



ArcelorMittal

Welcome Connecting **pioneers**

Christos Drettas, **ArcelorMittal Sheet Piling**

ArcelorMittal Europe – Long Products

10,700 employees

23 production sites

in **10** countries

12 Mt shipments

Flood protection

Did you know?

In 2013-2014, ArcelorMittal supplied 70,000 tonnes of sheet piles relating to emergency measures following the flooding in Eastern and Southern Germany of June 2013.



This is us

Hot Rolled Steel Sheet Piling ArcelorMittal mills and product range


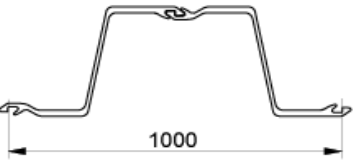
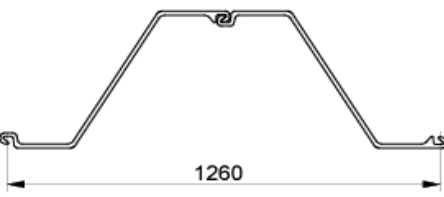
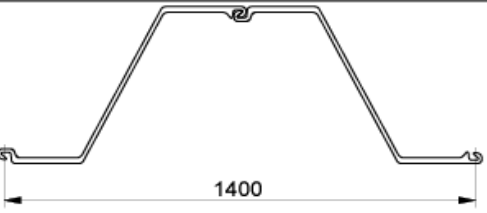
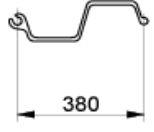

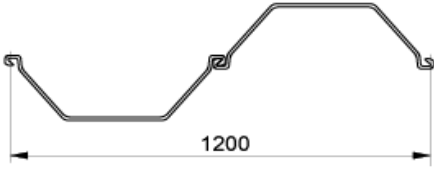
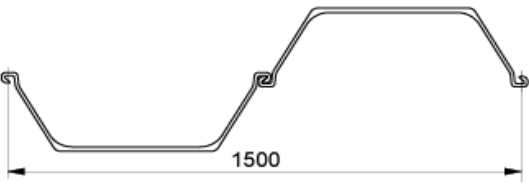


Mill	Capacity
Belval	620 kt
Dabrowa	200 kt *
Differdange	70 kt **

* depending on product mix on HSM ** Fabrication capacity

Steel sheet piles “Made in Belval”

- since **1911**, **BELVAL** has improved its sheet pile sections
- **WORLDWIDE LEADER** for more than 20 years
- continuous investments to develop innovative solutions

Type	RANSOME 1911	BZ 1933	AZ 1990	AZ - 700 2004
Z	 394	 1000	 1260	 1400
Type	TERRE-ROUGE 1912	LARSEN 1914	PU 1988	AU 2000
U	 380	 800	 1200	 1500

