



PARTNERS IN FRONT RUNNING
DANIELI INNOVATION MEETING
12 OCTOBER 2010
DANIELI HEADQUARTERS – ITALY
DRI, IRONMAKING,
EAF STEELMAKING,
CONTINUOUS CASTING

Highest productivity + highest quality
= Lower cost in Continuous Casting

Carlo TRAVAGLINI, Danieli Centro Met
Nuredin KAPAJ, Danieli Corporation

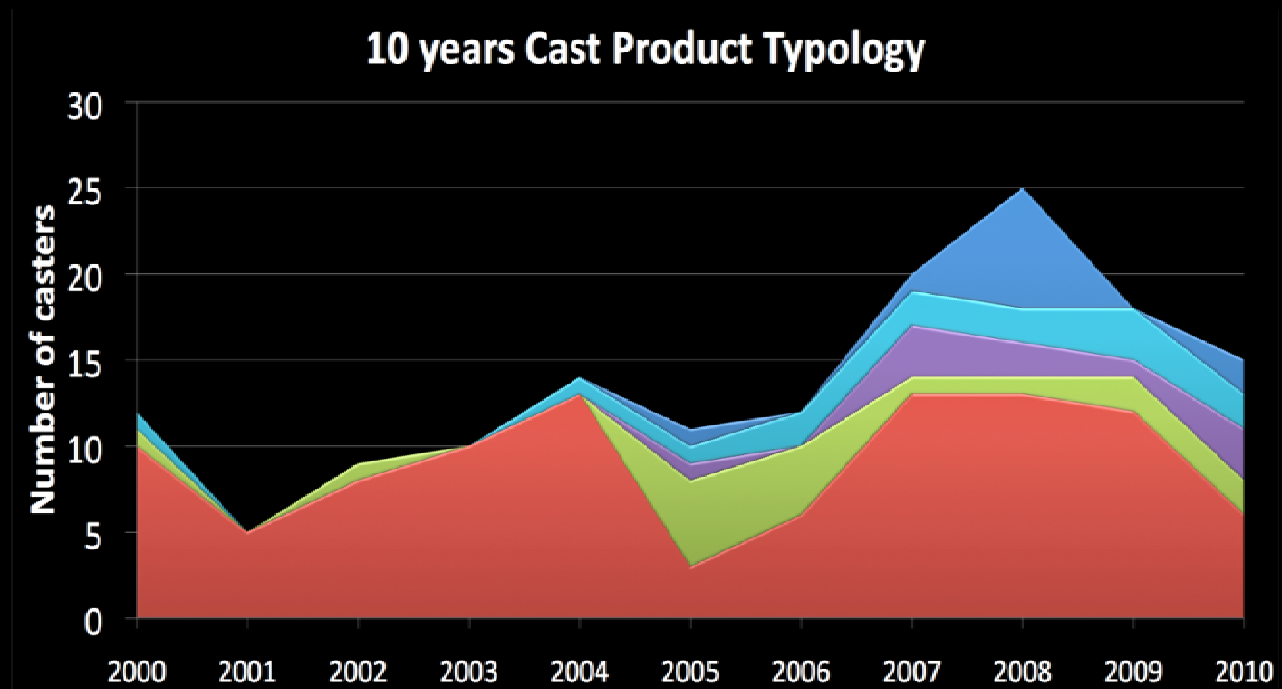
Summary

- Market trends and product specialization in long products
- Fast Cast Cube (CMC Arizona) more than 8 km-long billet cast and rolled in endless mode, up to 7.3 m/min (section 130 mm square)
- Power mould technology for big rounds (Nucor Memphis) - quality and productivity together



