

The Steel Innovation Horizon



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Advanced Steel Processing
& Products Research Center

Presentation Plans

Perceptions

Progress

Prospects

Personal reflections...

Perceptions

When *the public* thinks of the steel industry, what images do you think come to mind ?

The World Has Changed in My Lifetime

**Space program (now Mars)
Mobile phone and smart phone
Personal computer
Internet
GPS
Human genome
CRISPR gene editing
MRI
Cloud computing
Artificial intelligence and machine learning
Digital photography and digital imaging**

**Electronic calculator
Wi-Fi
Digital payments
Cryptocurrency
Hybrid electric vehicles
Self driving vehicles
3-D printing
VCR/MP3/DVD/streaming
Fitbit / wearables**

What about steel ?

PUBLIC PERCEPTION:

Steel is not “High-Tech” ?

REALITY



STEEL FACTS

Over

75%

of the 3,500 steel grades in use today did not exist 20 years ago.

worldsteel.org

**The domestic steel industry is in the
midst of a \$50B CAPEX campaign**

**Imagine Your Life Without
Steel...**

It's Unthinkable !

***What have we been doing
to enhance steel over
those decades, and what's
next ?***

***HSLA Steels for Vehicles Became
Important in the 1970s***

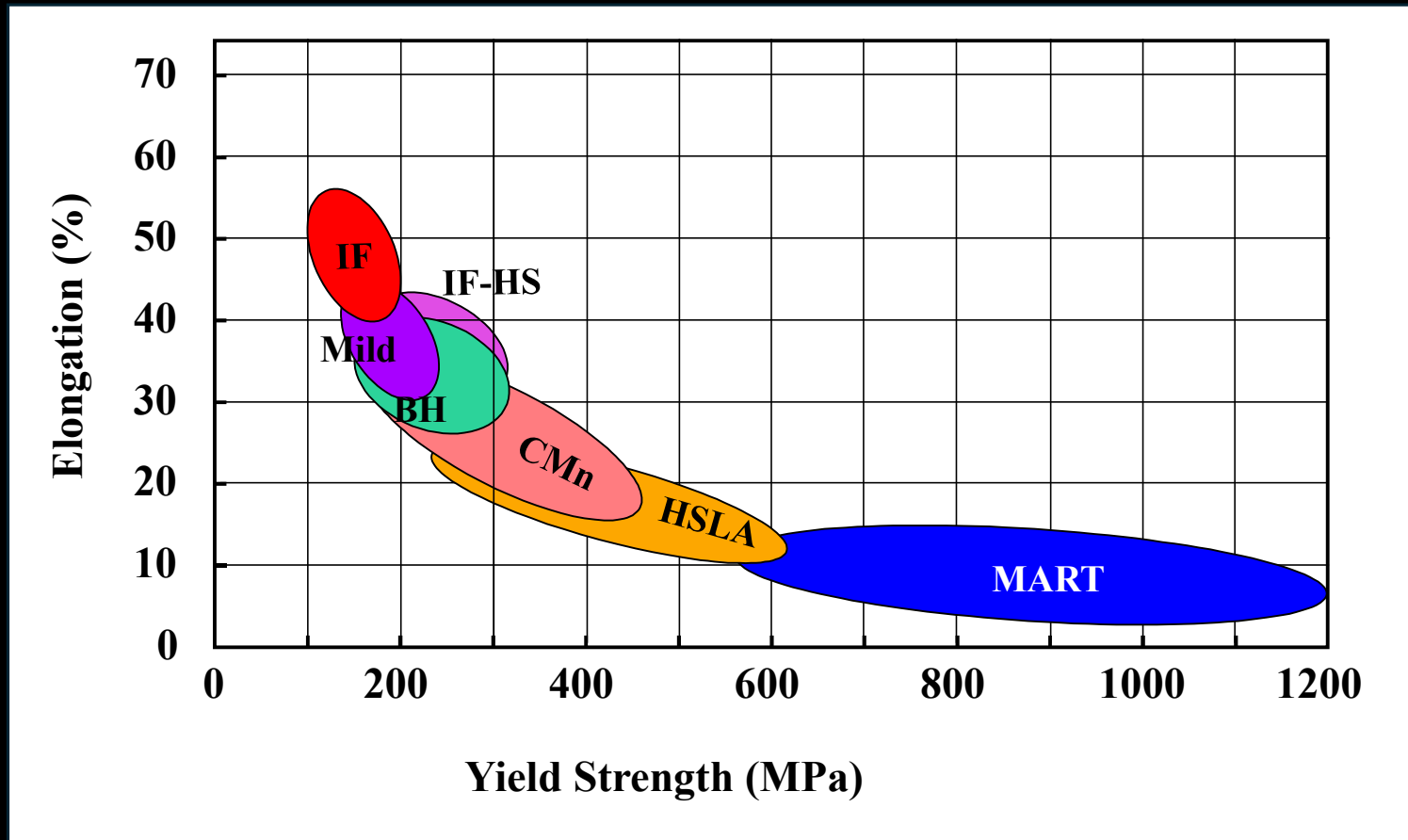


Corrosion was “Solved” in ~1980s by Coating Technologies

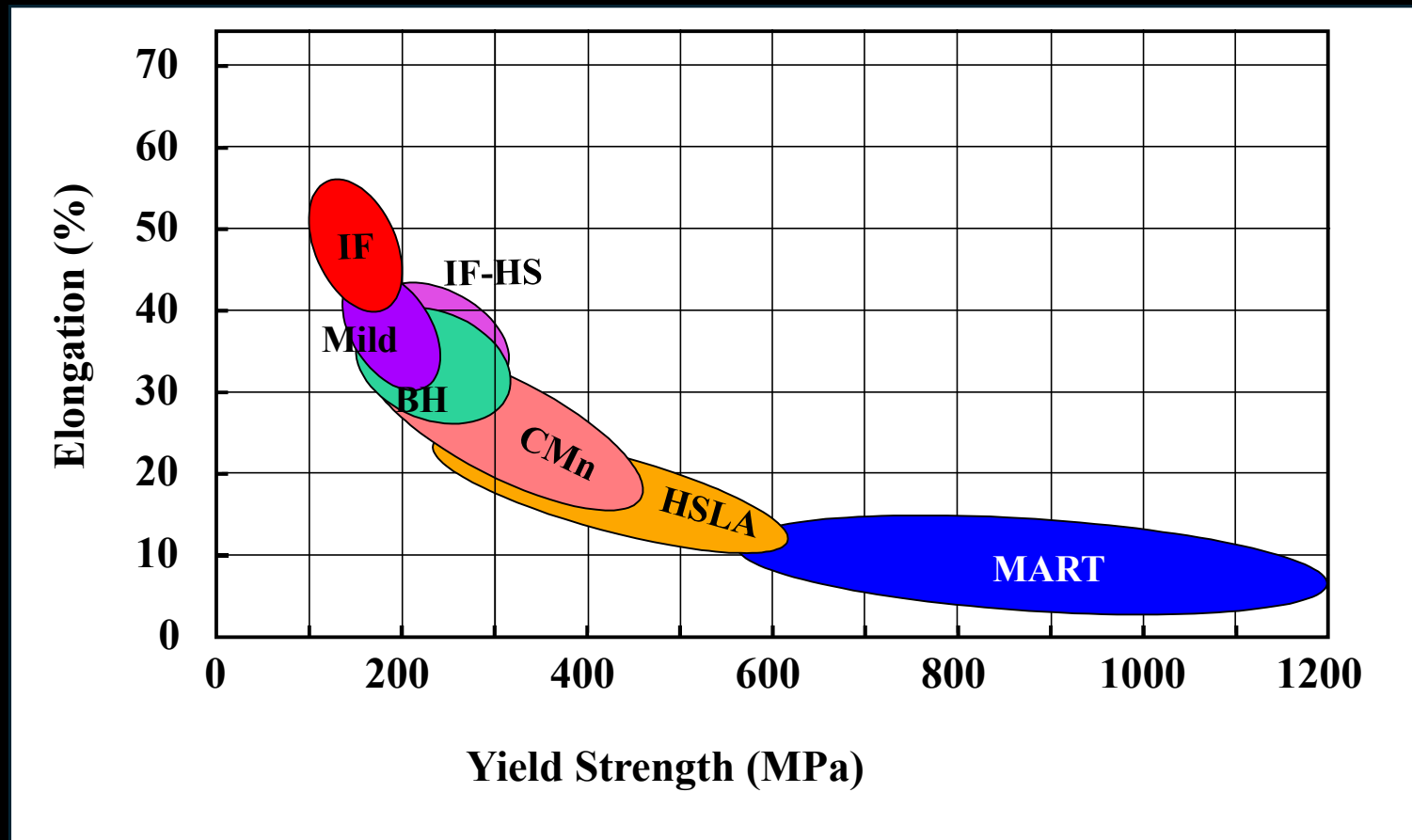


Dent-Resistant Steels Became Important in the 1980s

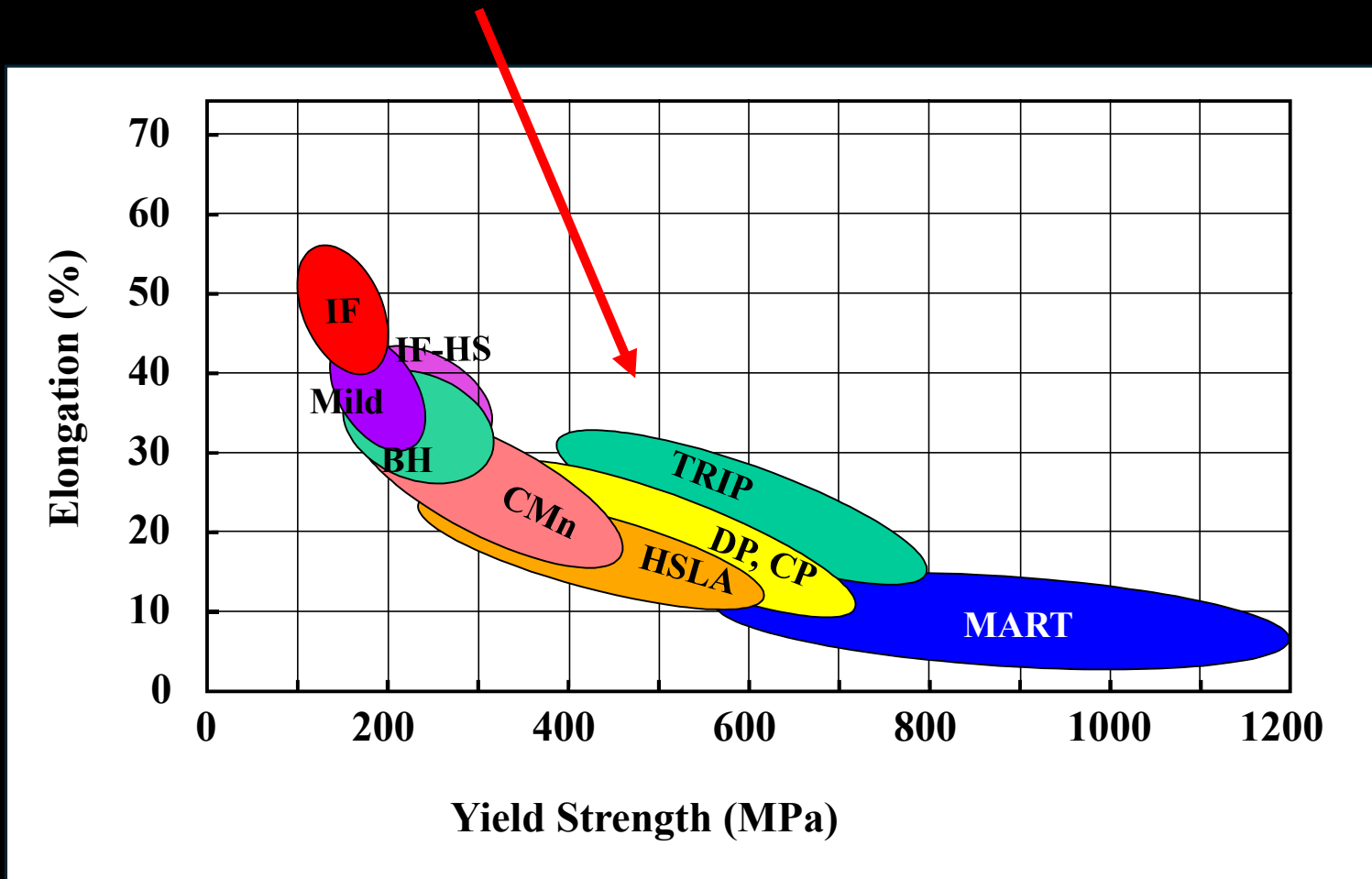
A Range of Steels Widely Available by the 1990s



VERSATILITY: “steel can be all things to all people”
(Grant Thomas)



AHSS Implemented in the Early 2000s



THIS COMMUNITY !

