

MATTEO BULFONE  
EXECUTIVE VICE PRESIDENT  
FLAT ROLLING TECHNOLOGY  
DANIELI GROUP

17th Arab Steel Summit  
OCTOBER 14-15, 2024  
DOHA, QATAR

# DANIELI MULTIPLATE™ & DANIELI UNIVERSAL ENDLESS™

## FLAT ROLLING TO THE NEXT LEVEL

DANIELI



DANIELI / SINCE 1914  
PASSION TO INNOVATE  
AND PERFORM  
IN THE METAL INDUSTRY

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## Introduction

01

What is the Danieli MultiPlate?

02

Reference: Nucor Steel Brandenburg

03

Danieli Universal Endless (DUE)

04

Plant Features at Yukun

05

Yukun DUE Startup

06

Conclusions

07

## DANIELI MULTIPLATE™ & DANIELI UNIVERSAL ENDLESS™

Flat rolling to the next level

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## DANIELI MULTIPLATE™



## DANIELI UNIVERSAL ENDLESS (DUE)™

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# DANIELI MULTIPLATE™ & DANIELI UNIVERSAL ENDLESS™

## Megatrends of human development

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THICK & WIDE PLATES

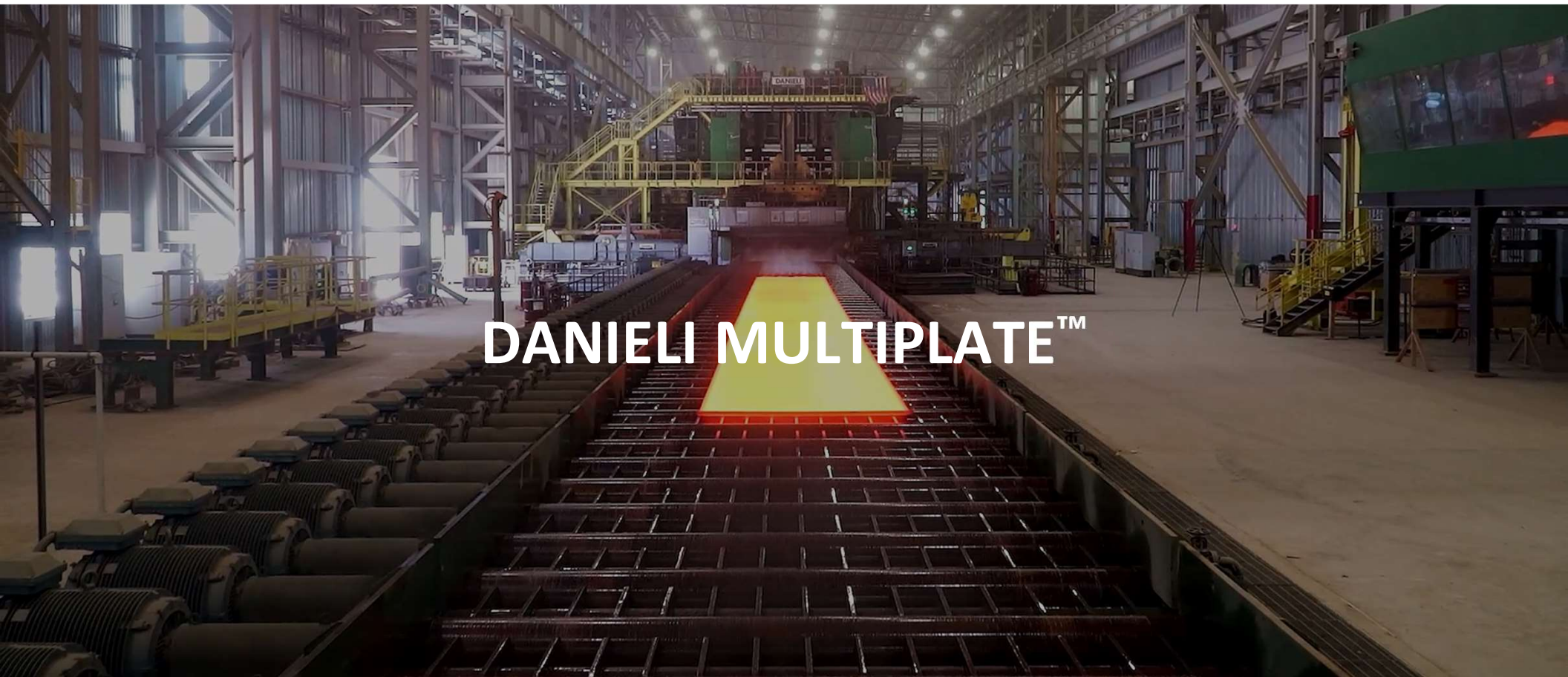


SPECIAL STEELS &  
SUPER ALLOYS

DANIELI MULTIPLATE™ &  
DANIELI UNIVERSAL ENDLESS™

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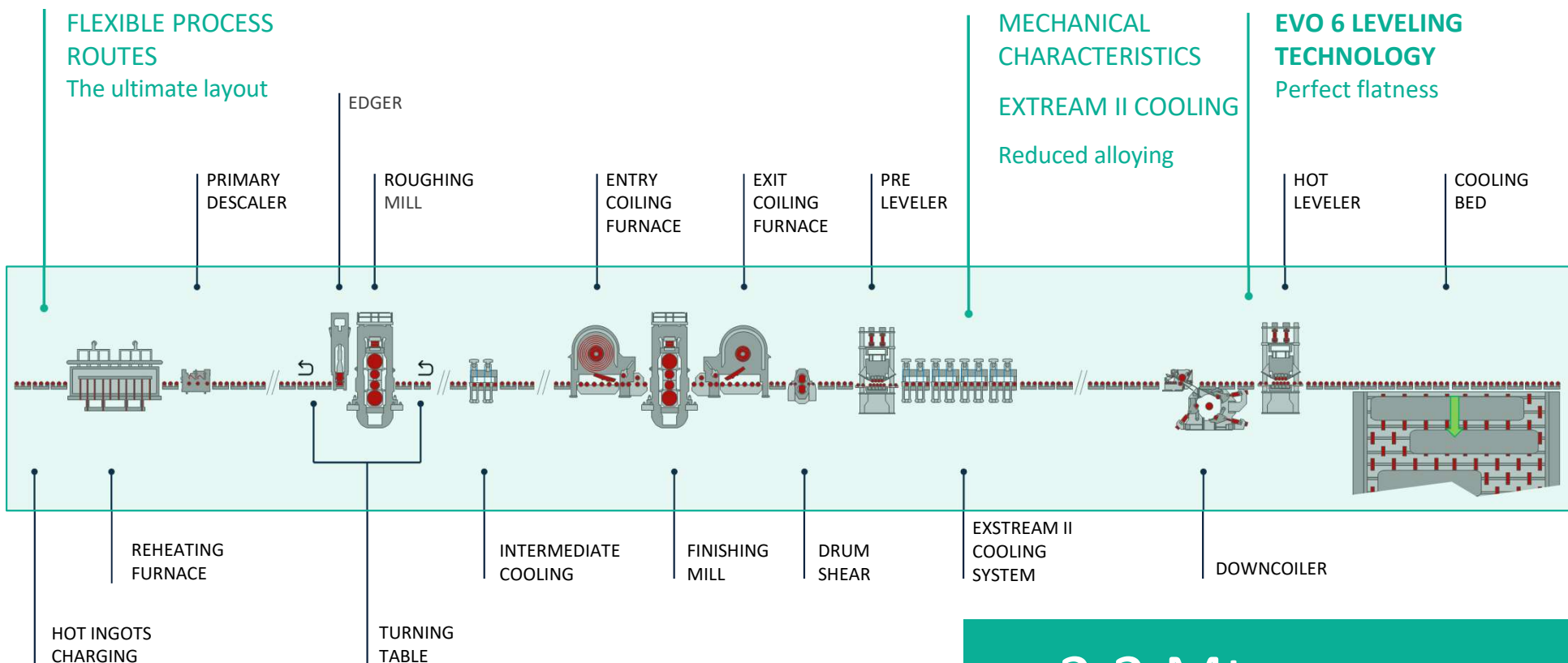