New AZ-800 range: advantages

wider

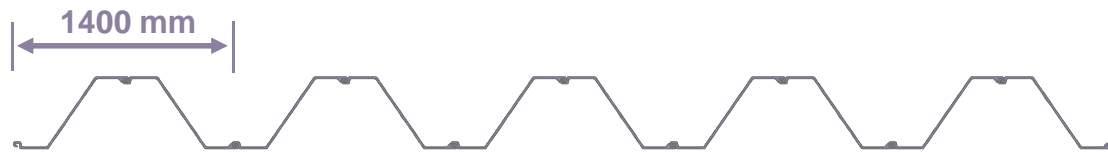
lighter

faster installation

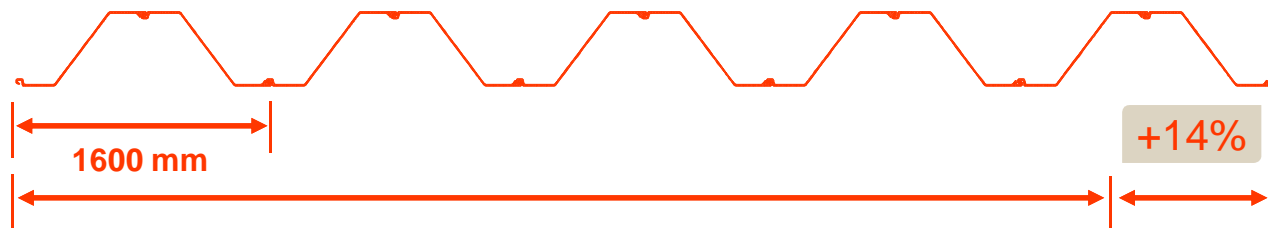
⇒ **HIGHER COST-EFFICIENCY**

- for our customers
- compared to competing materials

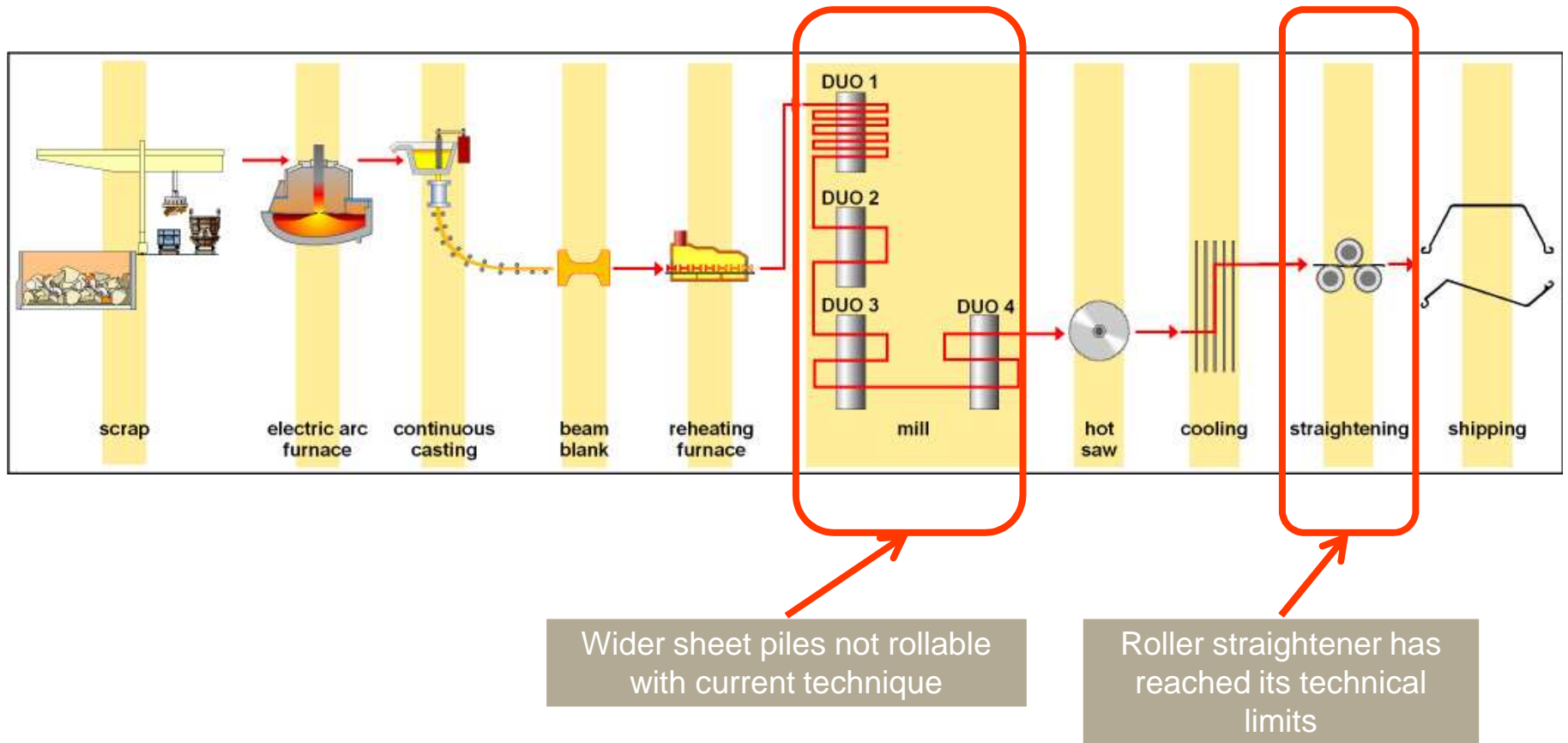
AZ-700



AZ-800

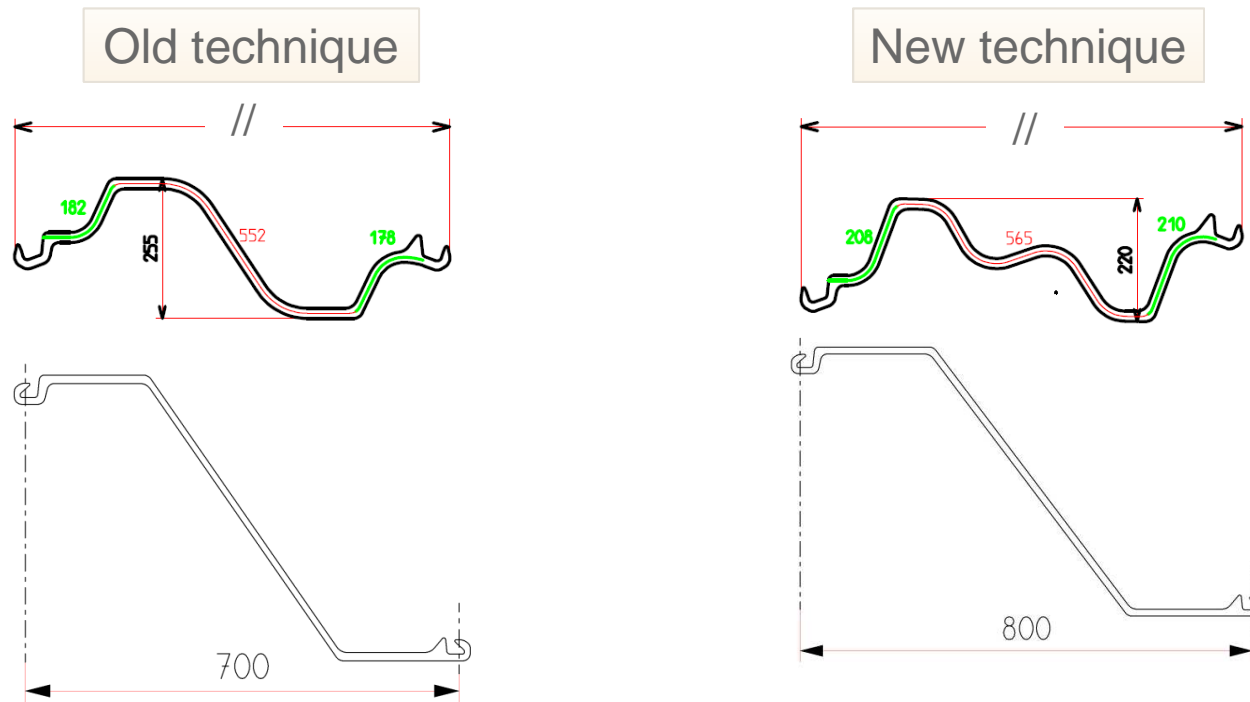


Investment Project. Production route for sheet piles



2 technical hurdles to pass in order to enable production of wider sheet piles

Development of a new rolling technique



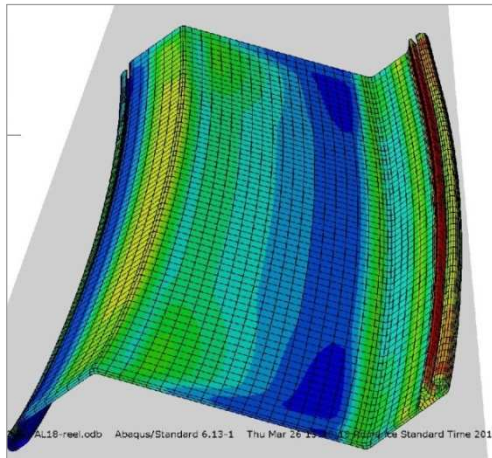
New rolling technique enables production of wider sheet piles on the same rolling stands by increasing the length of the different parts of the shape without enlarging the full shape



Roller straightening



Before straightening



- standard part of the manufacturing process of long products in general
- needed to respect the straightness tolerances of profiles and sections



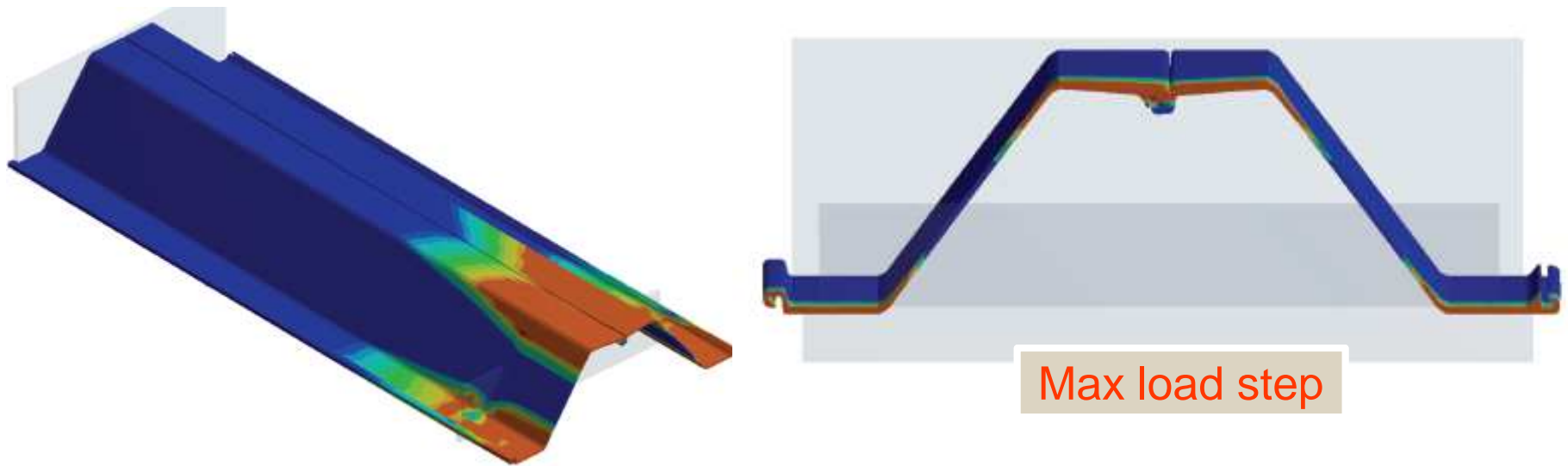


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**R&D. Development of new sections.
Fit for purpose?**

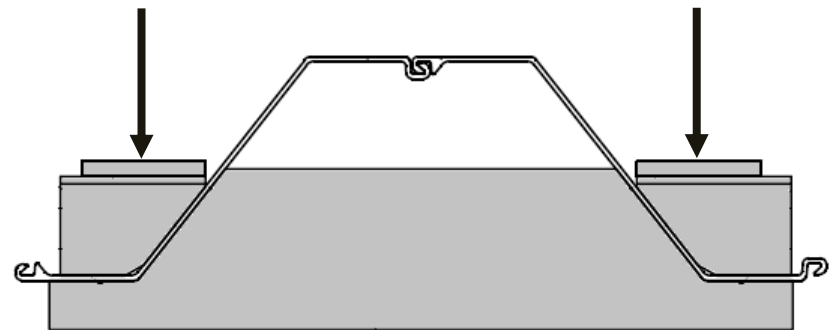
Compatibility of AZ-800 series to EN 1993-5 Tested by numerical modeling ...

- modeling of 4 point bending test (4PBT) with FE to check behaviour in bending
- allowed confirmation for
 - single flange criteria for classification
 - AZ 20-800 & AZ 25-800 **class 3** as expected according to EC3-5



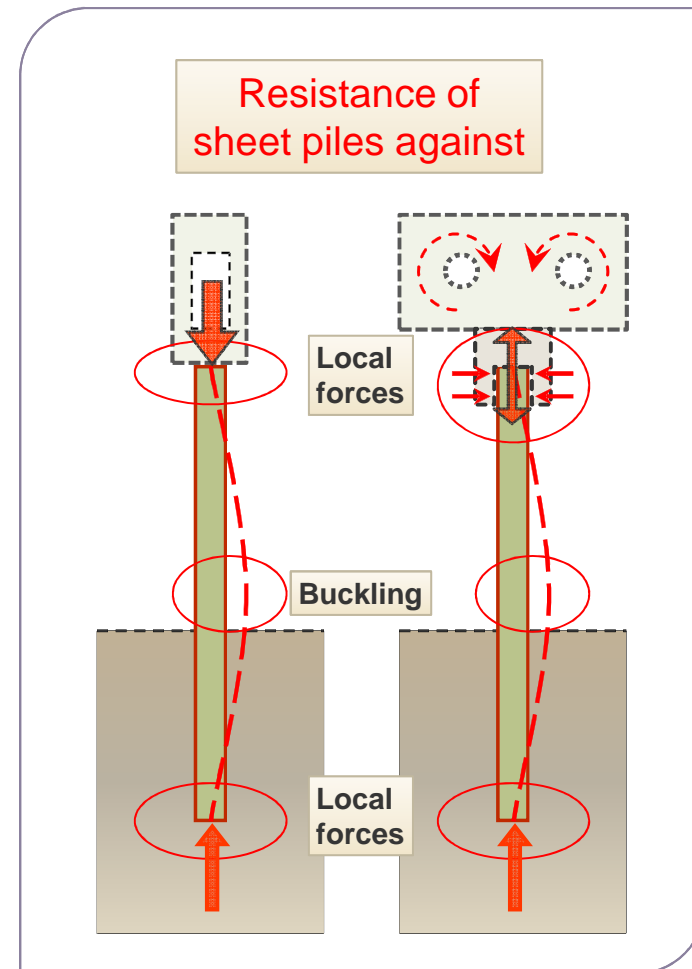
Compatibility of AZ-800 series to EN 1993-5 ... and laboratory testing