Cast product market trend

- Beam Blank
- Rounds
- Flex
- Blooms > 220 mm
- Billet

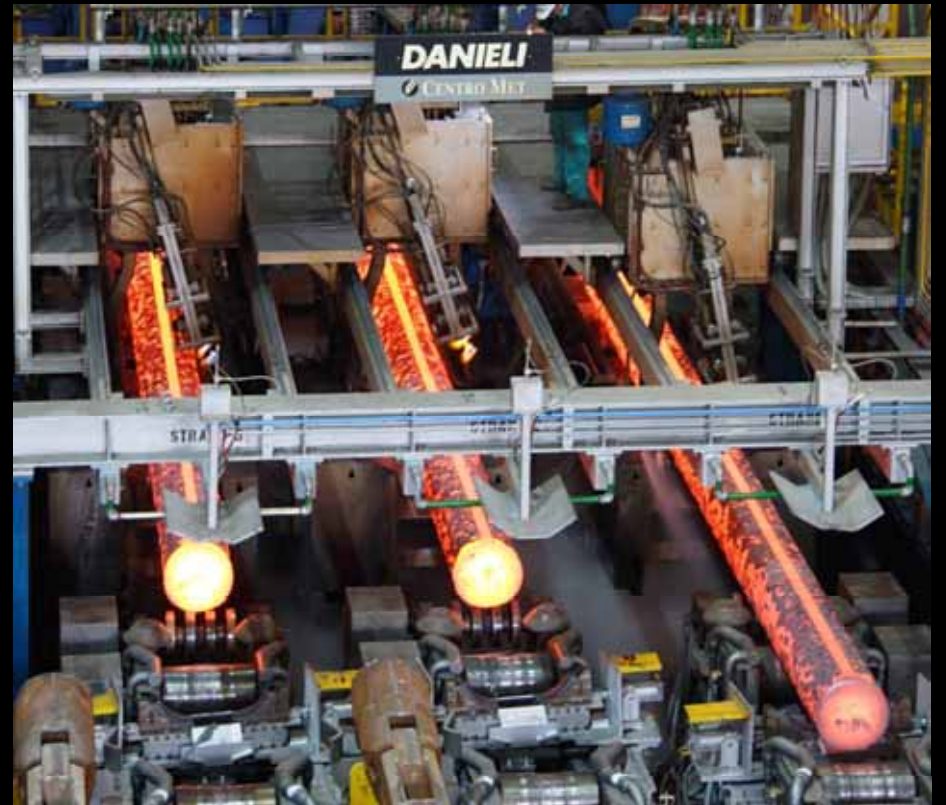
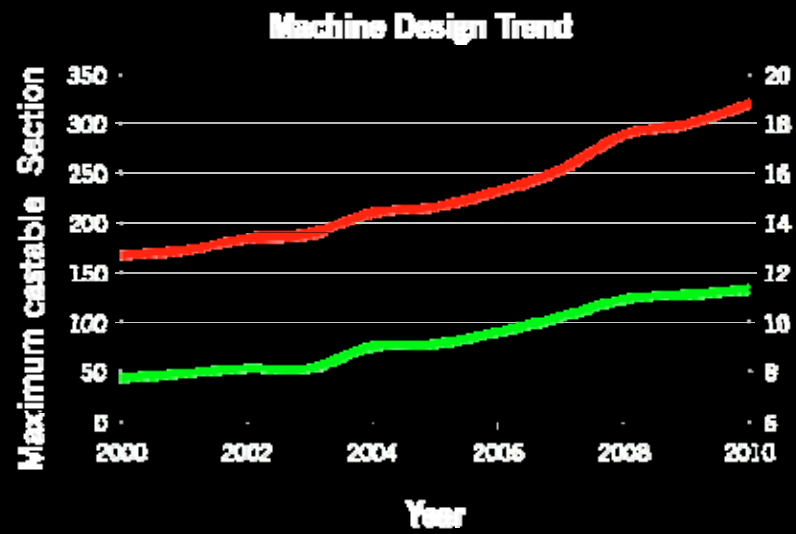


Danieli caster references (strands since 2000)

Billets	562
Beam blanks	45
Flexible (rounds & squares)	39
Blooms (> 220 mm)	68
Rounds	56



Cast product market trend



Danieli long history in continuous casting of long products

Since 1960 more than
1800 strands
commissioned by Danieli
Centro Met for long
products only



Since 1973 more than 1700
Electromagnetic Stirring
System supplied by Danieli
Rotelec



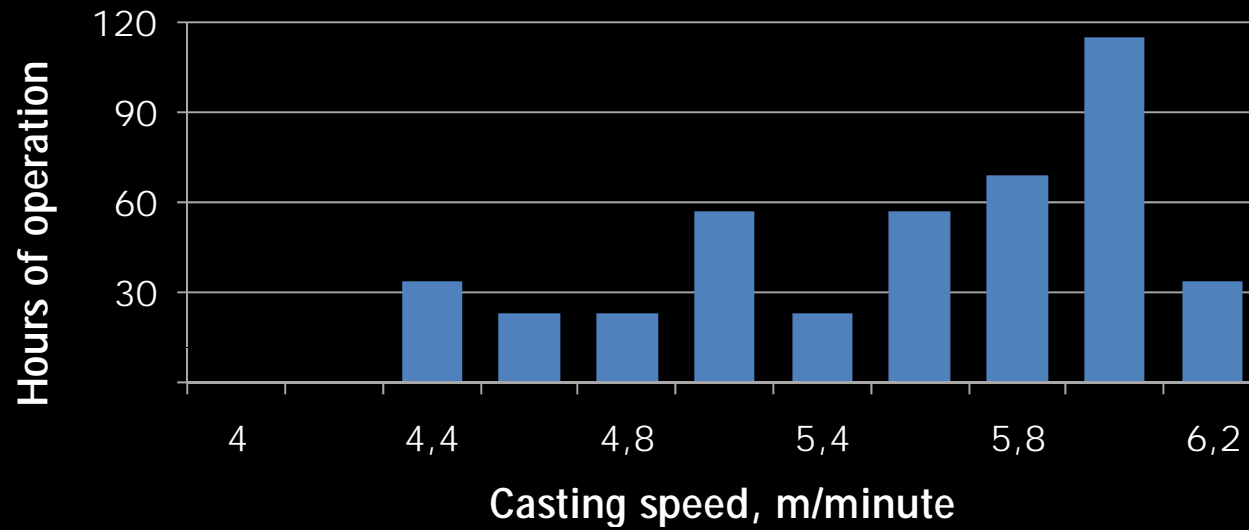
CMC (USA)