# DANIELI MULTIPLATE™ & DANIELI UNIVERSAL ENDLESS™

Danieli solutions  
to technological challenges

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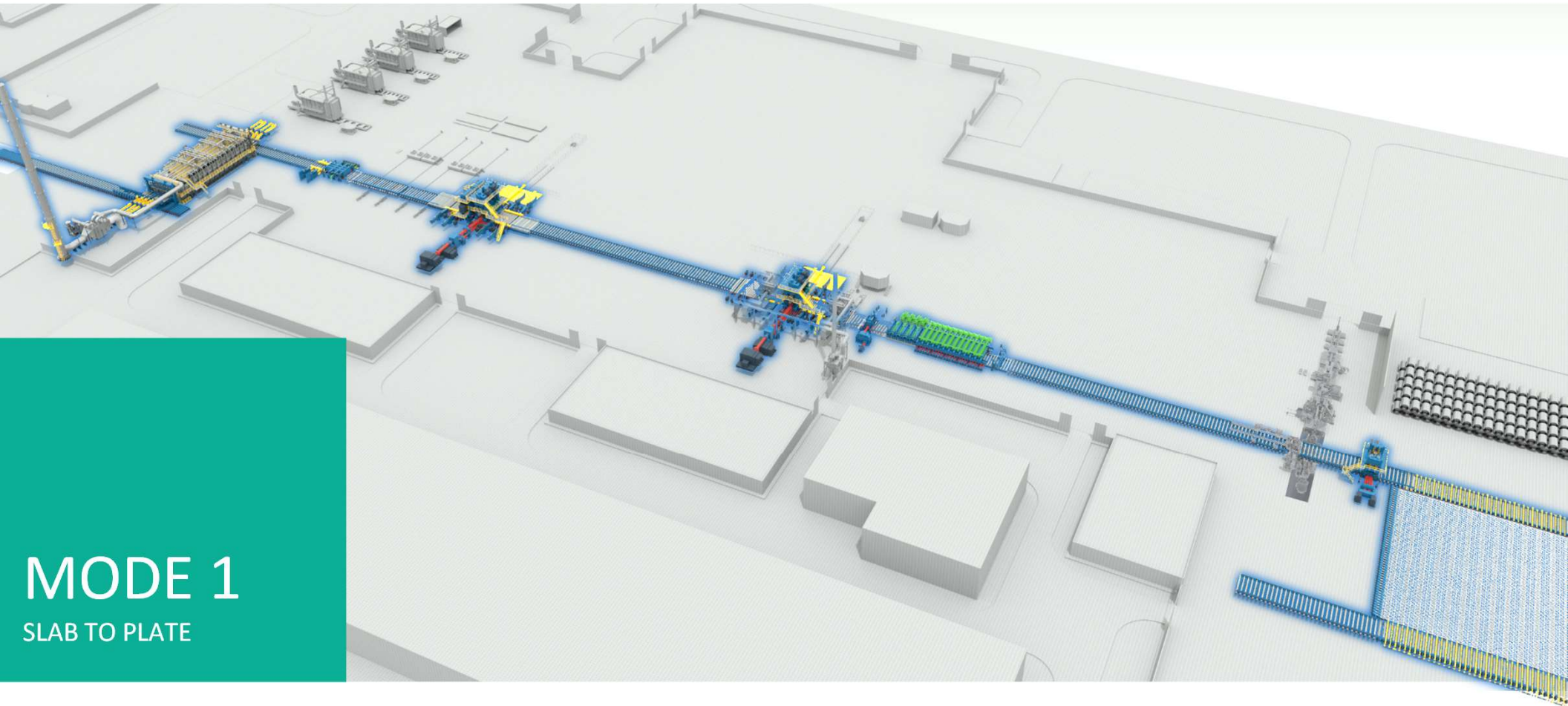
UP TO **2.2 Mtpy** PRODUCTION

# DANIELI MULTIPLATE™ & DANIELI UNIVERSAL ENDLESS™

Flexible Process Routes  
Slab to light plate typical process flow

## DANIELI

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**MODE 1**  
SLAB TO PLATE



# DANIELI MULTIPLATE™ & DANIELI UNIVERSAL ENDLESS™

## Flexible Process Routes Slab to light plate typical process flow

**DANIELI**

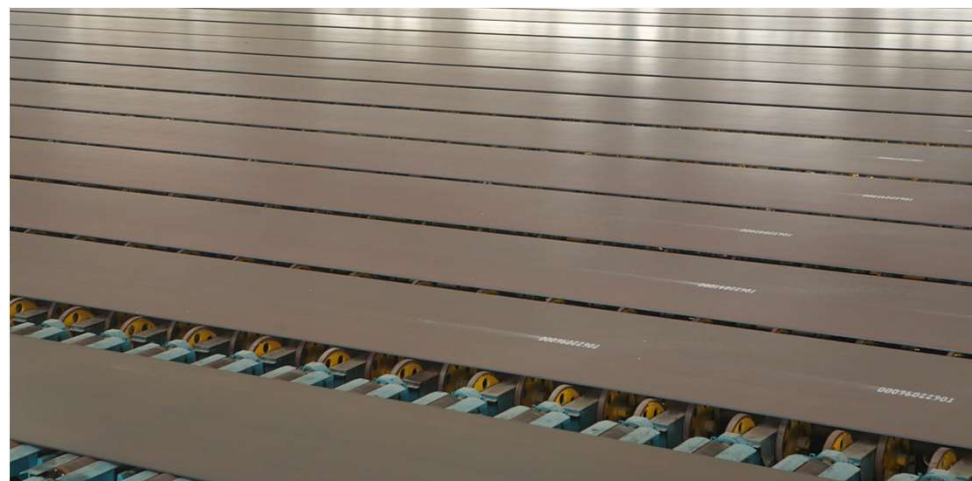
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INPUT: Slabs

### Input Material Specification

Thickness	220 ÷ 350	mm
Width	1,500 ÷ 3,300	mm
Length	3,200 ÷ 15,000	mm
Weight (max)	120	ton