- test set-up for 3PBT and 4PBT as used for determination of EC3-5 rules
 - 4 PBT gives good representation of real situation with distributed loads
 - compression zone not stiffened and thus free to buckle
- testing in cooperation with University of Stuttgart, Germany



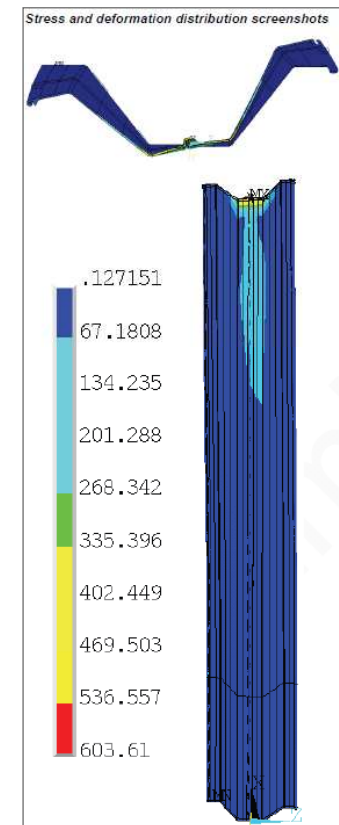
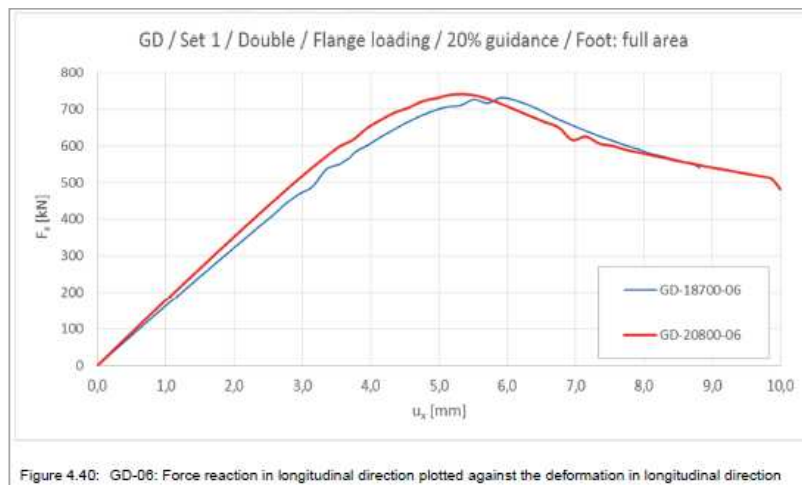
Fit for purpose for installation?

- comparison of driving behaviour of AZ 700 and AZ 800
- simple FE model allowed comparing
 - web buckling
 - global buckling
 - resistance to vibro-clamp



Fit for purpose for installation. Scenarii tested by FE modeling

- AZ 700 and AZ 800 have similar driving behaviour
- both mainly influenced by
 - thickness
 - slenderness of flange & web
 - inertia

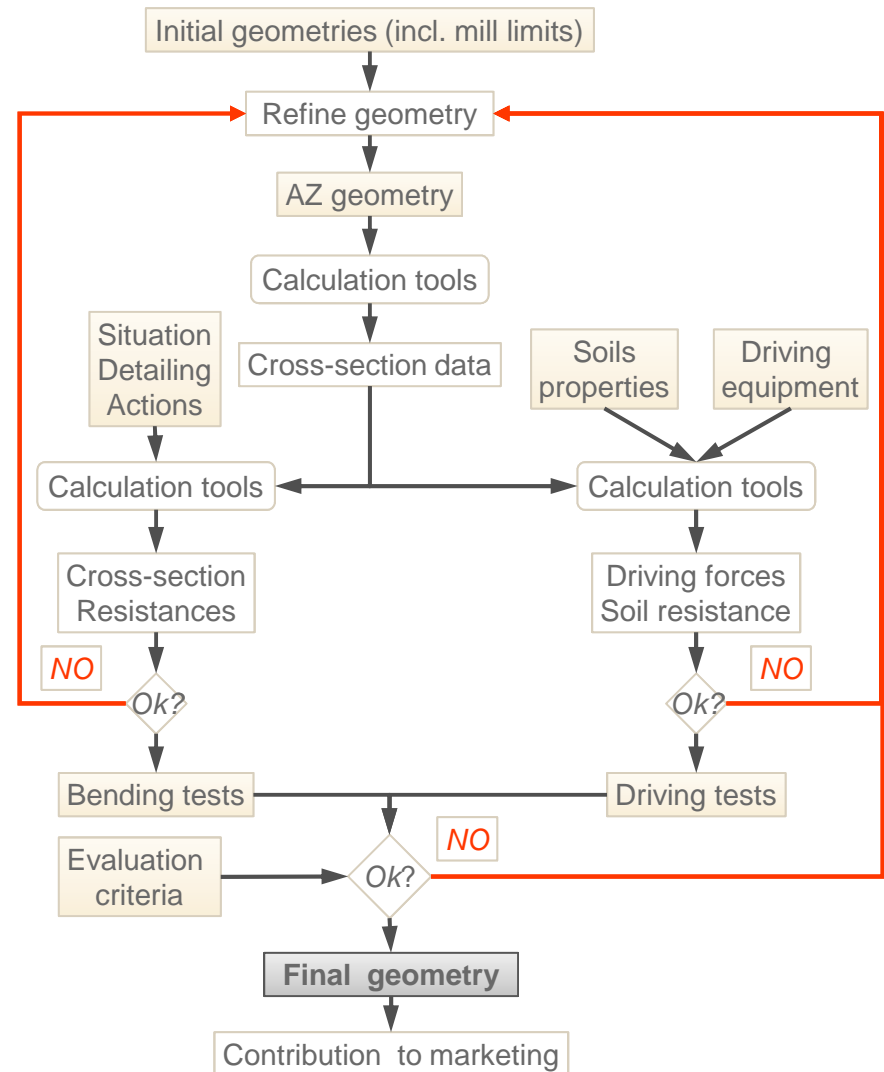


To be further validated in driving test (worst case)

Towards wider sheet piles. An iterative process

Geometries never used so far

- ⇒ is the solution industrially feasible?
 - roll pass design
- ⇒ are the current design methods applicable?
- ⇒ driveability of the new sheet piles?
 - comparison to AZ-700 series