130x130 mm up to 7.3 m/min (> 56 t/h).
Startup 2009, equipped with FCC™



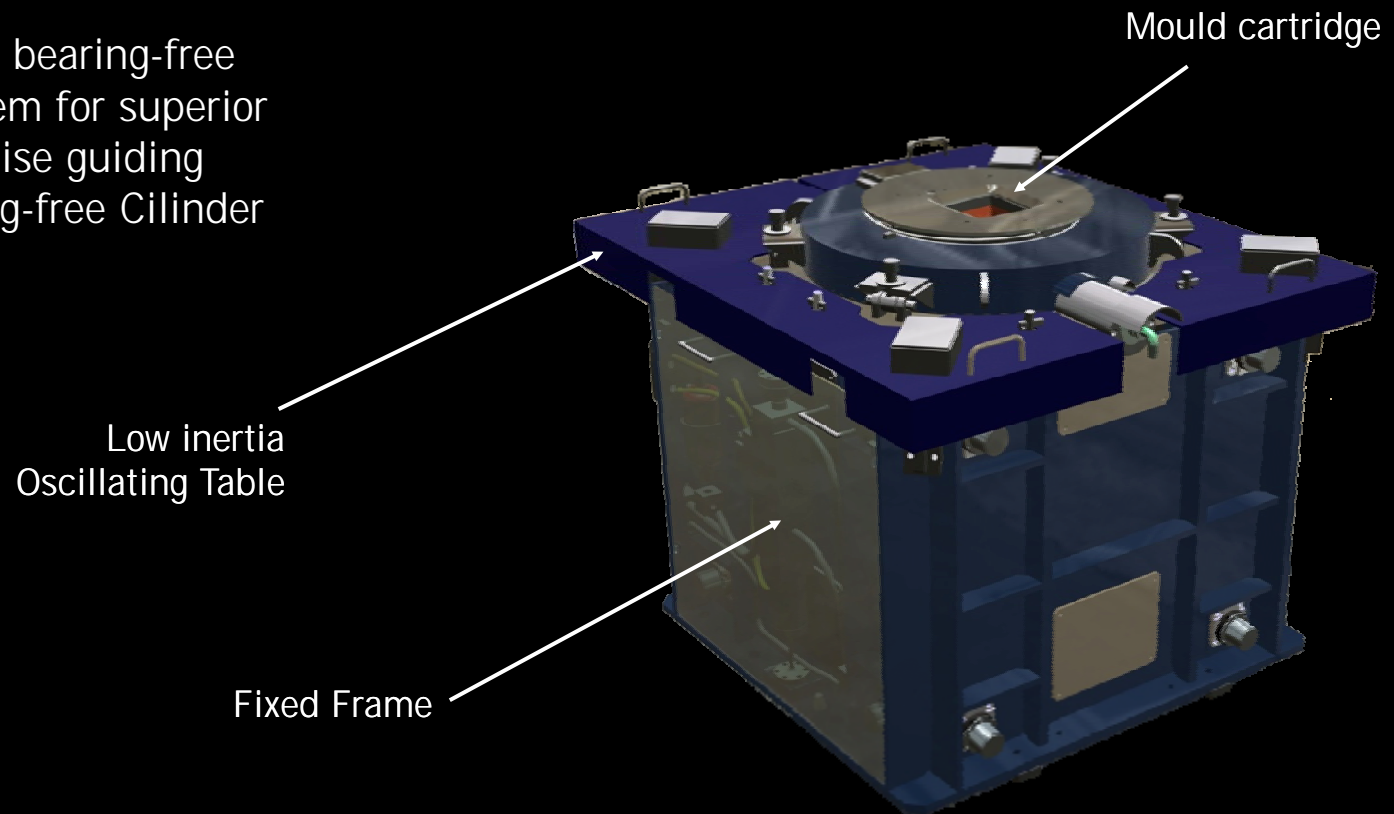
Performance highlights

CMC Casting Speeds - August 2010

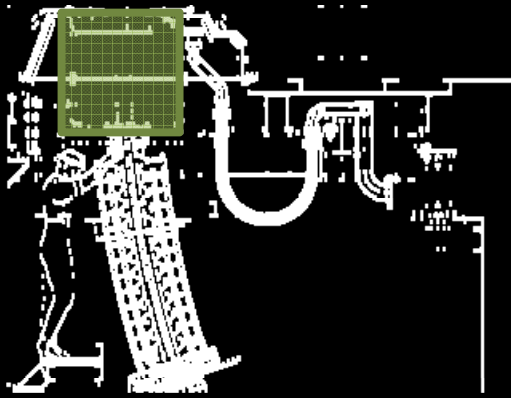


FCC (Fast Cast Cube) design features

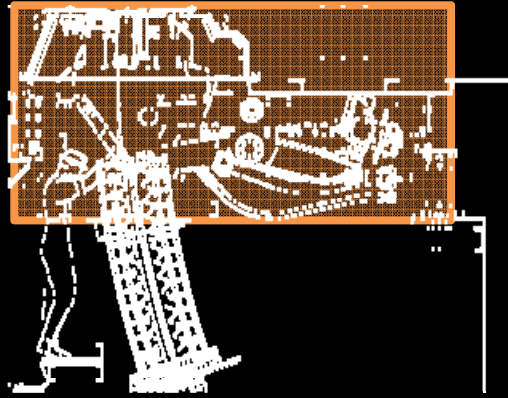
- Patented mould bearing-free suspension system for superior rigidity and Precise guiding