OUTPUT: Discrete light Plates

### Final Product Specification

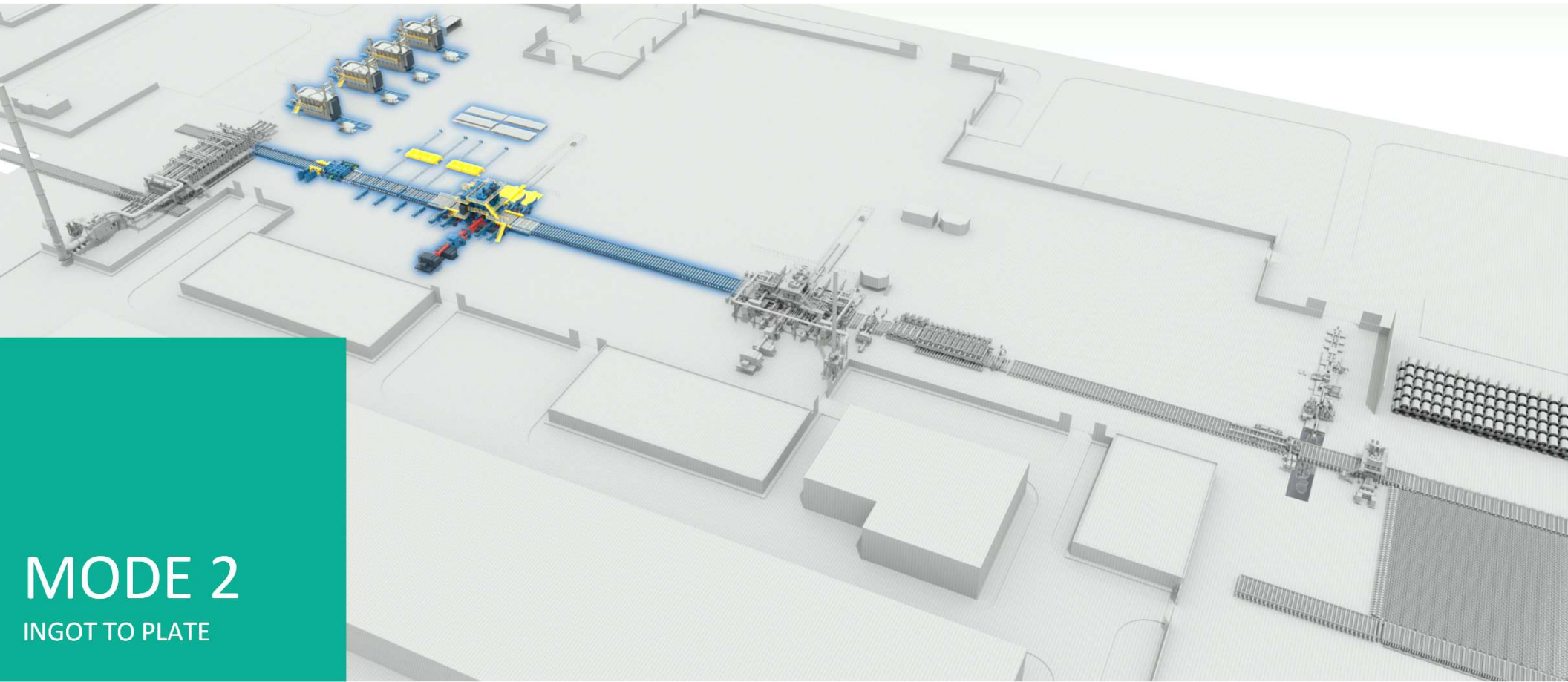
Thickness	4 ÷ 70	mm
Width	1,500 ÷ 4,200	mm
Length (max)	3 ÷ 38	m

# DANIELI MULTIPLATE™ & DANIELI UNIVERSAL ENDLESS™

Flexible Process Routes  
Ingot to thick plate typical process flow

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**MODE 2**  
INGOT TO PLATE

# DANIELI MULTIPLATE™ & DANIELI UNIVERSAL ENDLESS™

## Flexible Process Routes Ingot to thick plate typical process flow

**DANIELI**

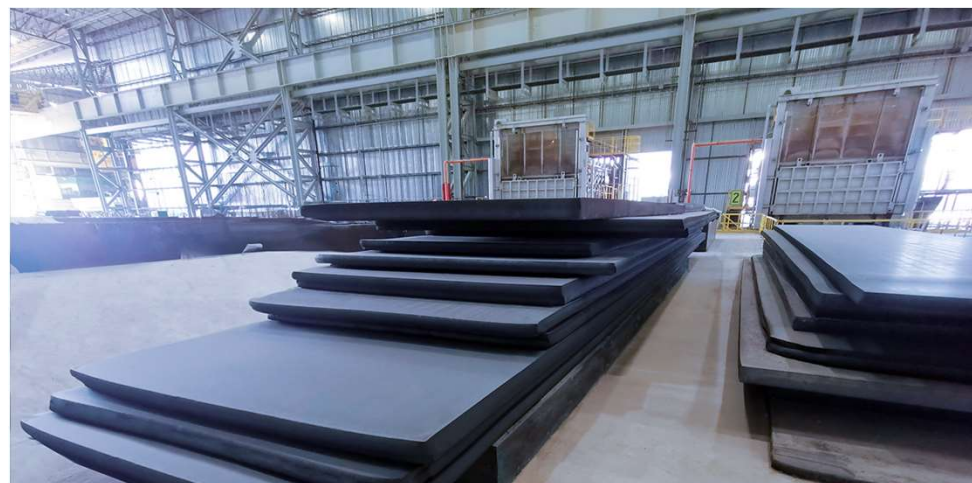
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**INPUT: Ingots**

### Input Material Specification

Thickness	430 ÷ 1,000	mm
Width	1,100 ÷ 1,950	mm
Length	3,400	mm
Weight (max)	45	ton



**OUTPUT: Discrete heavy plate**

### Final Product Specification

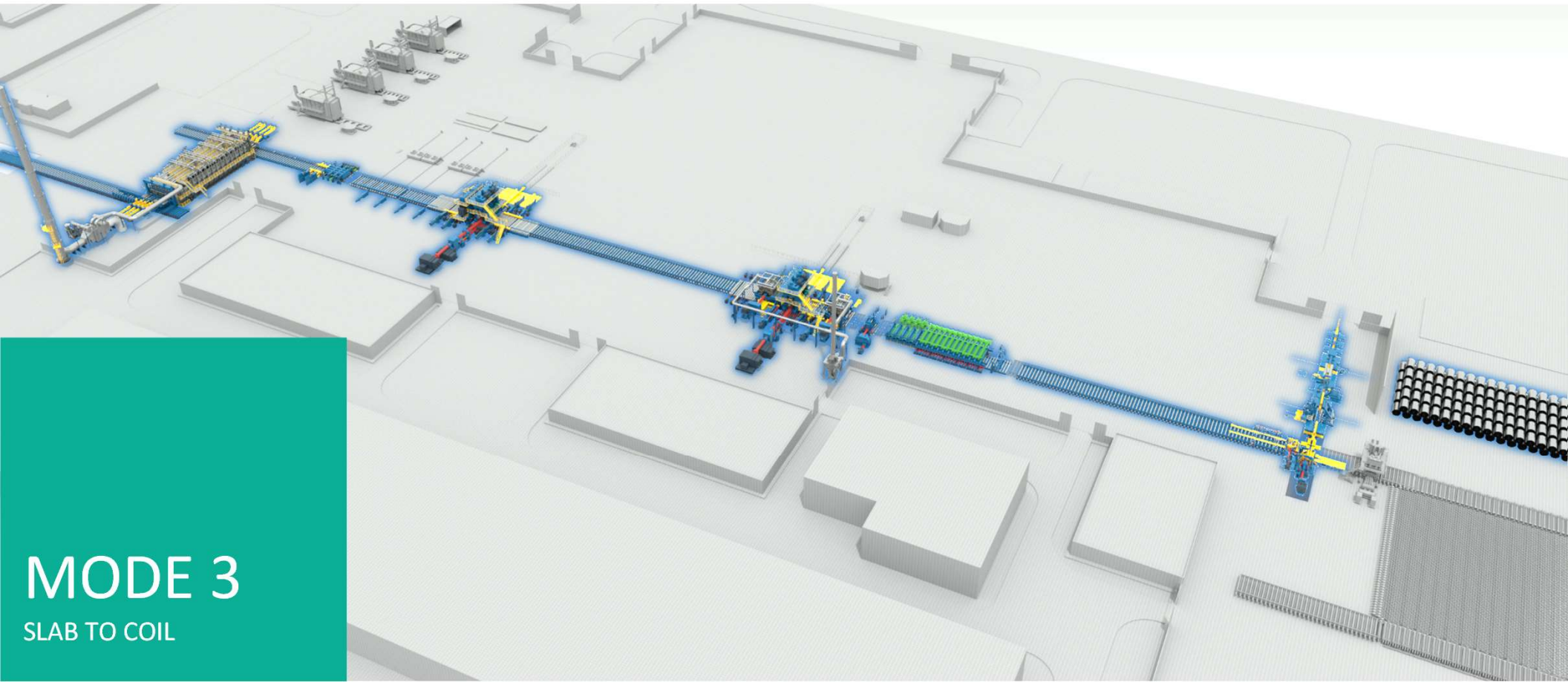
Thickness	70 ÷ 400	mm
Width	1,500 ÷ 4,200	mm
Length (max)	3 ÷ 15	m