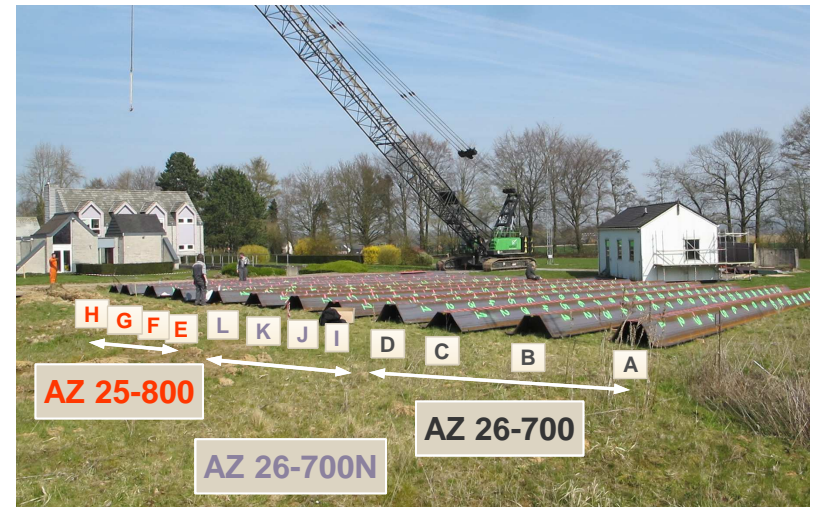
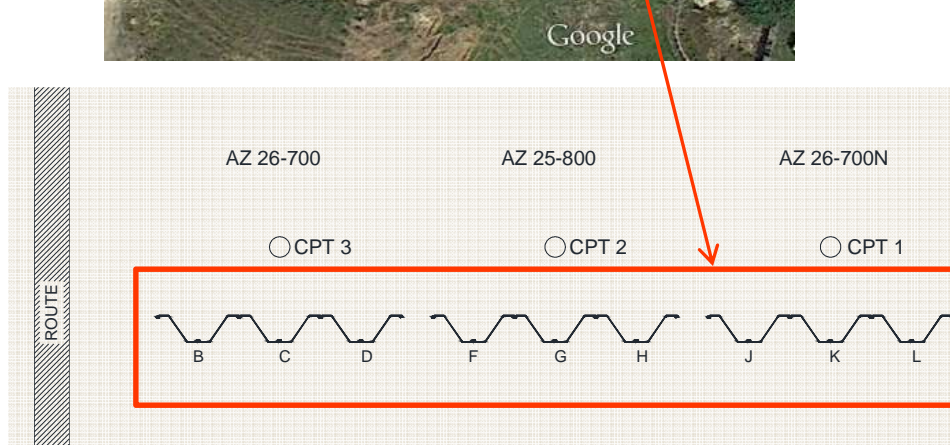
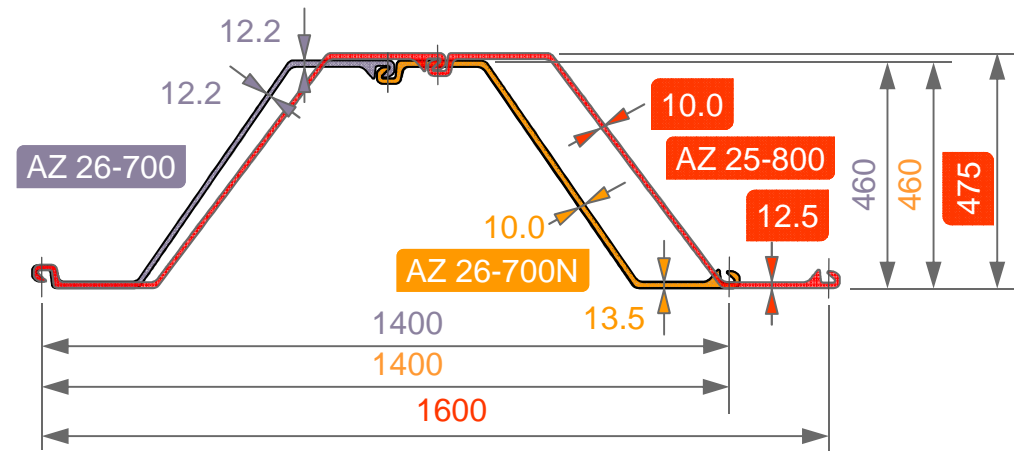




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**R&D. Development of new sections.
Fit for purpose? Driving**

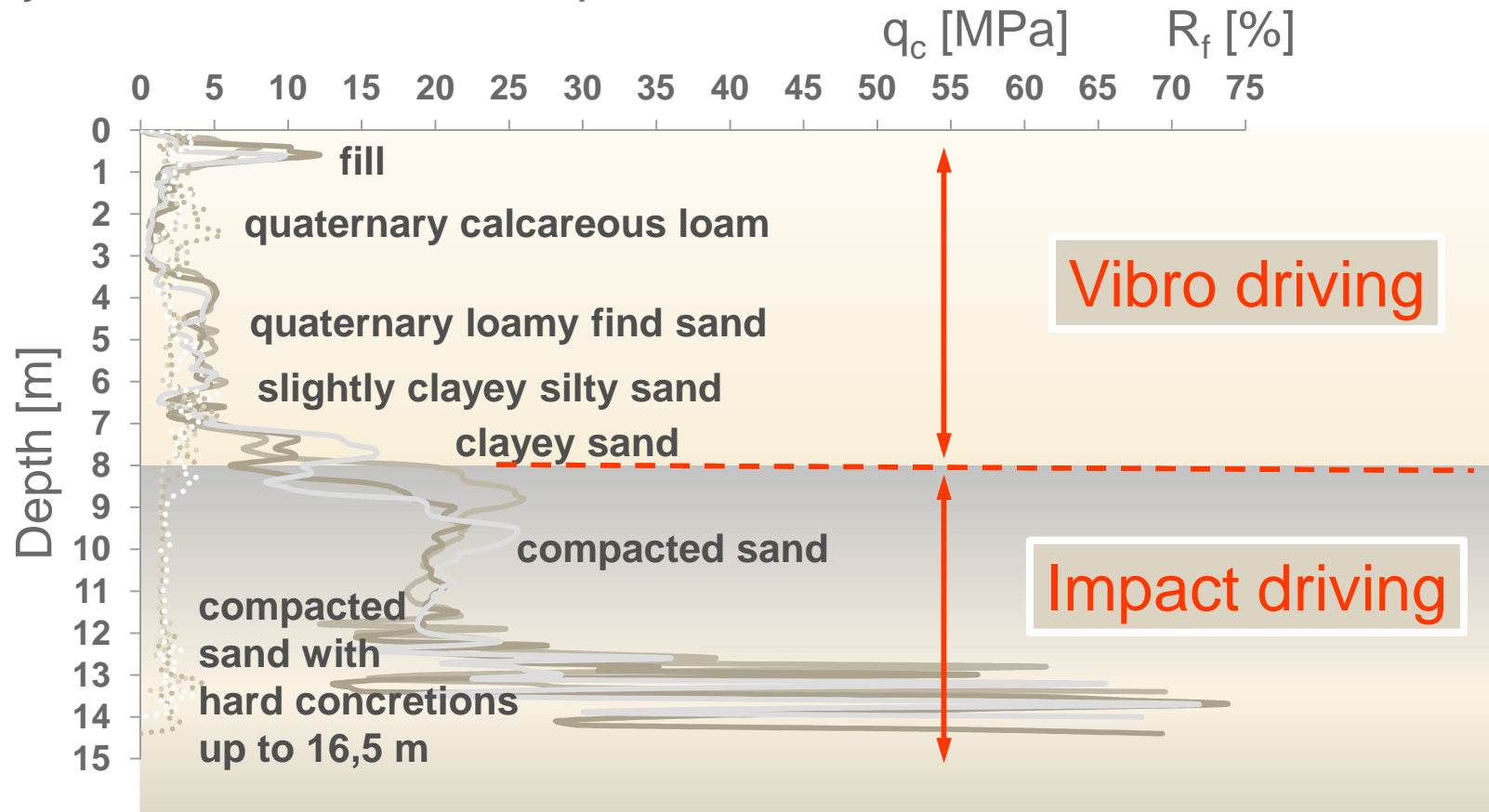
Driving test in Limelette, Belgium. Set-up.



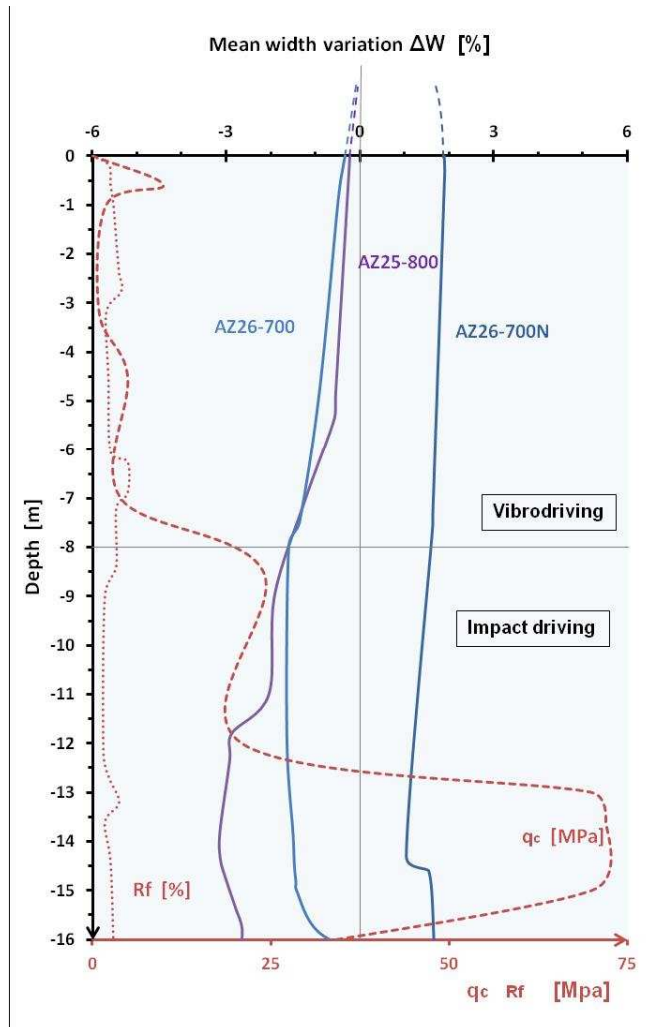
- collaboration with CSTC

Soil conditions and installation method

Very hard soil from 8 m depth



Variation of “w” (width of a double sheet pile)