- Patented bearing-free Cilinder fittings



FCC (Fast Cast Cube) technology features



FCC



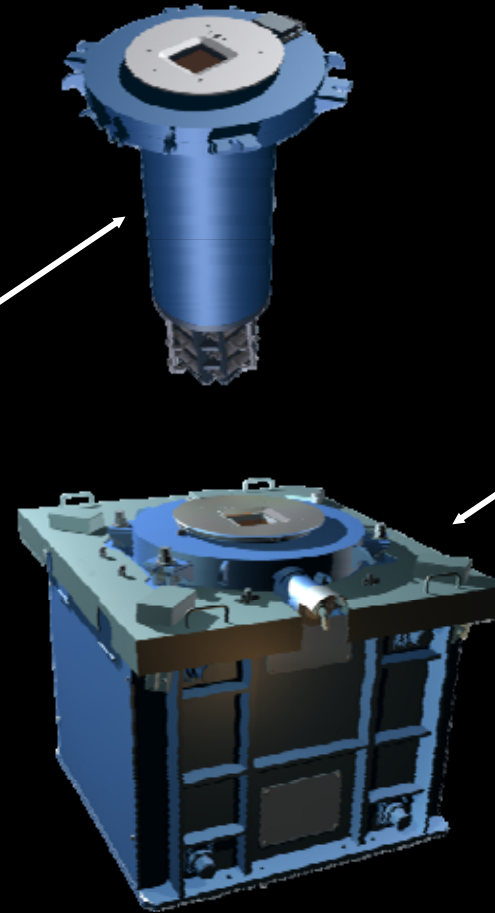
Conventional



FCC (Fast Cast Cube) design features

- Fast, compact and maintenance friendly set-up
- Maintenance free moving parts

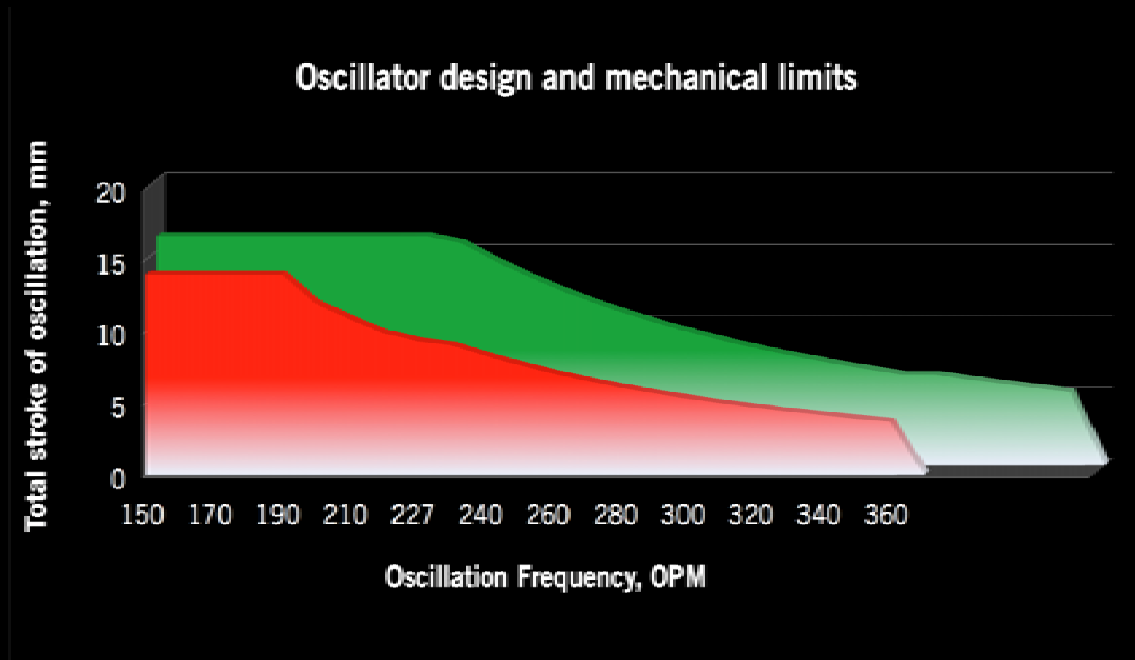
Mould cartridge and foot rolls with water quick-connections