# DANIELI MULTIPLATE™ & DANIELI UNIVERSAL ENDLESS™

## Flexible Process Routes Slab to coil typical process flow

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**MODE 3**  
SLAB TO COIL

# DANIELI MULTIPLATE™ & DANIELI UNIVERSAL ENDLESS™

## Flexible Process Routes Slab to coil typical process flow

**DANIELI**

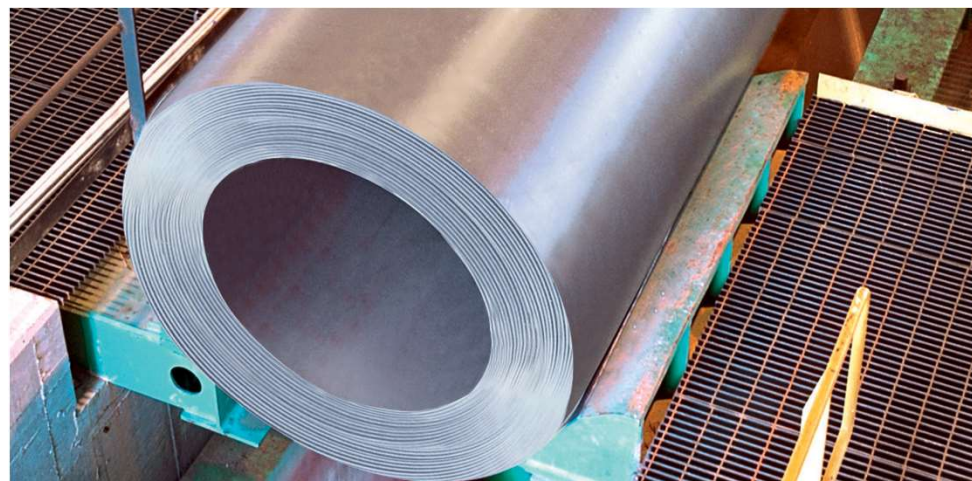
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INPUT: Slabs

### Input Material Specification

Thickness	220 ÷ 350	mm
Width	1,500 ÷ 3,300	mm
Length	3,200 ÷ 15,000	mm
Weight (max)	120	ton



OUTPUT: Coiled Plates

### Final Product Specification

Thickness	3 ÷ 32	mm
Width (trimmed)	1,500 ÷ 3,300	mm
PIW (max)	24	kg/mm
Weight (max)	75	ton

# DANIELI MULTIPLATE™ & DANIELI UNIVERSAL ENDLESS™

## Flexible Process Routes

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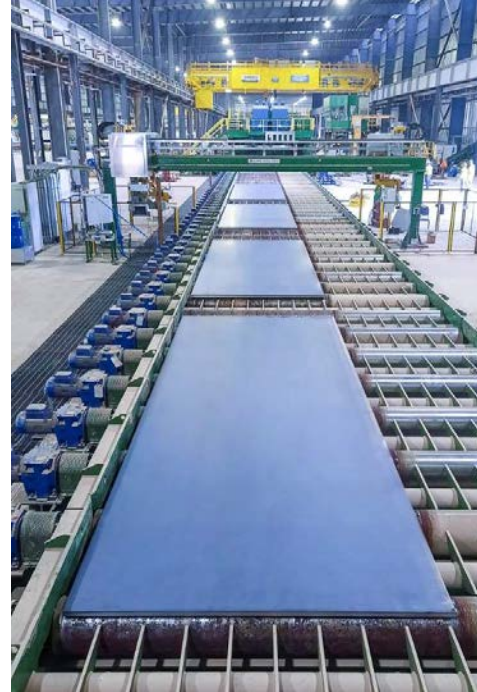
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EVERY