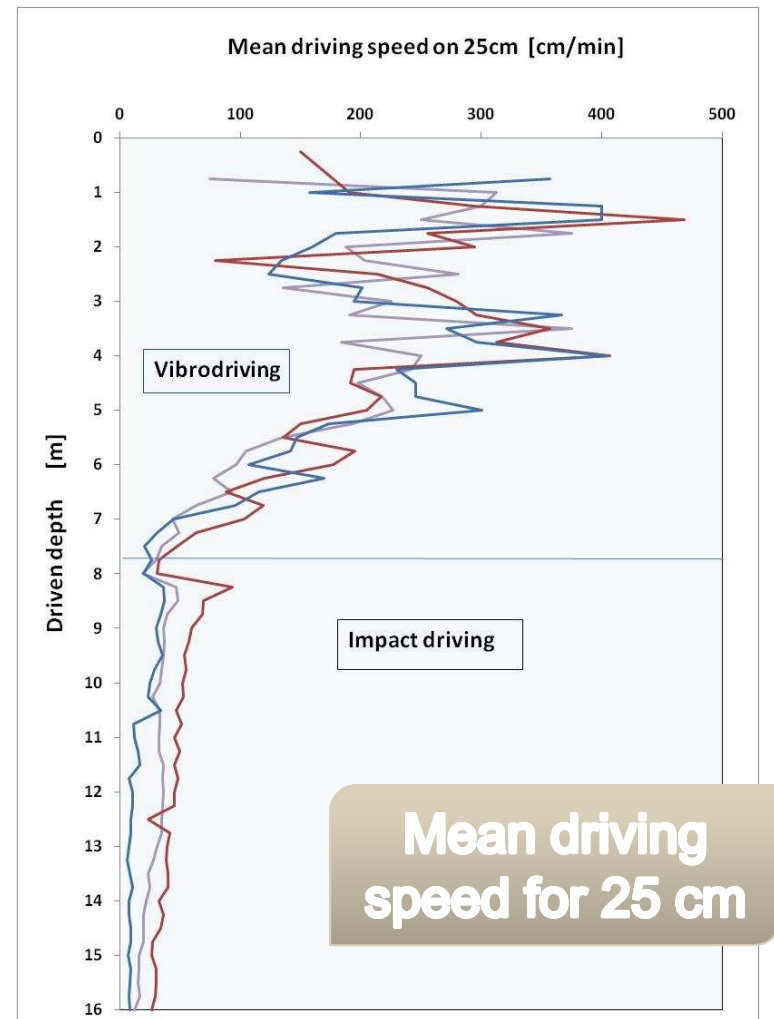
- measurement of the width of each pair
 - before installation
 - after pulling out (same vibratory hammer)
- mean variations in the same range as our delivery conditions (+/- 3%)



Analysis of driving speed

driving speed behaviour is similar for the 3 profiles

- for vibrodriving (0 ⇒ 8m depth)
- for impact driving (8m ⇒ 16m depth)