Ultra compact (1 m³) fixed frame and oscillating table

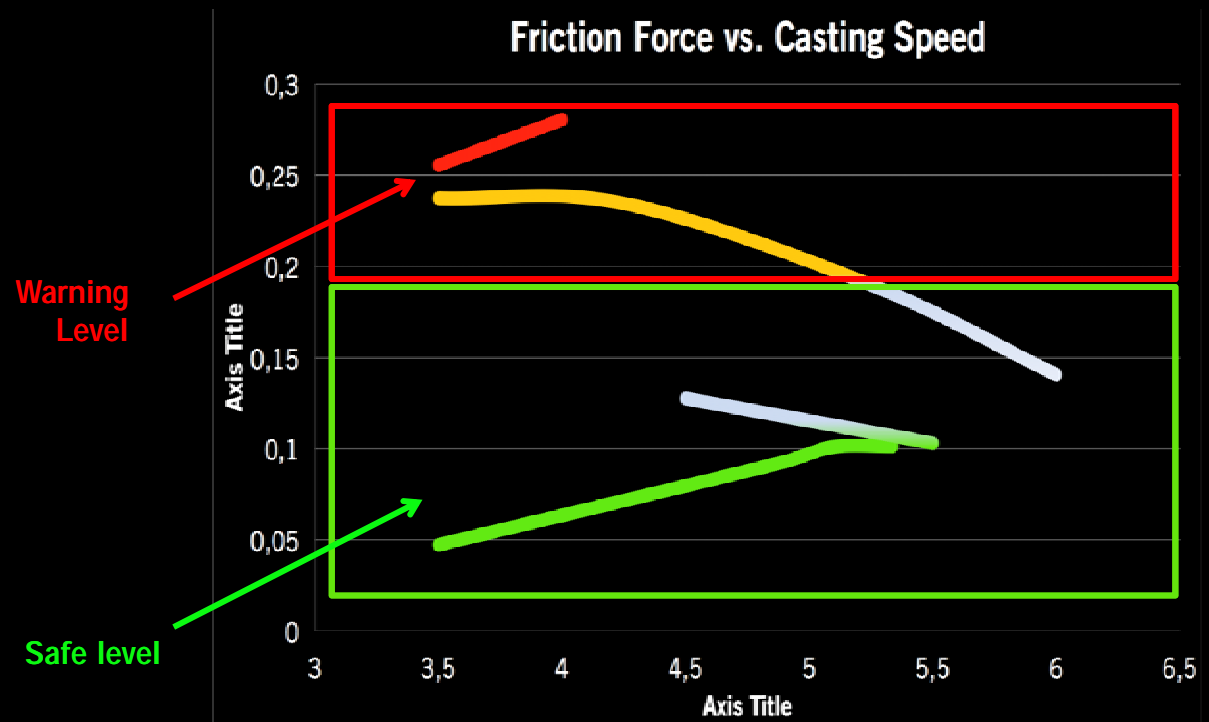
FCC (Fast Cast Cube) technology features

- Extended mechanical limits for unprecedented oscillator performances
- 50% wider oscillation range with no lateral deviations (<0.005 mm)



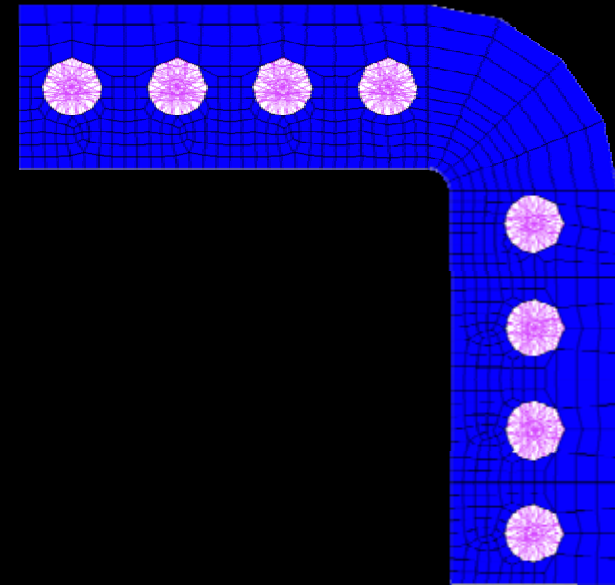
FCC (Fast Cast Cube) technology features