SINGLE



PLATE



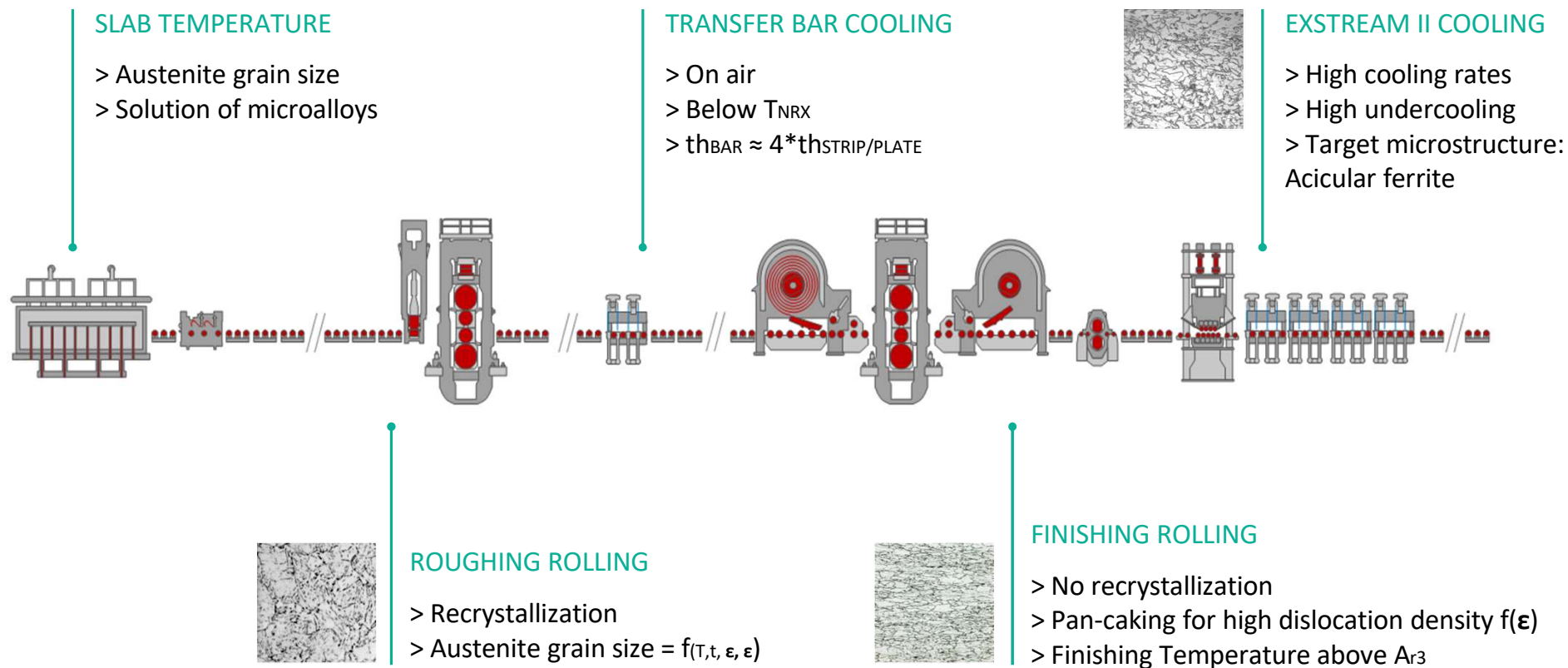
TYPE

# DANIELI MULTIPLATE™ & DANIELI UNIVERSAL ENDLESS™

## Danieli solutions to technological challenges

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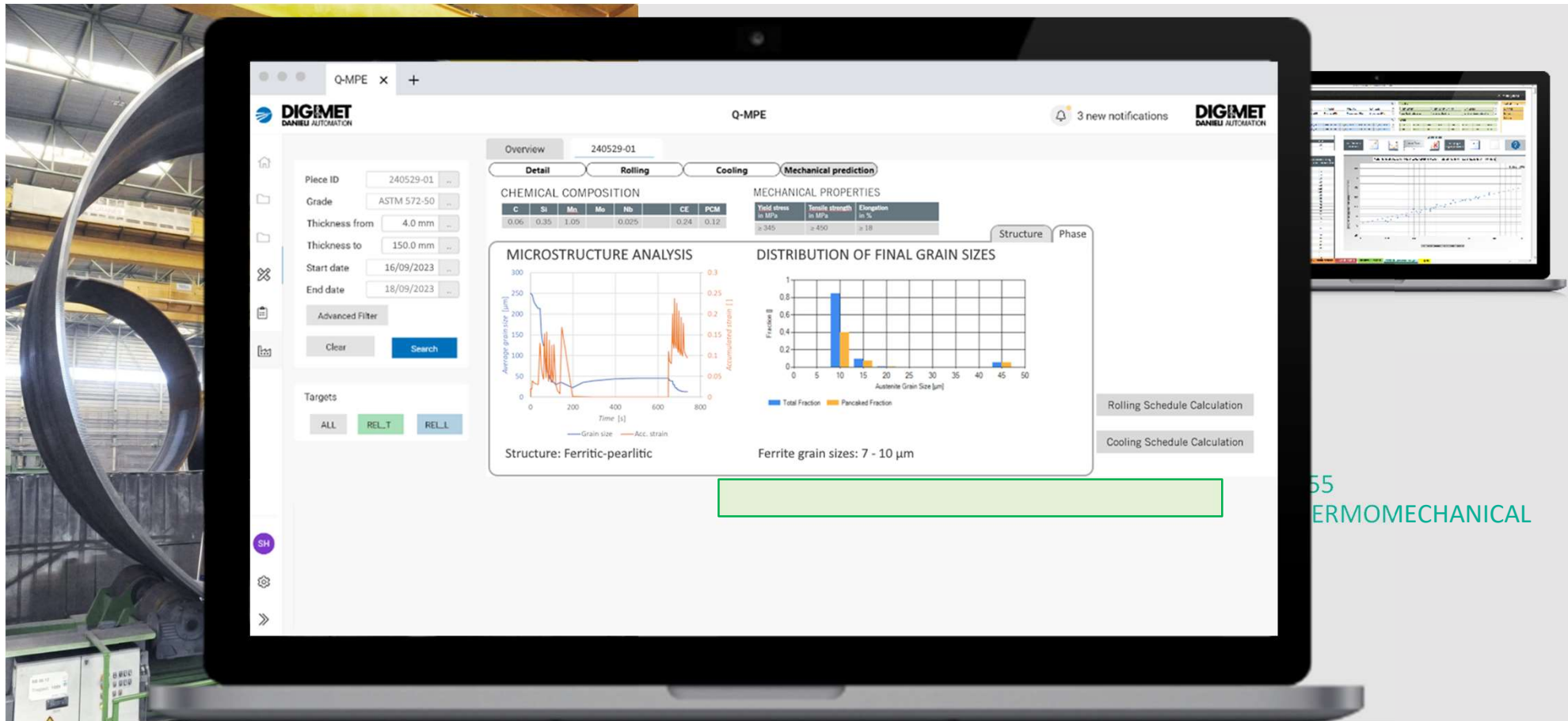


# DANIELI MULTIPLATE™ & DANIELI UNIVERSAL ENDLESS™

Process flexibility  
effects on weldability

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Rolling Schedule Calculation

Cooling Schedule Calculation

55  
ERMOMECHANICAL

Overview 240529-01  
Detail Rolling Cooling Mechanical prediction

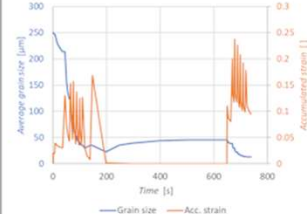
CHEMICAL COMPOSITION

C	Si	Mn	Mo	Nb	CE	PCM
0.06	0.35	1.05	0.025	0.24	0.12	

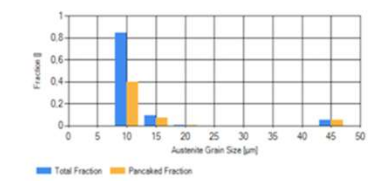
MECHANICAL PROPERTIES

Yield stress in MPa	Tensile strength in MPa	Elongation in %
≥ 345	≥ 450	≥ 18

MICROSTRUCTURE ANALYSIS



DISTRIBUTION OF FINAL GRAIN SIZES



Structure: Ferritic-pearlitic

Ferrite grain sizes: 7 - 10 μm

DIGIMET DANIELI AUTOMATION

Q-MPE

3 new notifications

DIGIMET DANIELI AUTOMATION

Piece ID: 240529-01  
Grade: ASTM 572-50  
Thickness from: 4.0 mm  
Thickness to: 150.0 mm  
Start date: 16/09/2023  
End date: 18/09/2023