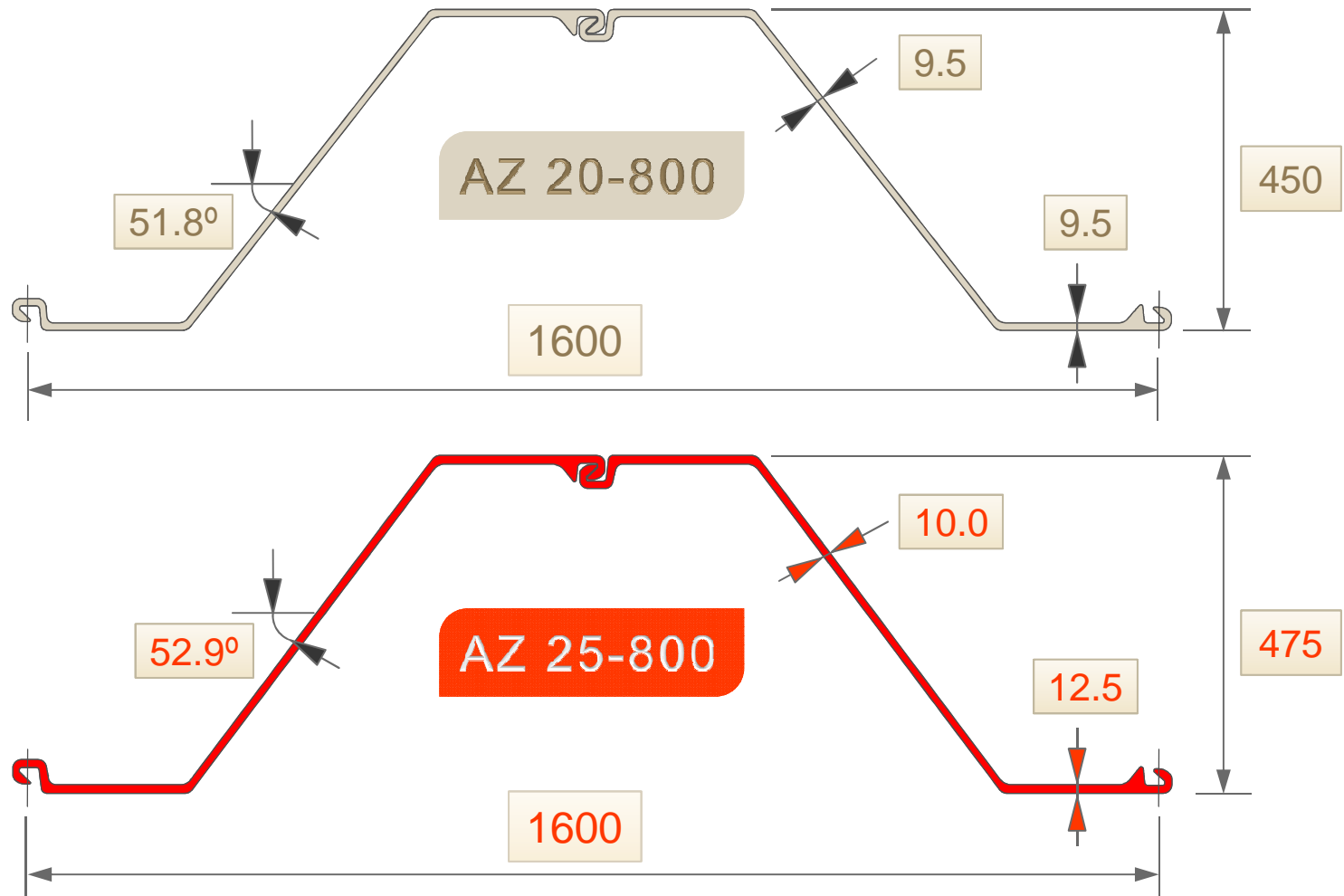




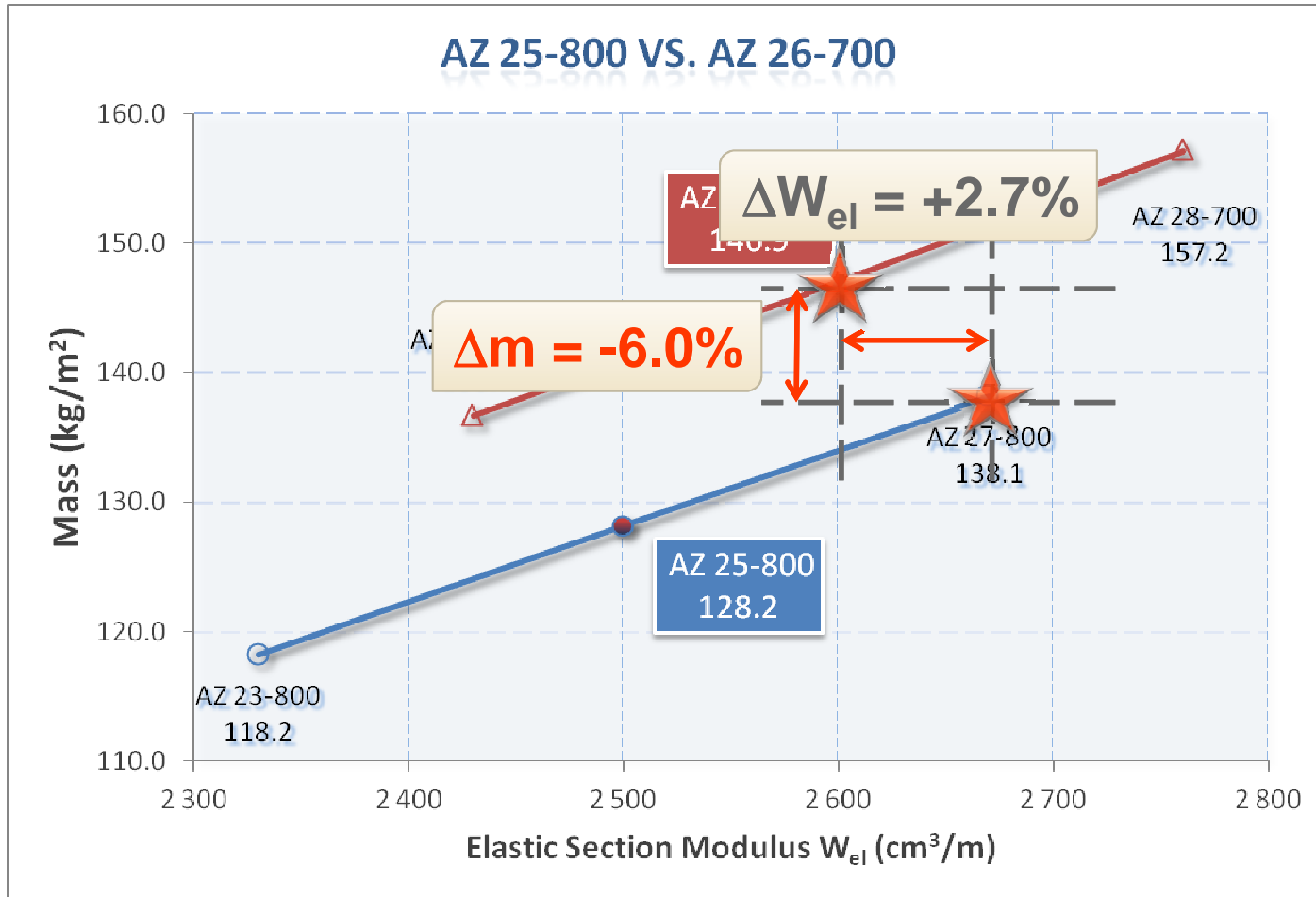
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Technical advantages of the new sections

AZ – 800 sections



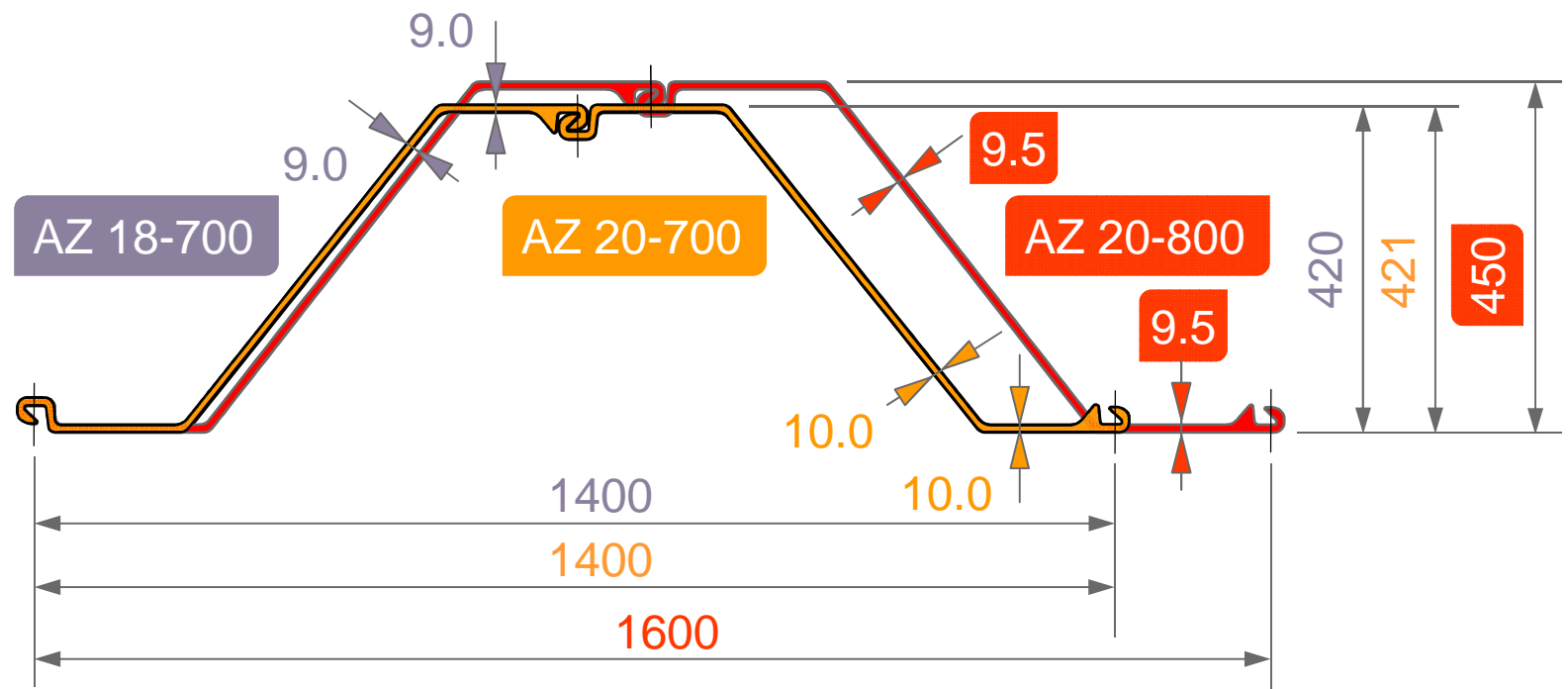
Comparison of similar sections





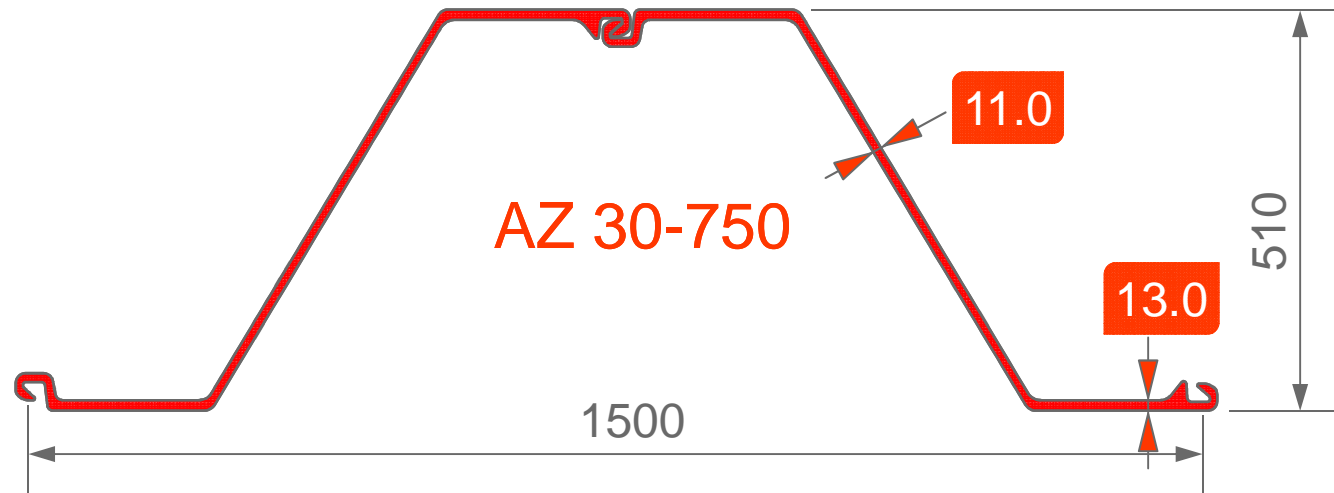
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New AZ 20-800 | AZ 18-700 | AZ 20-700