- Reliable Sticking/breakout prediction thanks to low inertia oscillator.
- Unique system for billet casters to ensure process reliability and troubleshooting



Power Mould™ for squares Danieli patent - design

- Very high copper rigidity
- No permanent deformations
- Very efficient cooling
- High and uniform heat transfer
- No influence of random boiling
- Optimized corner cooling
- Improved taper design



Power Mould™ for squares Danieli patent - technology

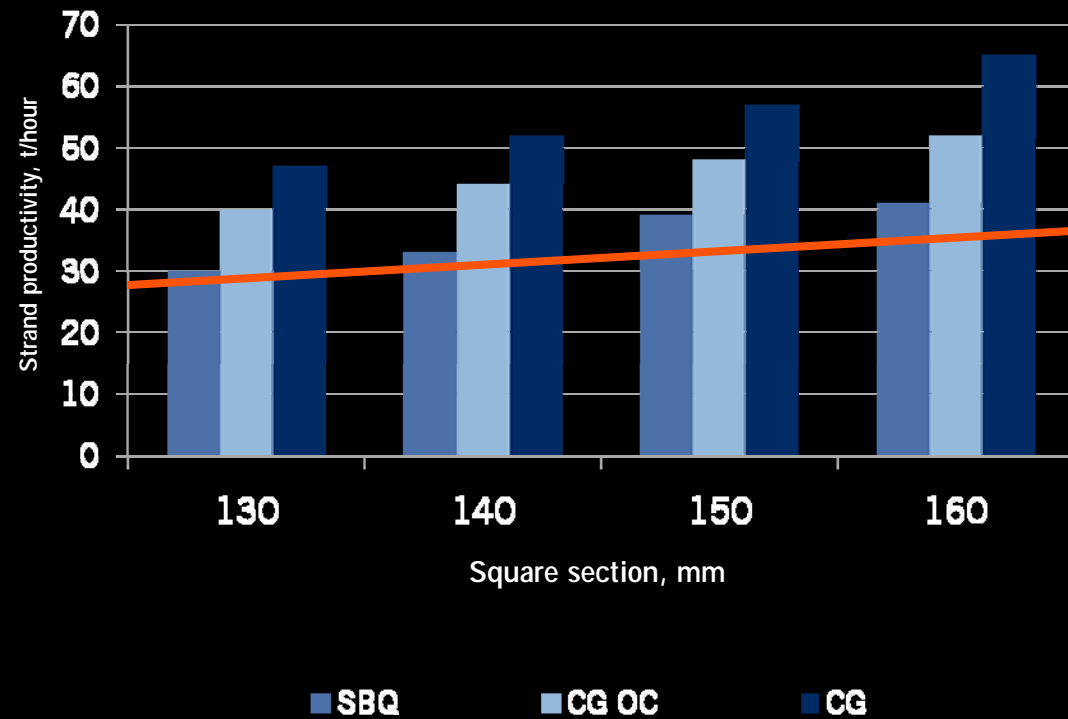
- Ultra high-speed and productivity
- Excellent quality for all steel grades
- Easy and simple mould assembly
- Consistent and reliable operations
- Long life of moulds



Strand productivity, casting speed vs. square section



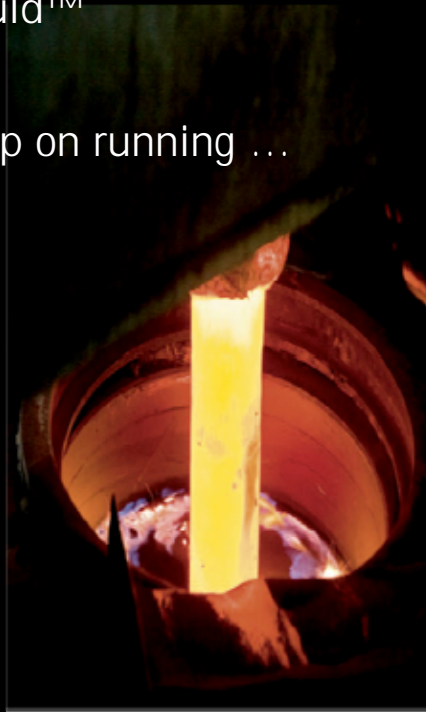
Conventional technology benchmark



Nucor Memphis (USA)

267R, 311R, 343R, 412R,
511R, up to 1.8 m/min startup
2008, equipped with Power
Mould™

Keep on running ...



Nucor Memphis - top performances with Power Mould™

Top productivity...

