IRD ANTITRUST

The Antitrust laws prohibit agreements or understandings between two or more individuals or businesses to regulate prices or quantities of goods and services, to allocate customers or territories, to hinder or limit a competitor or potential competitor's operations, or otherwise unreasonably to restrain business activity. Discriminatory pricing or servicing is also prohibited.

Every individual who participates in IRD meetings and activities should follow these guidelines:

• DON'T discuss with other members your own or competitors' prices, pricing procedures, or anything that might affect prices such as costs, discounts, terms of sale, or profit margins, or anticipated wage rates.

• DON'T stay at a meeting where any such price talk occurs.

• DON'T make public announcements or statements about your own prices or those of competitors at any IRD function.

• DON'T talk about what individual companies plan to do in particular geographic or product markets or with particular customers.

• DON'T disclose to others at meetings or otherwise any competitively sensitive information.

• DON'T propose or agree to any action intended to disadvantage or injure another company.

• DO have an IRD staff person present at any meetings you conduct and insist on the agenda being followed and minutes kept.

• DO confer with legal counsel or IRD staff before bringing up any topic or making any statement with competitive ramifications.

• DO send copies of all association-related correspondence to the IRD office.

• DO alert the IRD staff to any inaccuracies in proposed statements to be made by IRD, particularly in statements to government officials.

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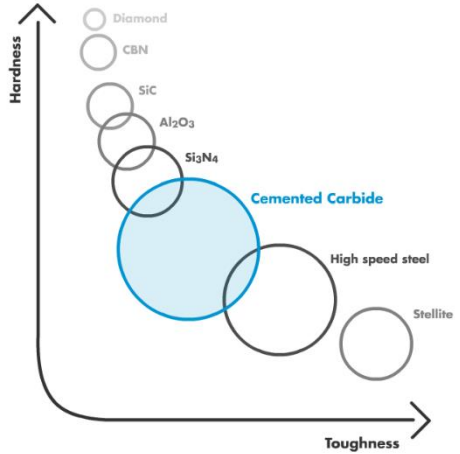
Cantilever rolls

IRD

April-2025

WHY TUNGSTEN CARBIDE?

There is a constant pressure for higher efficiency in the rolling mills



Tungsten carbide will bring:

- More tons per pass
- Stable bar shape

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THE BENEFITS OF TUNGSTEN CARBIDE

- BEYOND THE HIGHER PASSFORM TONNAGE:
  - Significant **reduction of line stops** to change passforms and rolls
  - Lower operational risks
  - Significantly increases surface quality of the bar
  - Higher rolling mill stability
    - Fewer cobbles / Lower scrap rate
    - Higher mill output

Results: Increased mill efficiency
Lower operational costs

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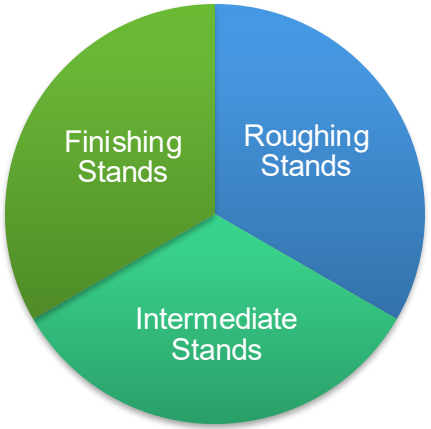
CARBIDE ROLLS FOR LONG ROLLING



Most common application
- Finisher and leader
- Multiple strands

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CARBIDE ROLLS FOR LONG ROLLING

Most common application
- Finisher and leader
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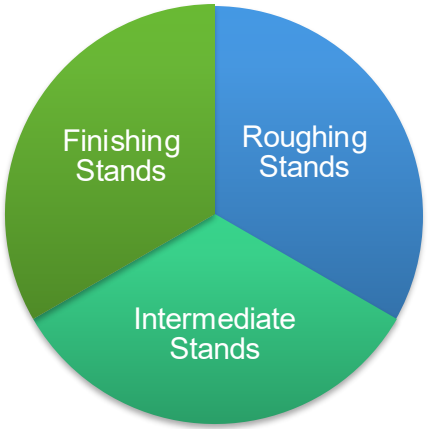