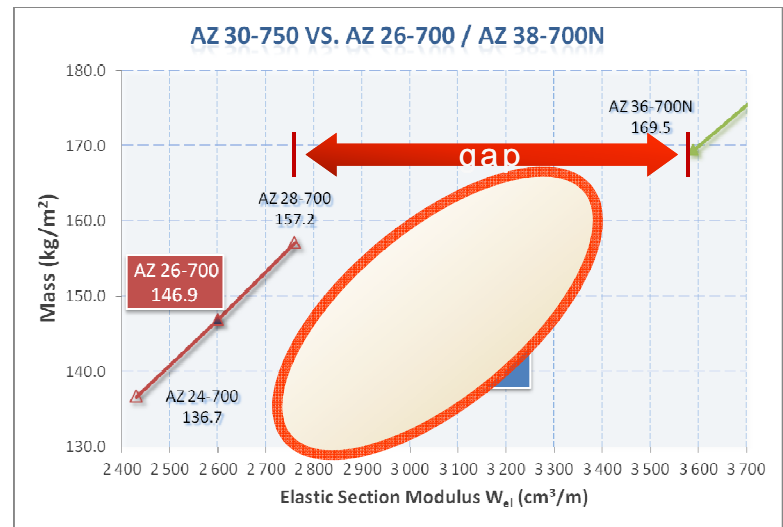


	AZ 18-700	AZ 20-700
W_x (cm ³ /m)	1 800	1 945
mass (kg/m ²)	109.3	119.3
Δ mass (%)	-----	0

New sections. AZ 30-750



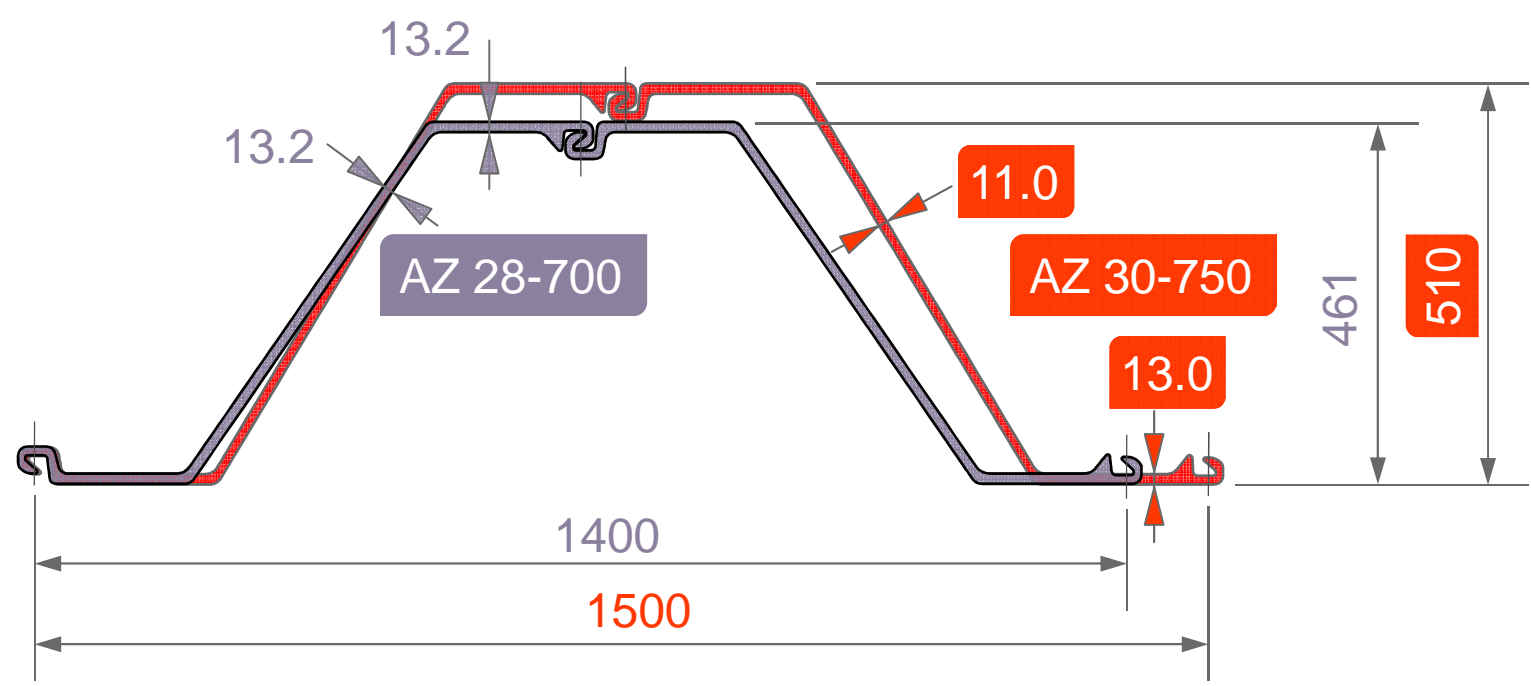
fills a gap between AZ 26-700 and AZ 36-700N
 ⇒ exclusive Z-type section in this range





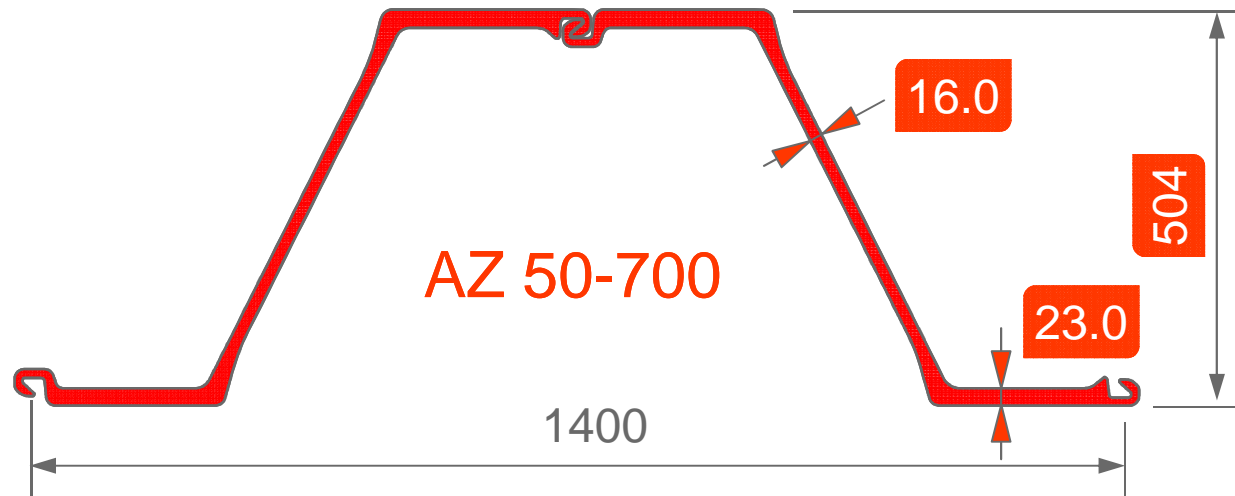
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New AZ 30-750 | AZ 28-700