~ 1994 to 2005+

ULSAB



- Mass savings of 25% over the benchmark at no cost penalty
- 80% improvement in torsional rigidity
- 52% improvement in bending rigidity
- 58% improvement in first body mode
- Meets all mandated crash requirements

The Ultralight Steel Auto Body (ULSAB) Programme is an initiative to demonstrate the capability to reduce substantially the weight of a vehicle's body-in-white, while maintaining or with improved comfort and driving performance, all at affordable cost. The programme involves the engineering of a lightweight, efficient steel body structure to achieve significant performance improvements, while retaining affordable costs.

worldsteel
ASSOCIATION

THIS COMMUNITY !



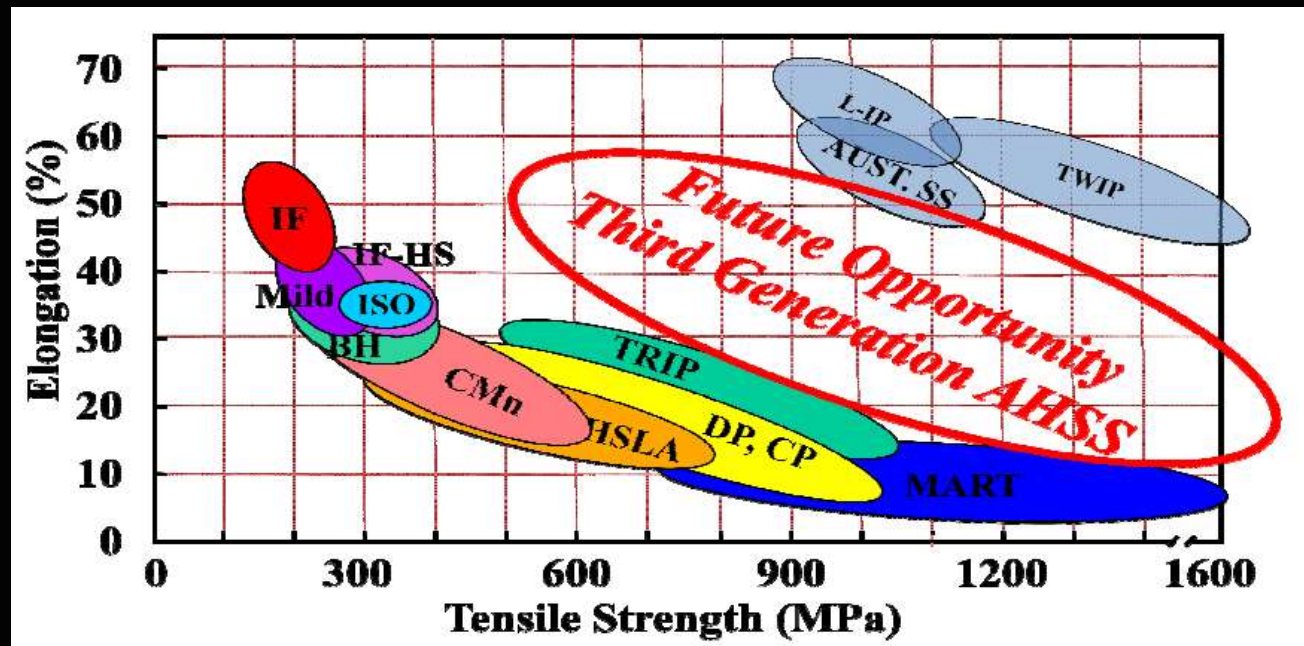
Inaugural GDIS: 2002

- 545 registrants
- Highlighted ULSAB-AVC

ULSAB

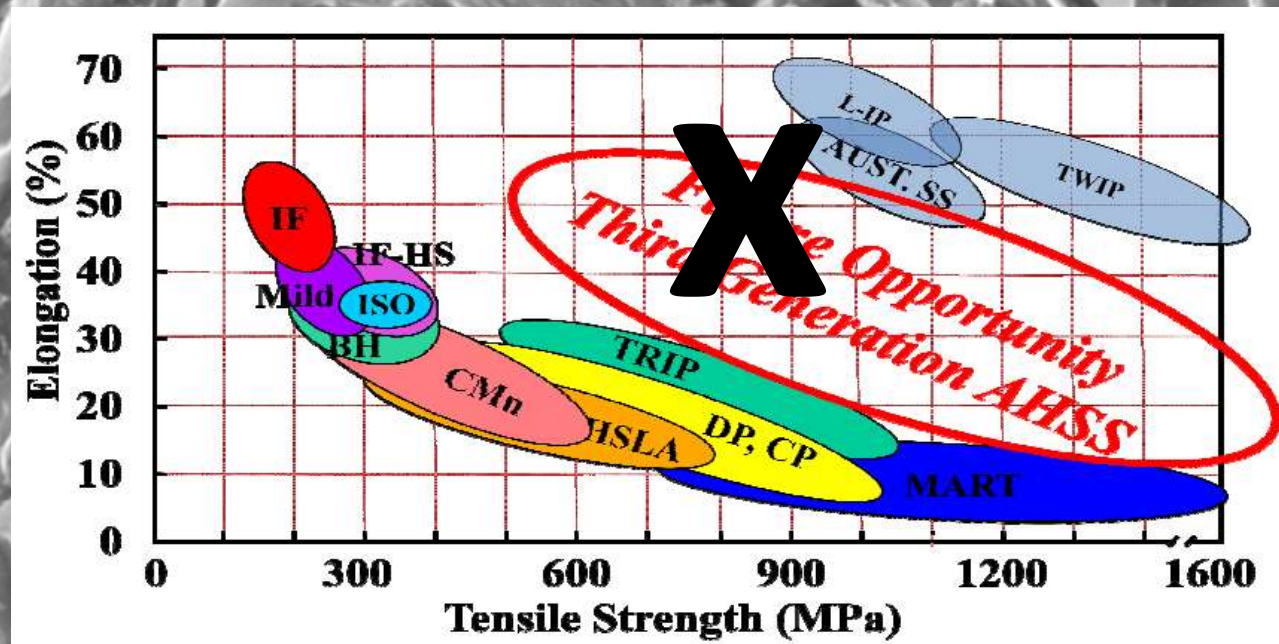


Circa 2005: 3rd Gen. AHSS Opportunity



AISI: www.steel.org (2006)