More mature, heavier applications
- Mostly 1 strand
- Long periods in the rolling mill
- One roll for many sizes of products

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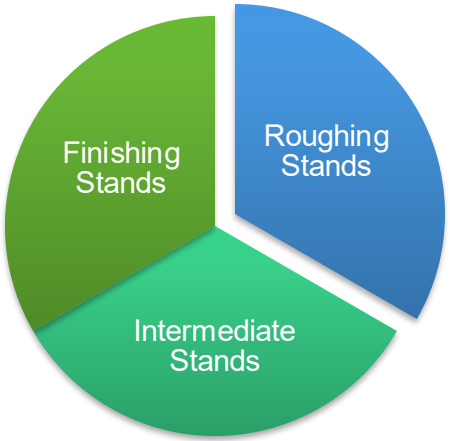
CARBIDE ROLLS FOR LONG ROLLING

Most common application
- Finisher and leader
- Multiple strands



Becoming a standard for mini mills
- Single stranded
- Heavy applications
- Low speeds

More mature, heavier applications
- Mostly 1 strand
- Long periods in the rolling mill
- One roll for many sizes of products

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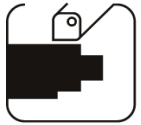
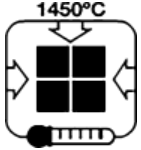
HOW IS IT MADE?

TUNGSTEN CARBIDE

PRESSING



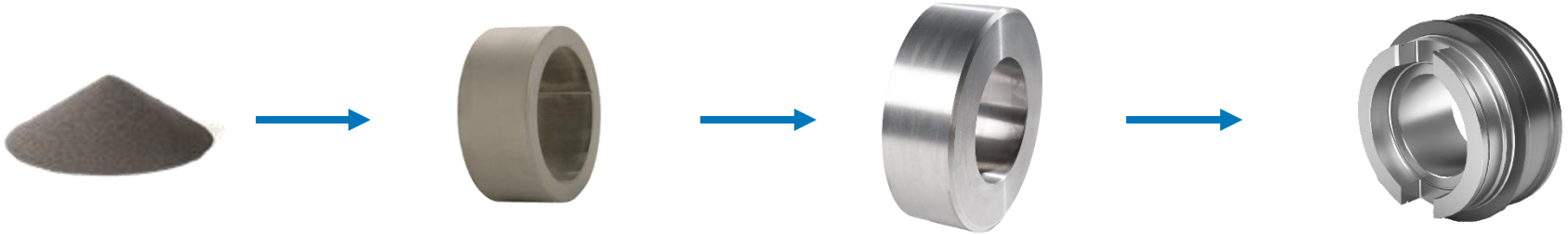
GREEN SHAPING



SINTERING

CASTING

FINAL MACHINING



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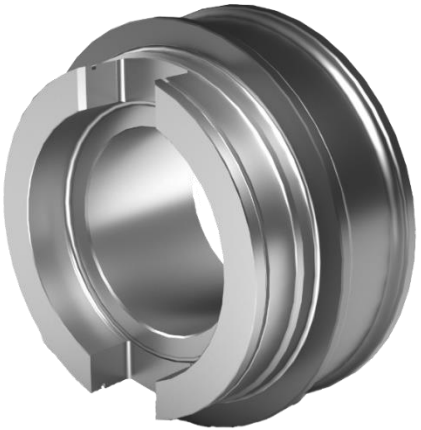
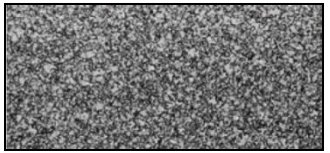
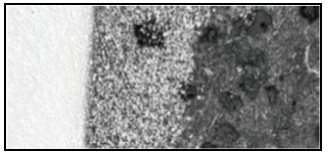
CIC | CAST-IN-CARBIDE