AZ 28-700	
W_x (cm ³ /m)	2 760
mass (kg/m ²)	157.2
Δ mass (%)	0

New sections. AZ 50-700

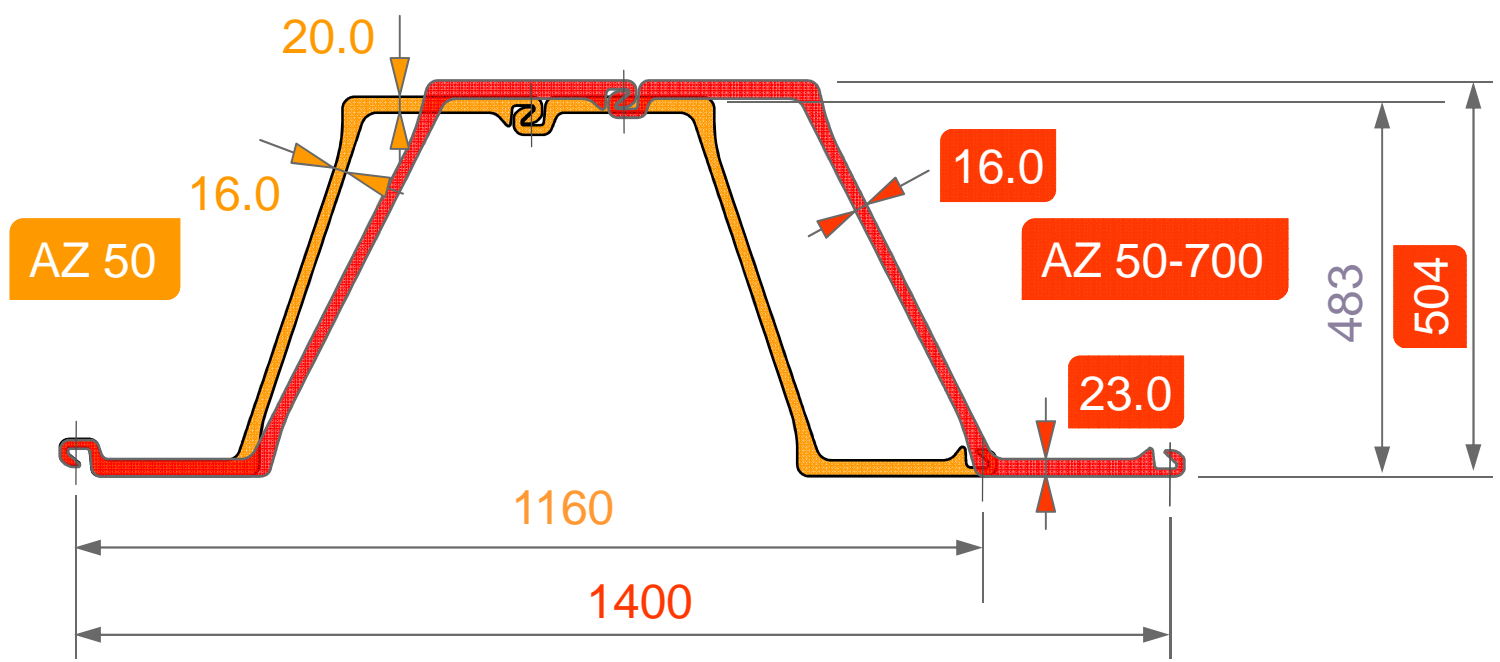


World premiere!
Strongest sheet pile



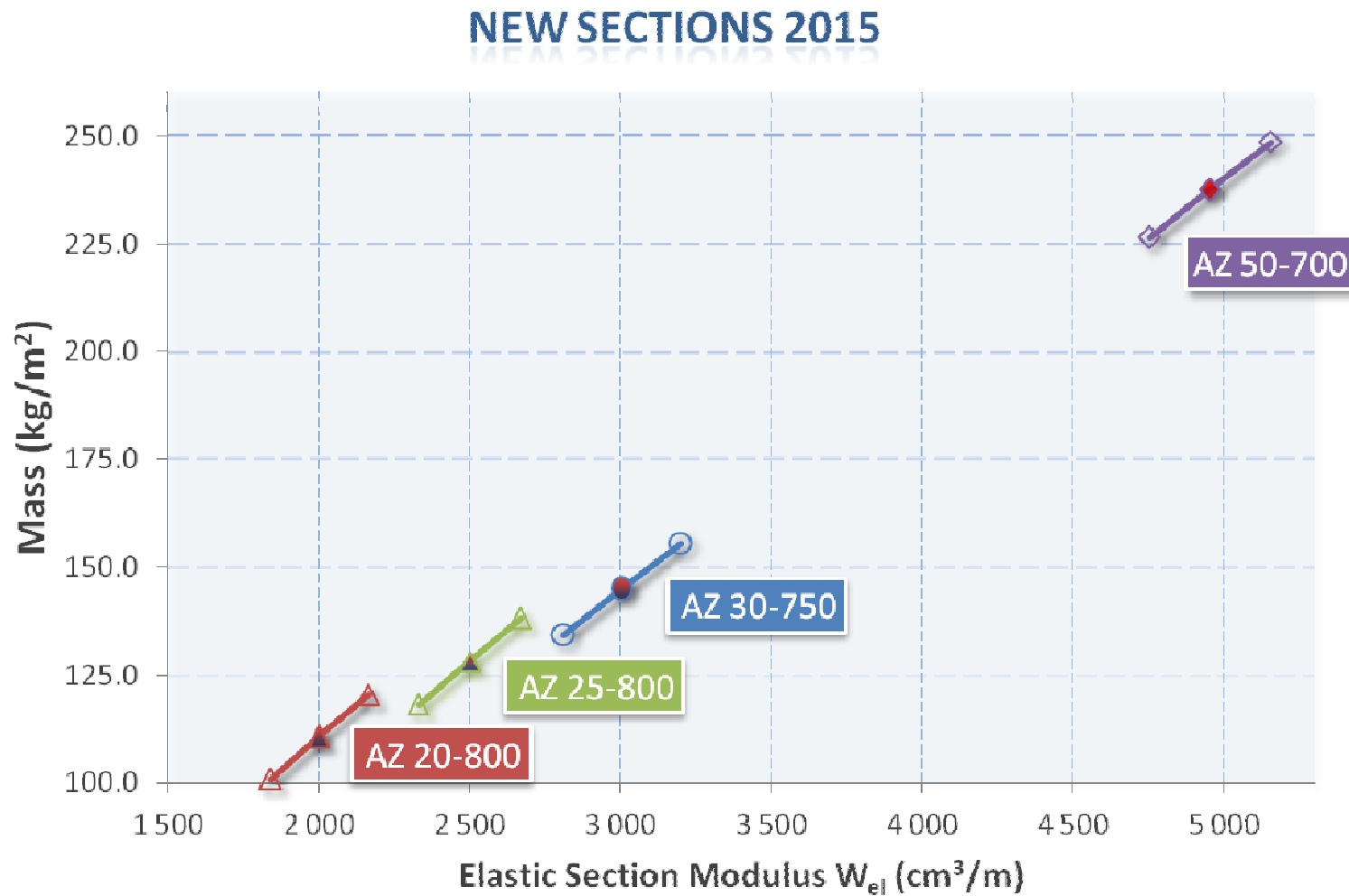
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New AZ 50-700 | AZ 50



	AZ 50
W_x (cm ³ /m)	5 015
mass (kg/m ²)	252.9
Δ mass (%)	0

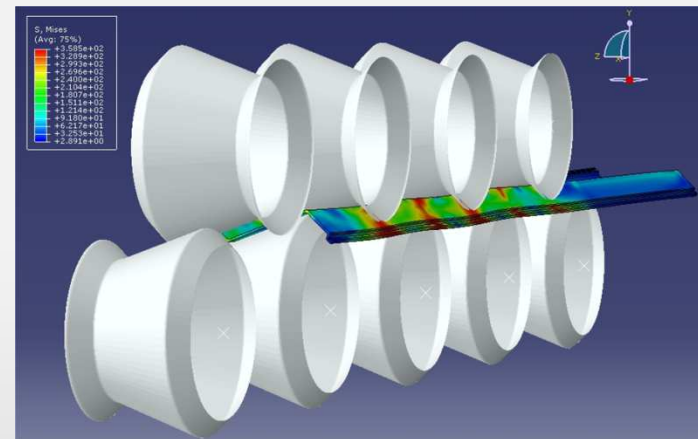
New sections 2015 - 2016



Closing remarks

2015

- jun official launch during customer events
- jun - jul revamp of Mill 2 (new straightening equipment)
- sep - oct **AZ 25-800**
- nov - dec **AZ 30-750**



2016

- H1 **AZ 20-800 & AZ 50-700**

ArcelorMittal

Franko Gassler
Chief Operating Officer
ArcelorMittal Spandauwerk
Deutschland

Connecting pioneers

Unsere Mission ist die Maximierung des Kundennutzens. Dazu führen wir innovative Konzepte unserer Forschungsteams mit dem Wissen von innovativen Ingenieuren zusammen, die auf herausragenden Service-Kundenzufriedenheit abzielen. Die Kraft innovativer Ideen verbindet sich so mit dem Mut ingenieurtechnischer Visionen zu den Priorisierungen von morgen. Zwei Welten, vereint durch eine Bindung aus Stahl. ArcelorMittal Spandauwerkssysteme.

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Heiko Elger
Leiter Ingenieurwesen
ArcelorMittal Steel West
Luxemburg

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Connecting pioneers

Pour nos clients, nous créons de la valeur en combinant les idées innovantes de nos clients à l'expertise de notre force de vente. Les ingénieurs, vecteurs d'innovation par la force de leurs idées, et les entrepreneurs, prêts à changer le monde par l'audace de leur vision, deviennent ainsi les pionniers des solutions de demain. Deux univers unis par un lien d'acier. Les pilastres signés ArcelorMittal.

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Aljosha Hoesen
Metallurg Experte
R & D Spandauwerk
Luxemburg

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Connecting pioneers

ArcelorMittal

Lars Schleggen
Chief Operating Officer
ArcelorMittal Projects Europe
The Netherlands

Connecting pioneers

Wij bieden onze klanten technologische waarde door de innovatieve concepten van onze ontwerpers samen te brengen met een vakkundig datagebruik in onze fabrieksoverstrooming. We combineren innovatieve ideeën en gedurfde visies van ingenieurs en ondernemers om de beste ingenieursoplossingen van de toekomst te ontwikkelen. Een gezamenlijk hand tussen twee werelden. ArcelorMittal Damwagingsystemen.

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Chief de Département
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