Diameters	Speed
mm	m/min
267	1.83
311	1.3
343	1.09
511	0.48

Diameters	Productivity
mm	t/h
267	45
311	46
343	46
511	48

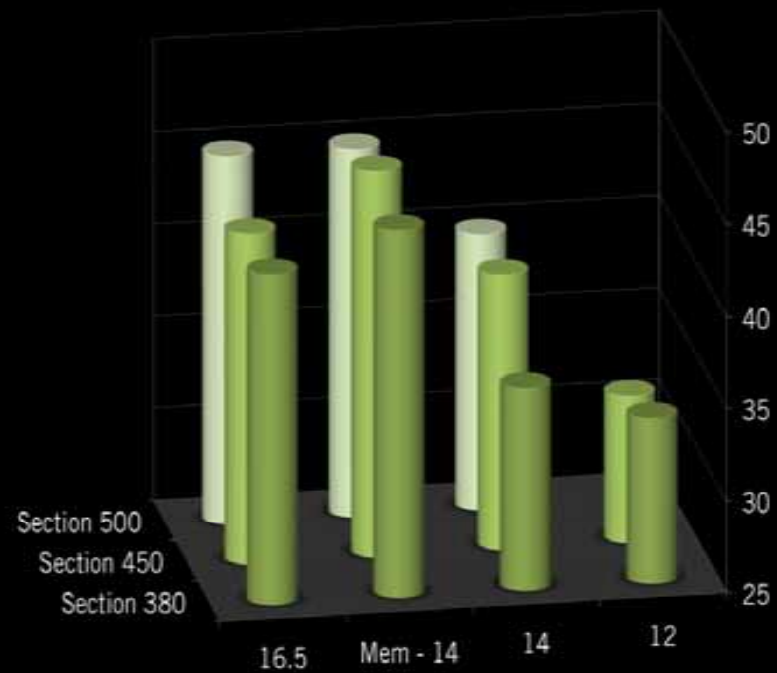
With top quality

Parameter	Value
Diameter	< 1.2 %
Ovality	< 1.5 %
Cutting accuracy	< 50 mm

Nucor Memphis (USA)

Top performances with Power Mould™

Machine radius	Section 380	Section 450	Section 500
12.0	34	33	
14.0	36	40	40
14.0	45	46	47
16.5	43	43	45



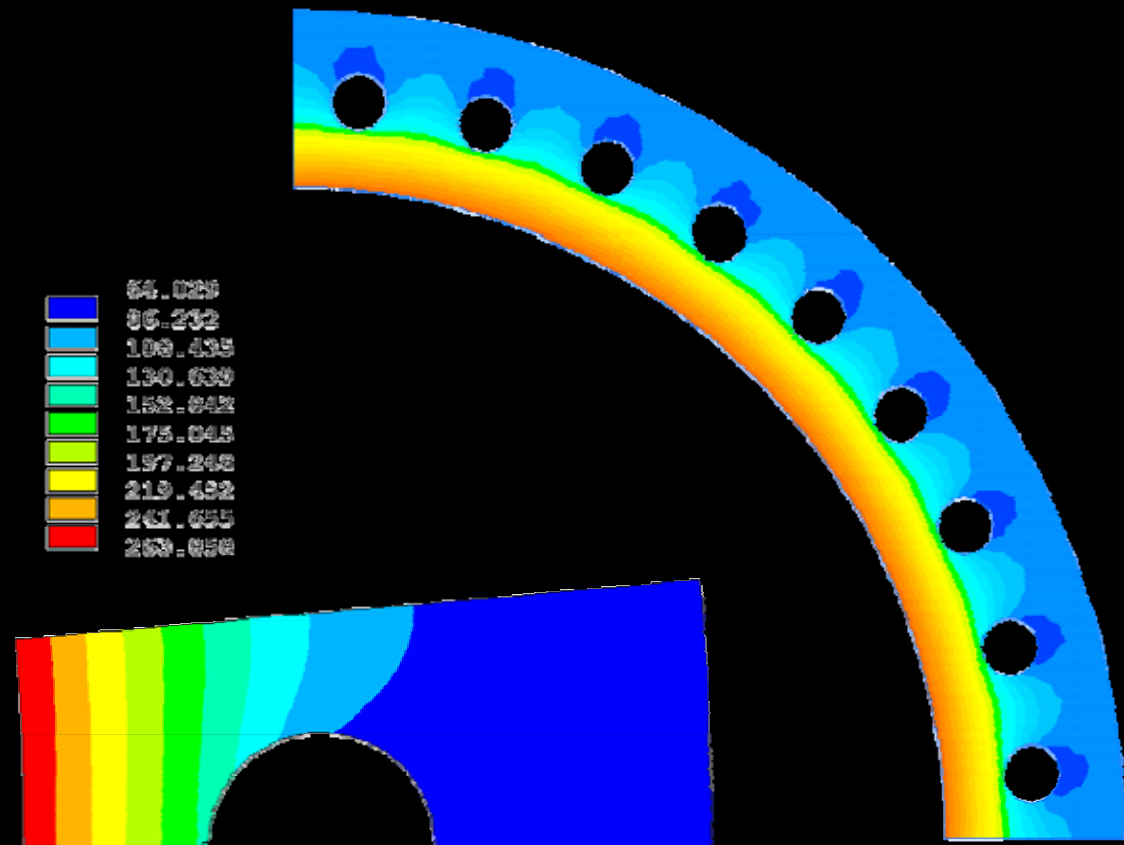
Power Mould™ for Rounds Danieli Patent - technology

