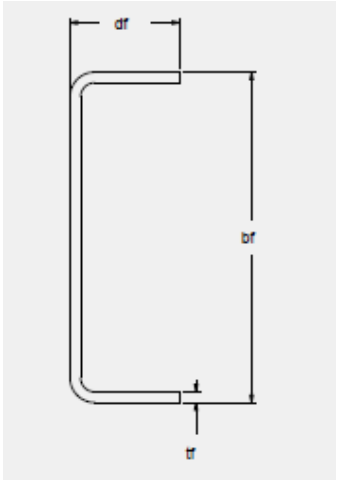
Cost Effective Safety & Light Weighting Products

Variable Thickness Rail

Nov. 2020

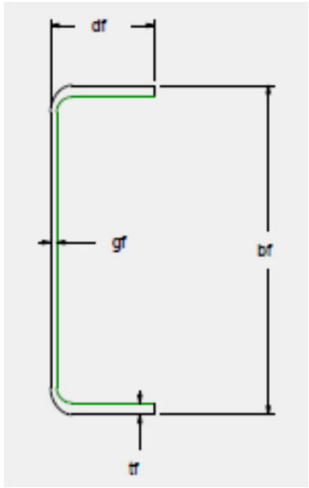
The Variable Thickness Rail

Constant Gage



Single constant thickness

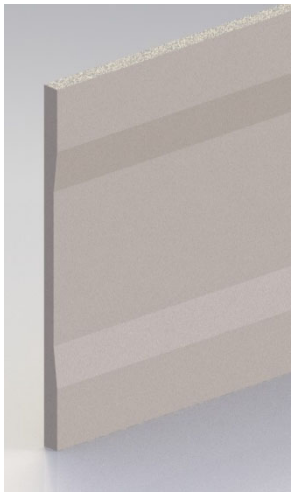
Variable Gage Proposal



Variable thicknesses

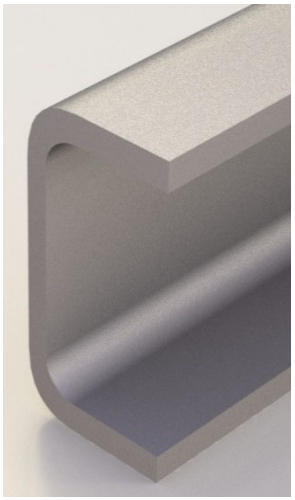
- Two thicker flange portions
- One thinner web portion

Variable Gage Blank



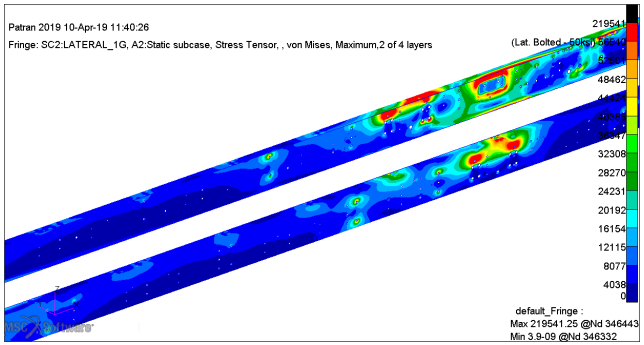
TWB manufacturing process creates high quality variable thickness blank

Variable Gage Formed Rail

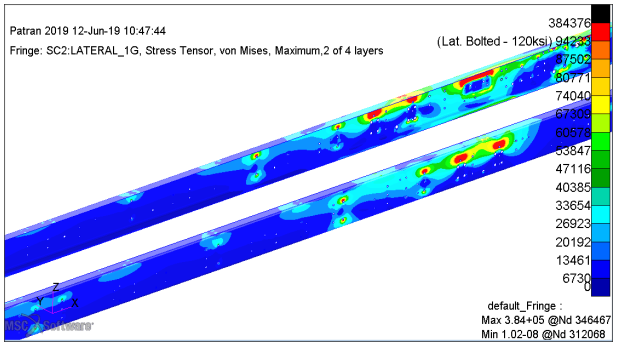


Integrated chamfer allows for simplified forming
(Patent Pending)

VTR Design



Baseline



Optimized VTR

Simulation shows improved stress distribution with optimized thicknesses

VTR Potential Geometry

Standard VTR

3T VTR
(Three unique thicknesses)
(Patent Pending)

Material compatibility: Medium Carbon Manganese-Boron Steel (UTS ≥ 800 MPa)