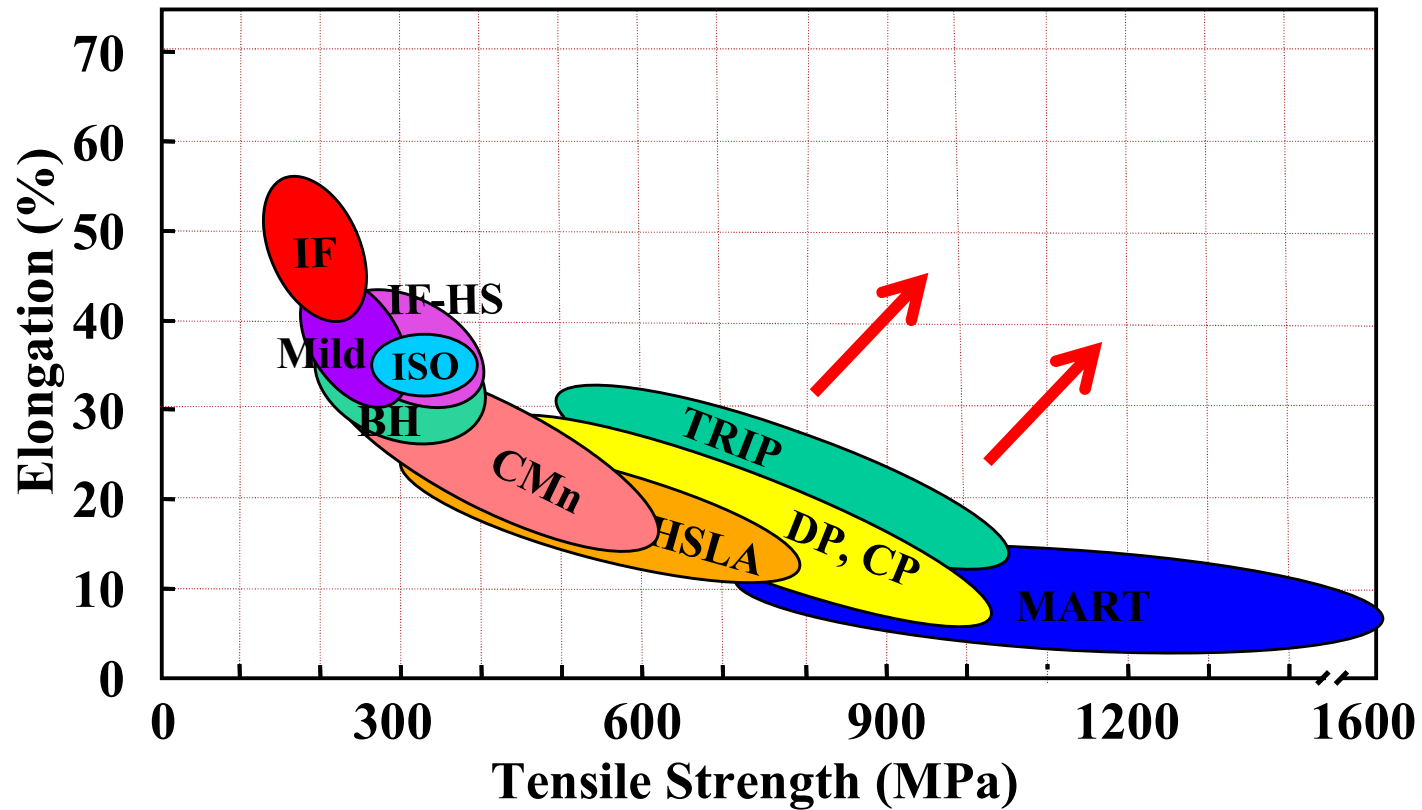
3rd Gen. AHSS:



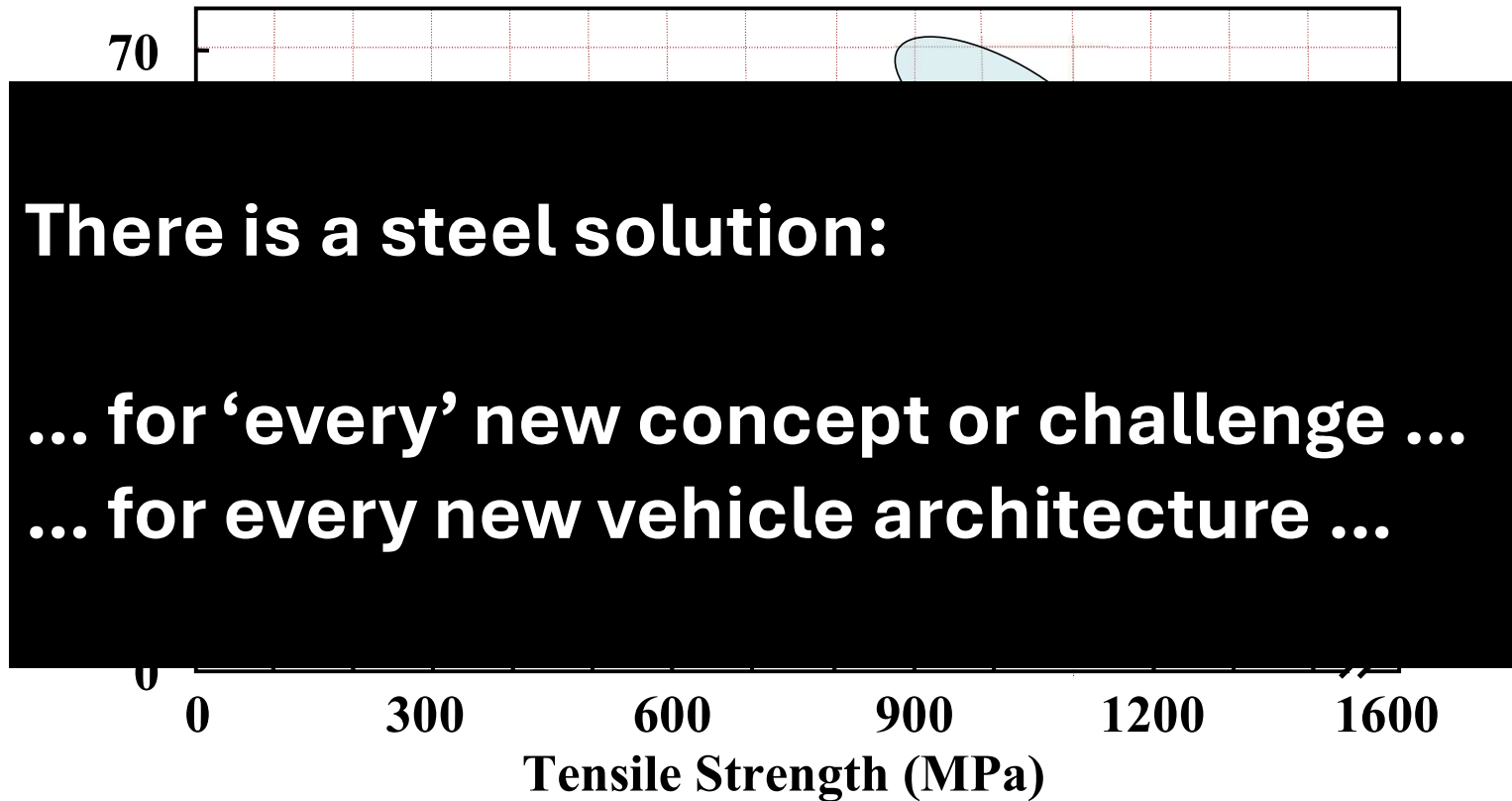
1 μm

What's next ?

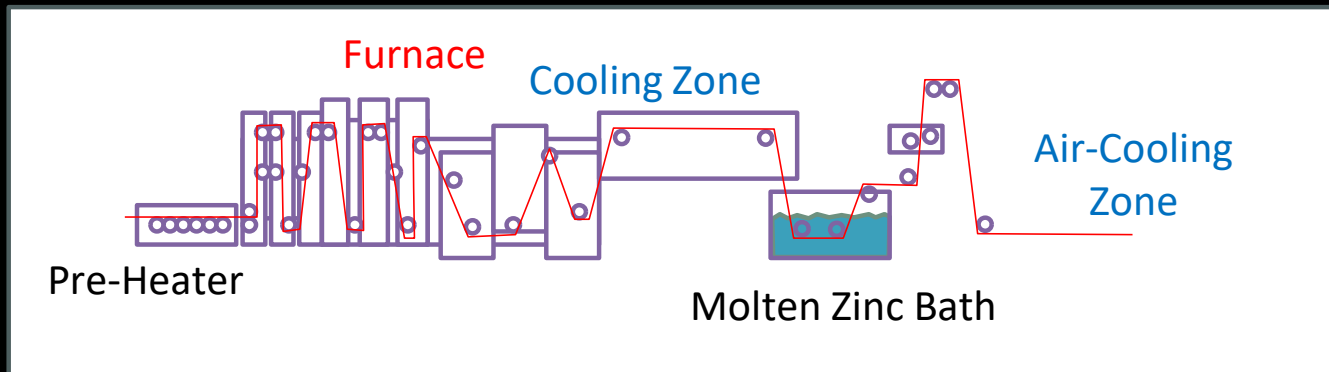
Stronger and Stronger...