- Very high copper rigidity
- No permanent deformations
- Very efficient cooling
- High and uniform heat transfer
- No influence of random boiling
- Optimized corner cooling
- Improved taper design

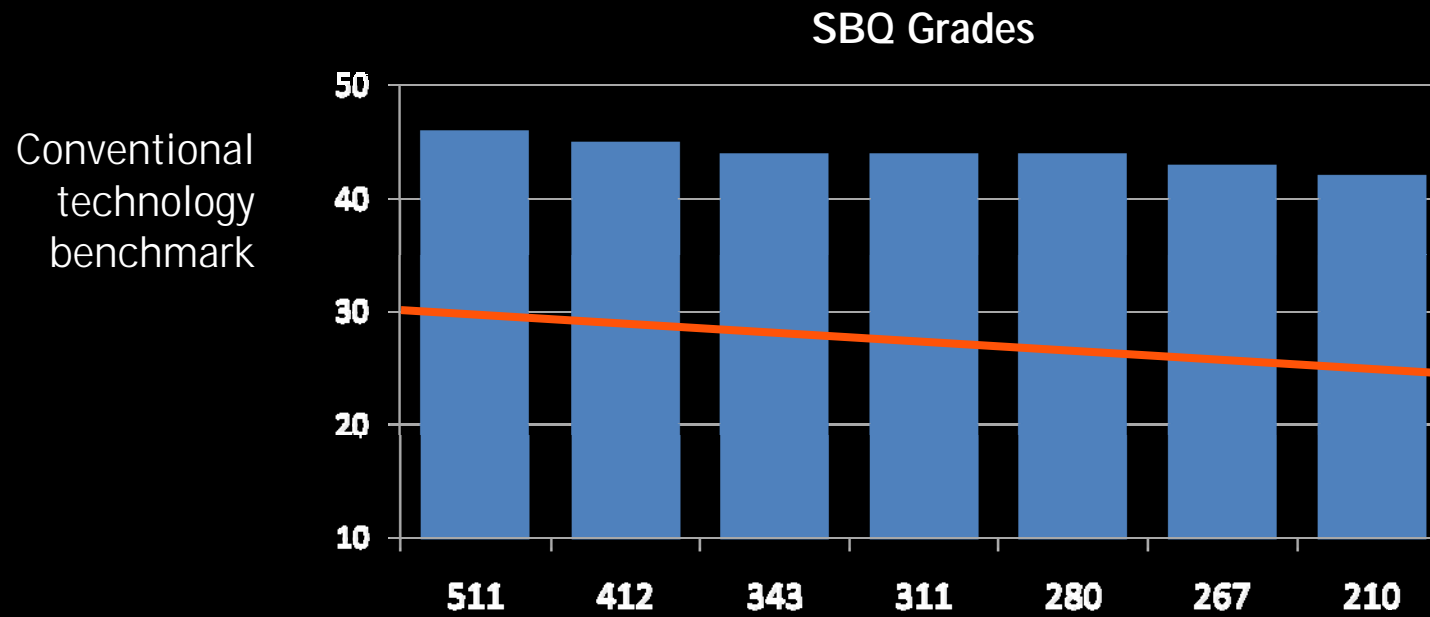


Power Mould™ for Rounds Danieli Patent

- Thanks to Power Mould features first solidification front is defect-free and perfectly homogenous



Strand productivity, casting speed vs. round section



ABS (Italy)

160x200 up to 6.5 m/min
(90 t/h), startup 2000,
equipped with Power Mould™

Keep on running ...



Sovel (Greece)

140x140 up to 5.2 m/min
(> 46 t/h)
Tests since 2006
Industrial production since
2008
Equipped with FCCTM



300,000 t/y per strand square 130 mm

up to 500,000 t/y per strand square 160 mm

Unprecedented casting speeds and productivity that **rewrite** the **layout** and technological **concepts** of mini- and micro-mills, allowing direct and efficient hot charging to the downstream process.

FAST CAST™

Best in class for
CAPEX and OPEX

- Increased productivity per strand (t/h) +36%
- Reduced number of strands -33%
- Reduced utility requirements - 22%
- Reduced refractory consumptions -0.7 Euro/t
- Increased process yield -0.45 Euro/t
- Reduced power consumption -19 %

FAST CAST™