Targets: ALL REL\_T REL\_L



# DANIELI MULTIPLATE™ & DANIELI UNIVERSAL ENDLESS™

Digital tools  
Predictive Tools & AI

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**+1%**  
**PRIME**

Q-MPE: QUALITY ESTIMATION

**+0.5%**  
**YIELD**

Q-VPM: VISION DETECTION SYSTEMS

**-3%**  
**CONSUMPTION**

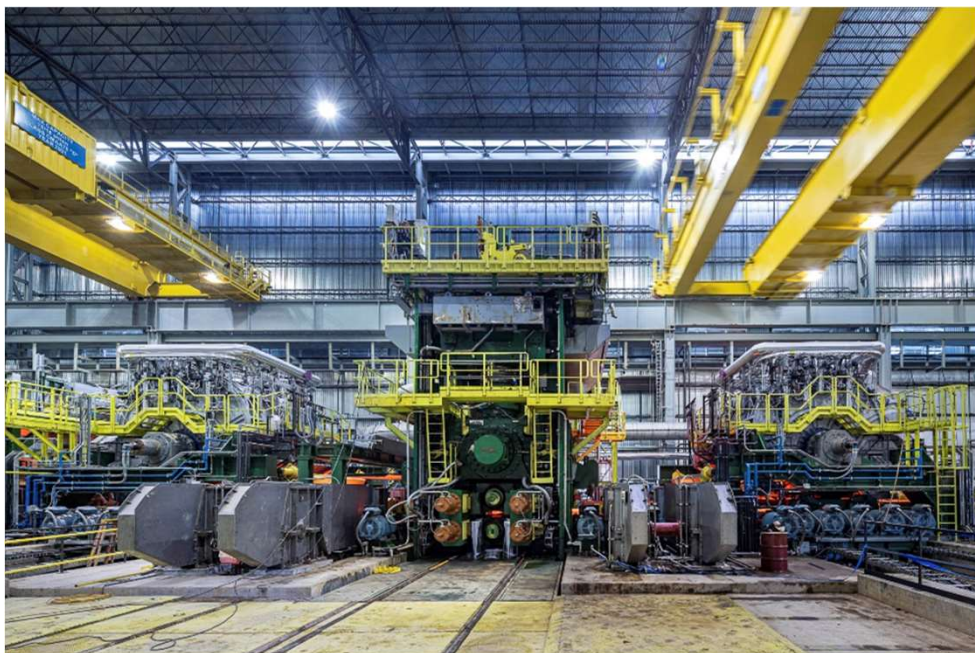
Q-DEMS: ENERGY MANAGEMENT

## DANIELI MULTIPLATE™ & DANIELI UNIVERSAL ENDLESS™

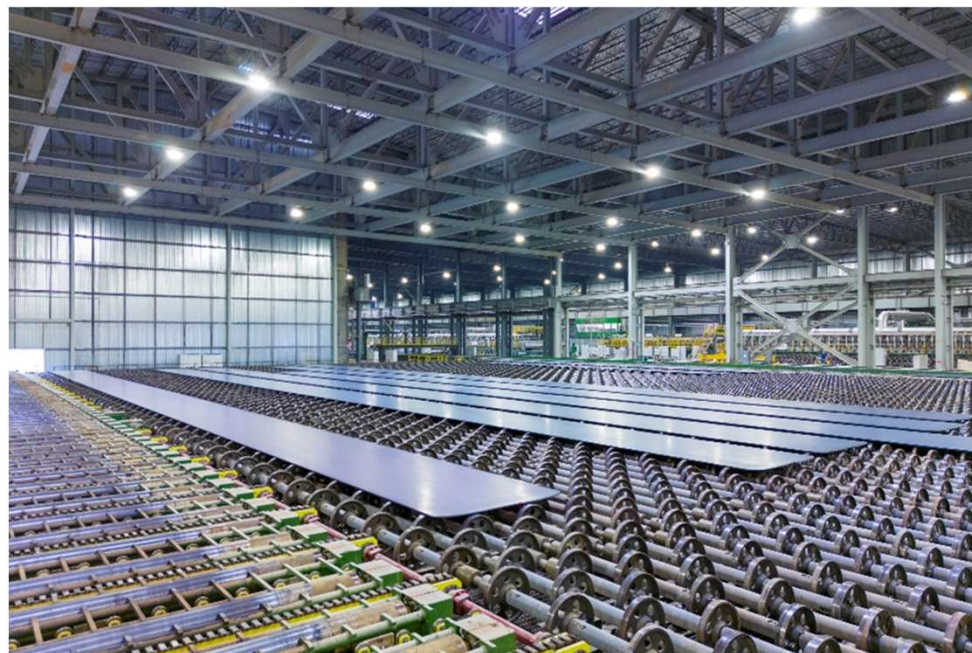
Process flexibility  
Opex and yield savings

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20\$/t  
OPEX REDUCTION



7%  
YIELD BOOST

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Danieli Universal Endless (DUE)

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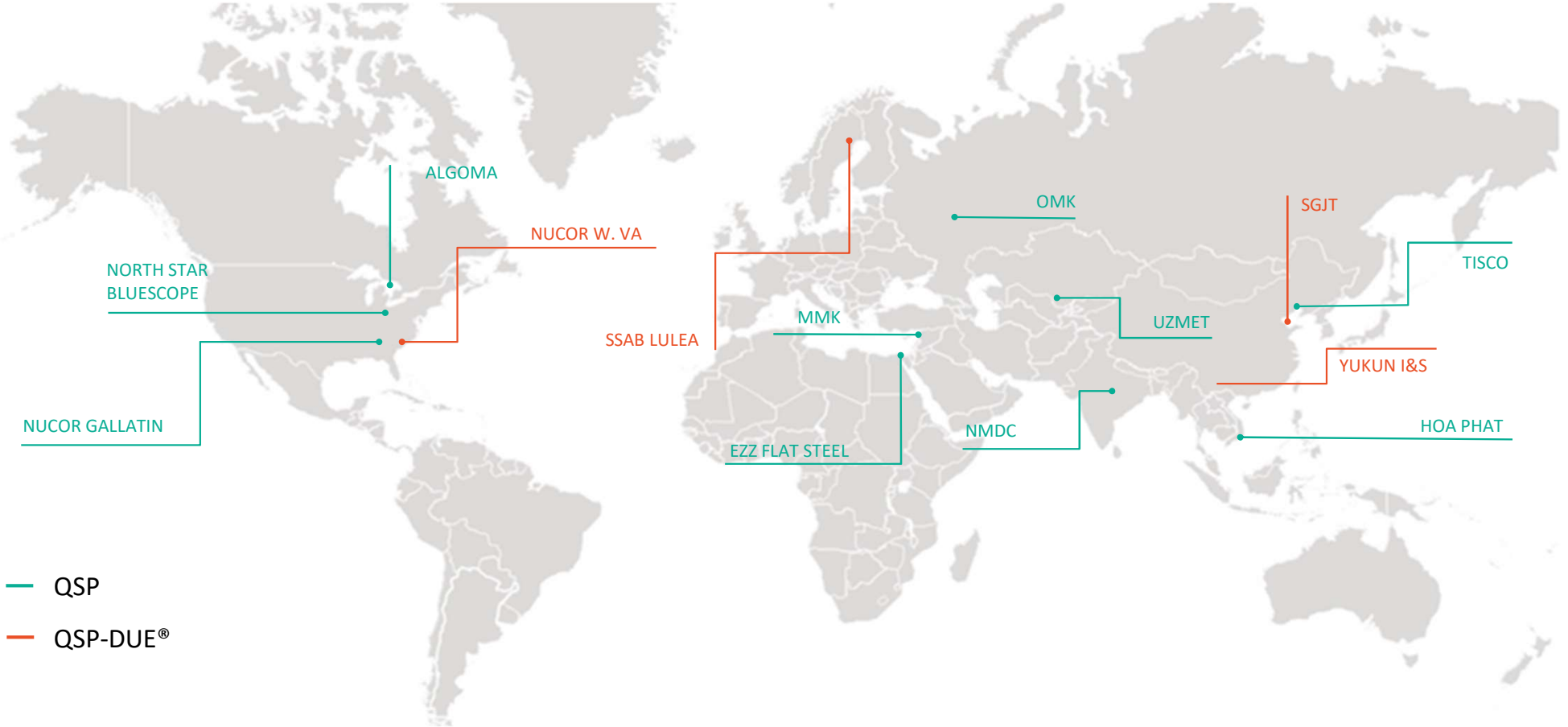
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## Worldwide references