VTR Manufacturing Process

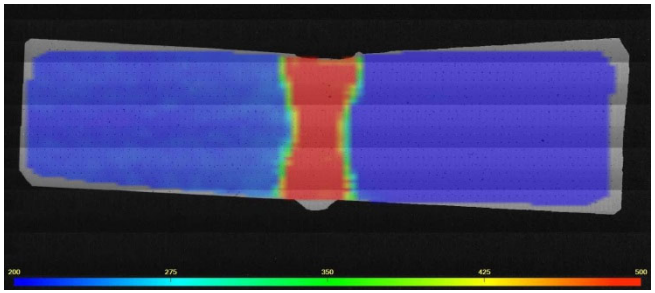
Raw material

Weld Process

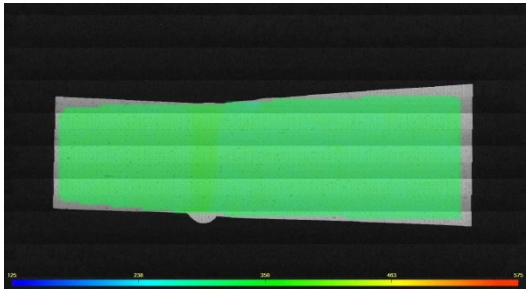
Forming

Heat Treatment

TWB Welding – safe and effective process for frame rail applications



Hardness Map – Post Weld



Hardness Map – Post Heat Treat

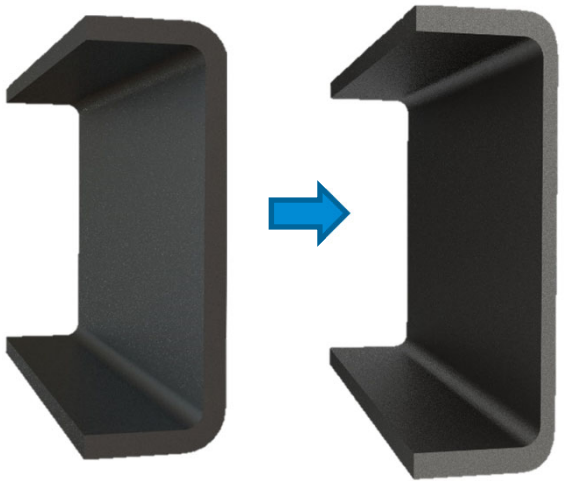
Mechanical properties in the welded area following heat treatment are nearly equivalent to the parent metal, negating any effect of the weld process

VTR Concepts

Solution #1 – Reduced Web

	Constant Gage	VTR
Flange Thickness (mm)	6.35	5.85
Web Thickness (mm)		4.10
Rail Mass (kg)	250	185

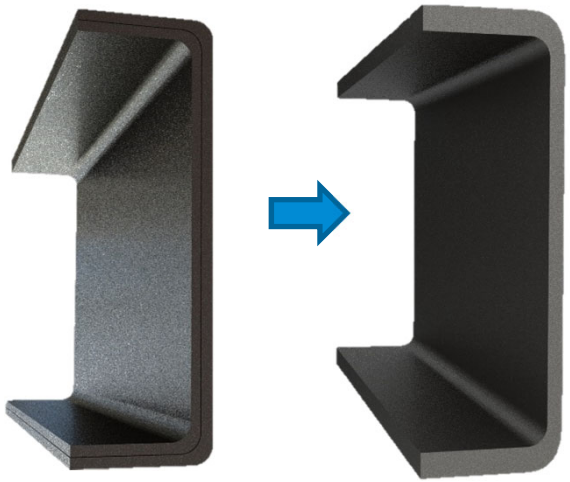
130 kg Overall Vehicle Weight Savings



Solution #2 – Liner Delete

	Constant Gage	VTR
Rail Mass (kg)	475	389

172 kg Overall Vehicle Weight Savings + Assembly Simplification



Assumed Length: 10 meters

Development Roadmap

- VTR offers the **largest weight savings** potential for the commercial truck industry while maintaining a steel structure.
- Welded VTR manufacturing is based off of **25+ years of success** in tailor welded blanks.
- Static and dynamic CAE analysis show design success. Optimization sequence has been developed to calculate **best possible design**.
- Manufacturing **partnership opportunities now available** for evaluation of bench level prototypes and market development.

Tailored Product – Cost Effective Steel & Aluminum Solutions

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to learn how we can help
optimize your design.