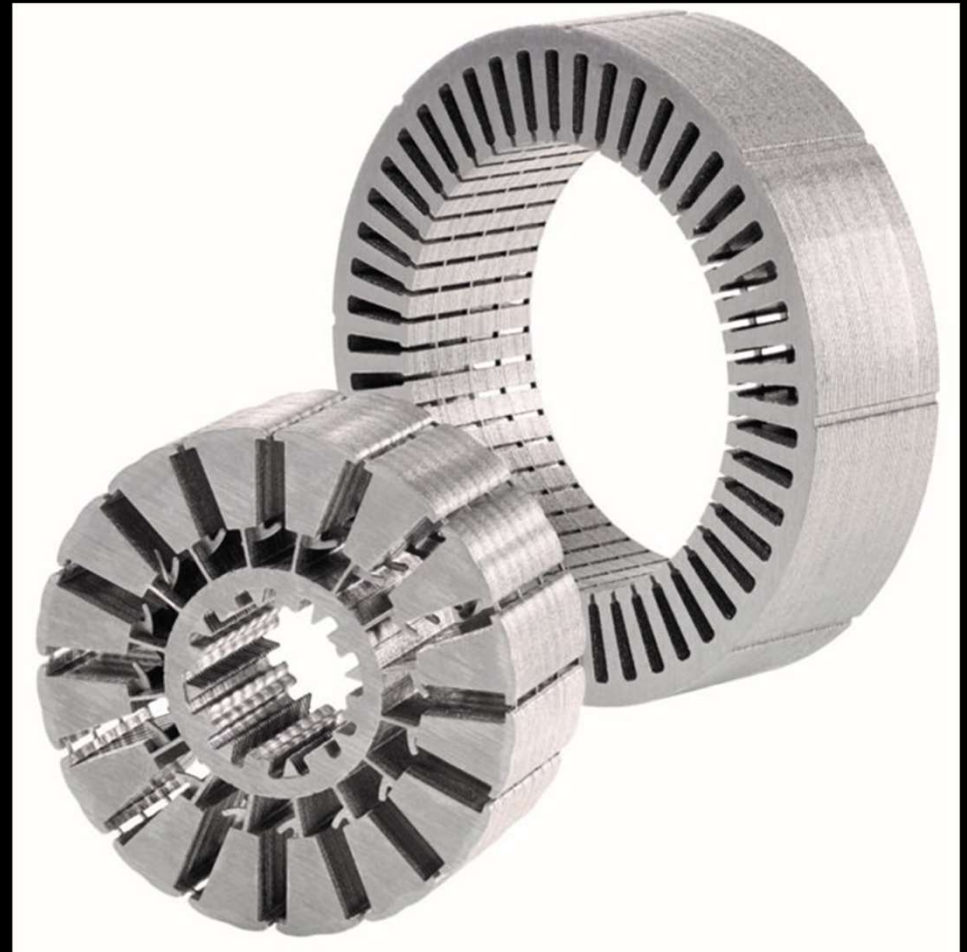
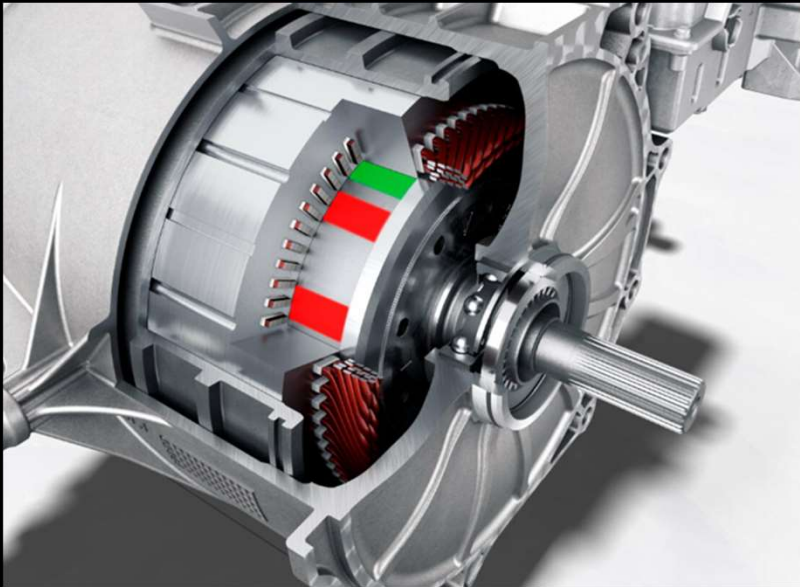
Versatility...



- ***Cold-rolled***
- ***Hot-rolled***
- ***Hot-stamped***



Motor lamination steels for EV traction motors



<https://www.emobility-engineering.com/motor-laminations/>

Deployment of Artificial Intelligence ?

- *Design*
- *Development*
- *Manufacturing*
- *Assembly*
- *etc...*

Sustainability

- *H₂ and CO₂ pipeline steels*
- *Electrification of process heating...*



Future Steels:

***...more to come as progress
marches forward...***

You are the ones who will make it happen !

***Progress will come from
your hard work and good
ideas...***



Concluding Remarks:

- **Steel has advanced steadily and will continue**
- **What you are doing is critical to sustainability of modern life**
- **Your ideas and hard work make the difference**