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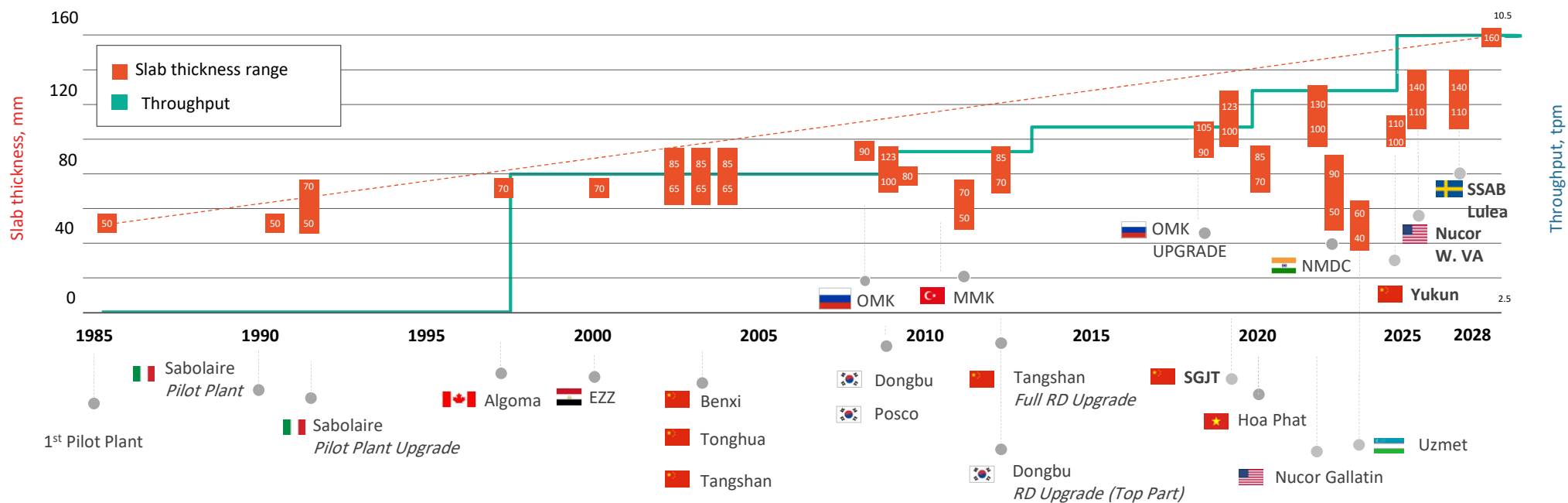
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## Worldwide references



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### MORE THAN 30 YEARS OF ACHIEVEMENTS in slab casting and rolling




# DANIELI MULTIPLATE™ & DANIELI UNIVERSAL ENDLESS™

QSP-DUE® layout flexibility

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FULL ENDLESS,  
COIL-TO-COIL,  
SEMI-ENDLESS

THERMO-  
MECHANICAL  
PROCESS

DYNAMIC WIDTH &  
THICKNESS CHANGE

TOTAL FLEXIBILITY  
TO REACH  
THE TARGET

+

+

=



# DANIELI MULTIPLATE™ & DANIELI UNIVERSAL ENDLESS™

## Yukun QSP-DUE® plant layout

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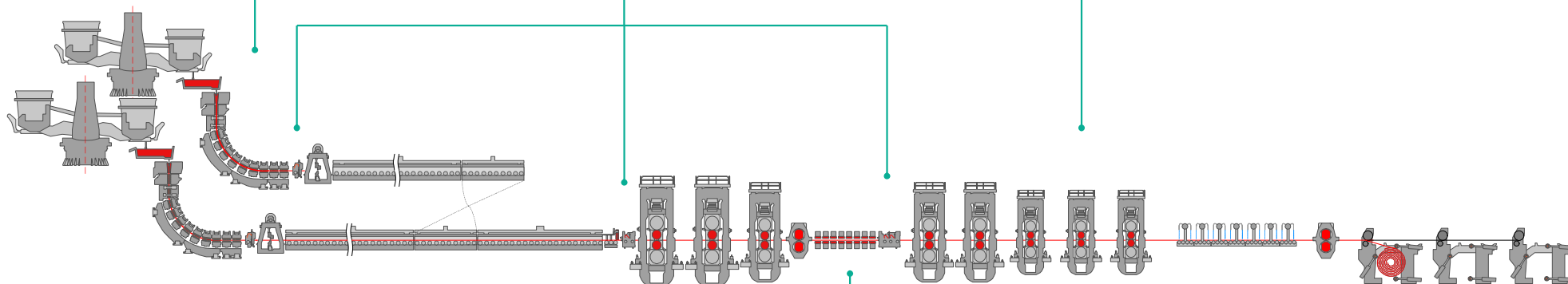
**TWO VERTICAL  
CURVED SLAB  
CASTERS**  
HIGH THROUGHPUT  
CASTERS



**MULTI POINT  
DESCALING**  
Excellent surface quality



**SPLIT MILL DESIGN**  
Split RM and FM enable  
thermomechanical rolling  
for advanced steel grades



**TUNNEL FURNACE**  
Maximum plant flexibility thanks  
to the buffer capability plus  
uniform slab temperature



**ELECTRICAL HEATING**  
Heating with induction technology  
for ultra-thin gauges production in  
endless rolling mode



**WIDE THICKNESS  
RANGE**  
From ultra thin to thick  
gauges

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YUKUN REQUEST	Danieli QSP-DUE
<b>HRC PRODUCTIVITY</b> 4.6 Mtpy	✓
<b>STRIP WIDTH CHANGE DURING PRODUCTION</b> 900 ÷ 1,500	✓
<b>STRIP THICKNESS</b> 0.8 ÷ 25.4 mm	✓
<b>ENVIRONMENTAL &amp; COST-EFFECTIVE</b> Best OpEx and extreme energy savings	✓
<b>OPEN TO FUTURE DEVELOPMENT</b> provision to produce thick API line pipe and DP grades	✓

To replace conventional hsm process with better quality and competitive opex

DANIELI MULTIPLATE™ &  
DANIELI UNIVERSAL ENDLESS™

Yukun QSP-DUE overall layout

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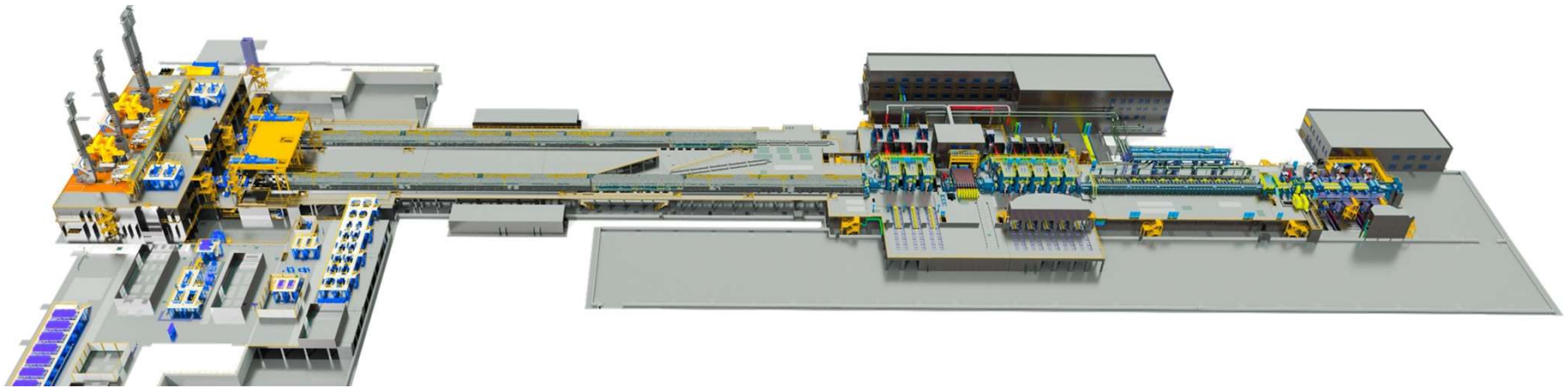


