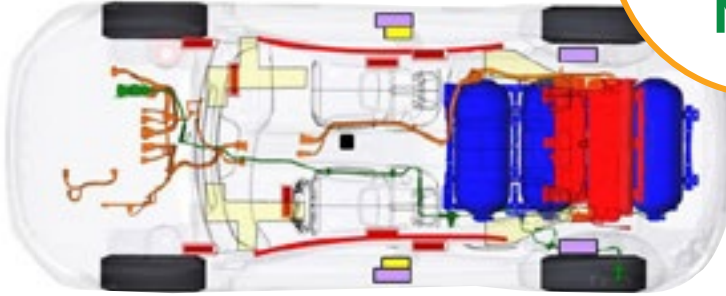
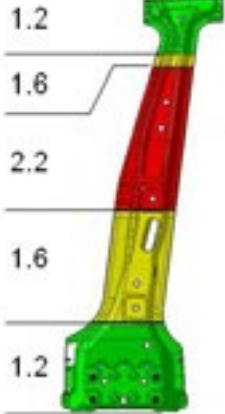
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VANADIUM**

FACT 2

Press hardening forms thin, strong metals into vehicle parts, enhancing their strength-to-weight ratio.

These parts are used in vehicle body structures and reinforce underbody components in electric vehicles, protecting the battery pack from impact.

Thickness in (mm)



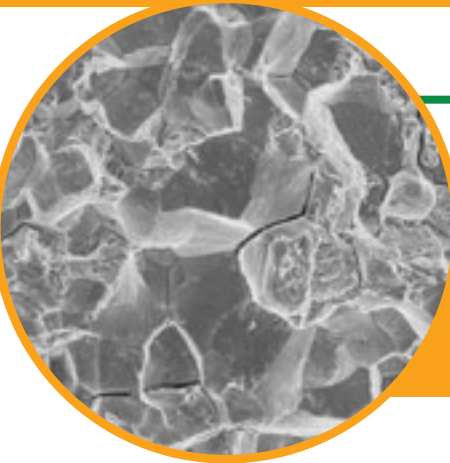
Press hardening can produce tensile steel strengths of up to

2,000 MPa

25-39%

reduction in vehicle parts weight using AHSS

FACT 3



The trend toward stronger, more durable, and ductile steels will make hydrogen embrittlement increasingly significant.

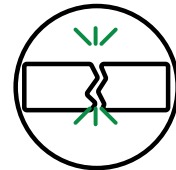
VANADIUM

- Used as a micro-alloying agent in steel production
- **IMPROVES** the **RESISTANCE OF STEEL TO HYDROGEN EMBRITTLEMENT.**

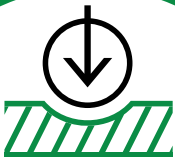
The precipitation of

VANADIUM CARBIDES HELP REFINE THE MICROSTRUCTURE AND TRAP HYDROGEN

- mitigating hydrogen embrittlement.



Vanadium's microstructural refinement helps reduce hydrogen embrittlement.



Research shows that adding vanadium reduces hydrogen embrittlement in aluminized ultra-high strength press-hardened steels with tensile strengths of 1,800 to 2,000 MPa.



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