YUKUN CITY  
YUNNAN, China

DANIELI QSP DUE®



**4.6 Mtpy**  
**OF HOT ROLLED COILS**



## DANIELI MULTIPLATE™ & DANIELI UNIVERSAL ENDLESS™

### [New yukun production base](#)

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**22 Billion CNY**  
Overall Investment



**8 sqkm**  
Square foot operation



**10 Million ton / year**  
Total Rolling capacity



**4.6 Million ton / year**  
HRC production capacity



**9th April 2024**  
Start of QSP production



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## Design data

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### SLAB SIZE

**Thickness**

100 - 110 mm

**Slab Width**

900 – 1,500 mm

**Length (max)**

23.9 m

**Weight (max)**

30.0 t

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## Design data

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### COIL SIZE

**Thickness** 0.8 – 25.4 mm

**Coil Width** 900 – 1,500 mm

**Specific Weight** 20 kg/mm

**Weight (max)** 30.0 t

**Coil ID / max OD** 762/2,000 mm





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First slab and first coil  
at same day

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April 9,  
2024

First slabs in the morning  
First hot rolled coils in the same afternoon



DANIELI MULTIPLATE™ &  
DANIELI UNIVERSAL ENDLESS™

HRC thickness

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1.5 mm



DANIELI MULTIPLATE™ &  
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HRC thickness

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25.0 mm



48 h  
Production test



287 t/h  
Performance target



295 t/h  
Test result

Just 3months from first coil

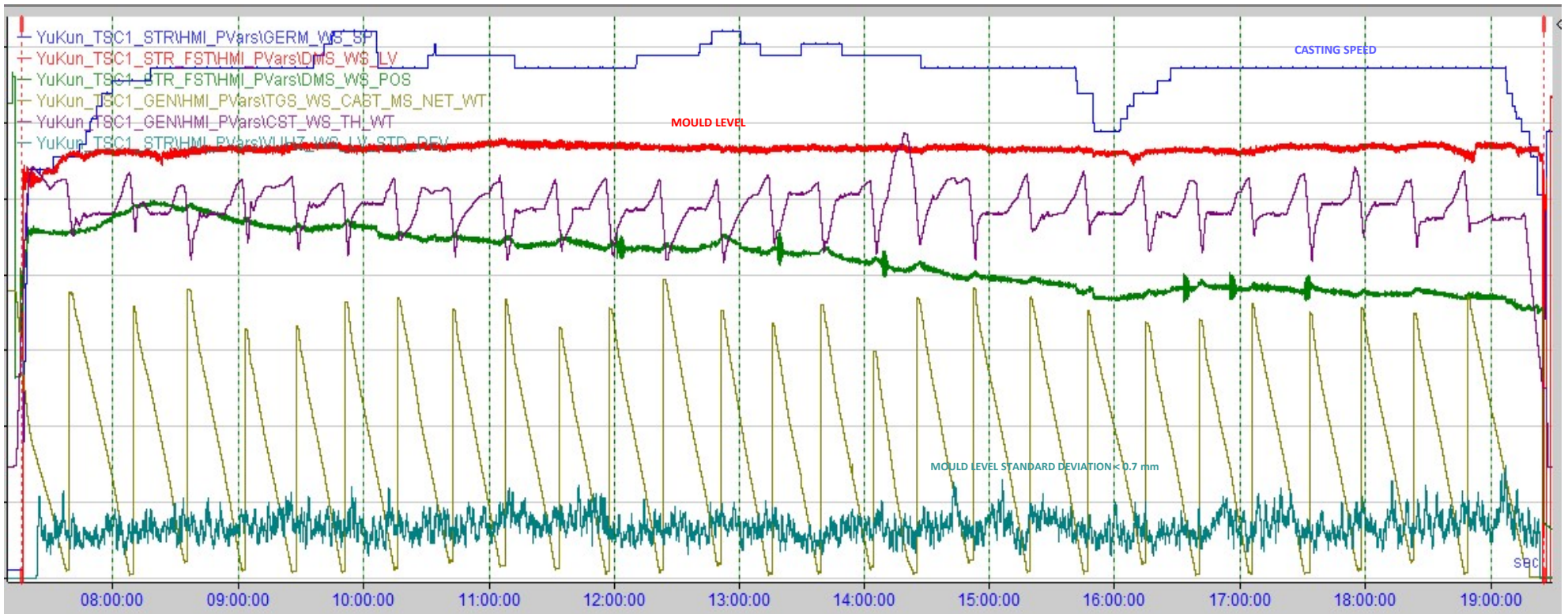
1 CASTER production

PERFORMANCE  
ACHIEVED



# DANIELI MULTIPLATE™ & DANIELI UNIVERSAL ENDLESS™

## Sequence duration



12 hours  
28 heats in sequence

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## DANIELI MULTIPLATE™ & DANIELI UNIVERSAL ENDLESS™

What are the common winning points of  
the Multiplate™ QSP-DUE™?

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### UNLIMITED FLEXIBILITY

Unique layout  
concept & multiple  
operation modes

### COMPETITIVE

Ready for the to replacent  
of old-fashion rolling  
processes

### ENVIRONMENT & BUSINESS FRIENDLY

Saving of alloying elements  
& opex

### HIGHEST VALUE ADDITION

Production  
of special steels & widest  
range of formats







# DANIELI MULTIPLATE™ & DANIELI UNIVERSAL ENDLESS™

[QSP-DUE® flexibility](#)  
[ongoing projects](#)

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**QSP-DUE® CAN BE ADAPTED TO ANY SPECIFIC CUSTOMER & MARKET NEEDS**

SHOUGANG JINGTANG	YUKUN IRON & S	NUCOR WEST VIRGINIA	SSAB LULEA
 2.1 Mt/y	 4.6 Mt/y	 2.7 Mt/y	 2.5 Mt/y
900 – 1600 mm 0.7 – 12.7 mm	900 – 1500 mm 0.8 – 25.4 mm	900 – 2134 mm 0.8 – 25.4 mm	900 – 2100 mm 0.8 – 25.4 mm
2019 STARTED UP	2024 STARTED UP	2025/2026 TARGET START UP	2028 TARGET START UP

# DANIELI MULTIPLATE™ & DANIELI UNIVERSAL ENDLESS™

## FLAT ROLLING TO THE NEXT LEVEL

17th Arab Steel Summit  
OCTOBER 14-15, 2024  
DOHA, QATAR

Thank you



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DANIELI / SINCE 1914  
PASSION TO INNOVATE  
AND PERFORM  
IN THE METAL INDUSTRY

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