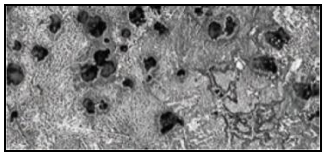
- Wear resistance
- High toughness
- No separation risk
- Shape flexibility
- No locking mechanisms



Tungsten carbide



Metallurgical bond



Cast Iron

APPLICATIONS

High Carbon / SBQ

Stands 7 – 10

- High Carbon SBQ
- 200 – 800 ft/min
- 31 kton / pass S7-8
  - 0.24 in redressings
- 15 kton / pass S9-10
  - 0.14 in redressings

Stand 3

- High Carbon Rebar
- 100 ft/min
- 21 kton / pass
  - 0.12 in redressings

Low Carbon / Rebar

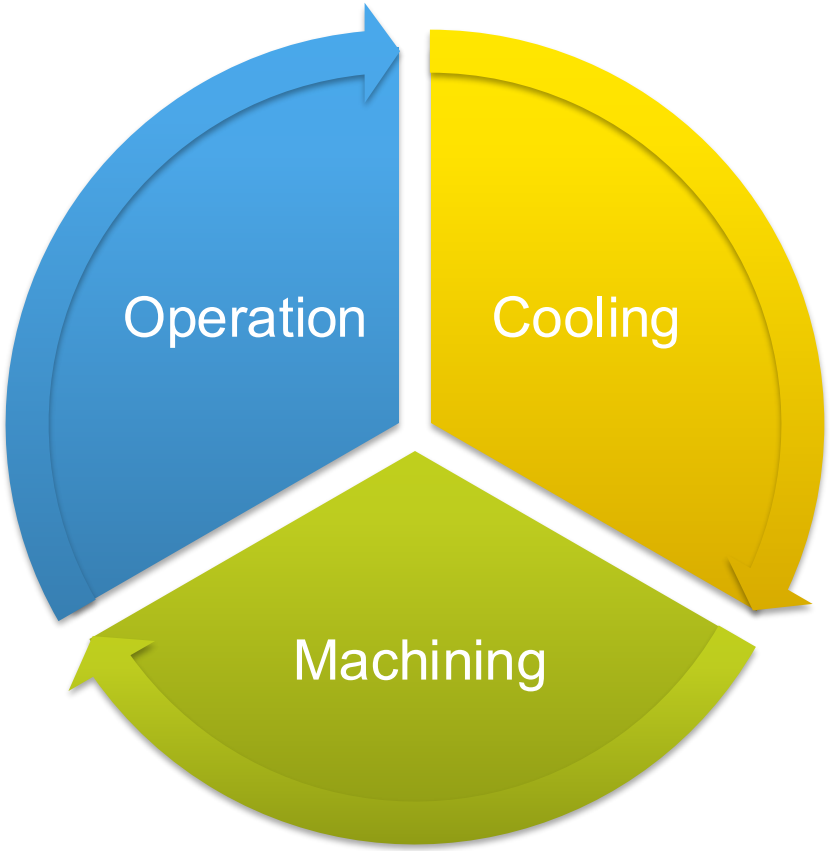
Stands 8 – 10

- Low Carbon Rebar
- 400 – 600 ft/min
- 50 kton / pass
  - 0.15 in redressings

Stands 9 – 12

- Low Carbon Rebar
- 12 – 15 kTon / Pass
- 0.07 in redressings

CRITICAL POINTS FOR GOOD PERFORMANCE



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ROLLING WITH CARBIDE

- Not recommended to do spray welding
  - Carbide friction factor is twice the one for cast iron/steel
  - Better bite of the bar
  - Creates preferential tension spots

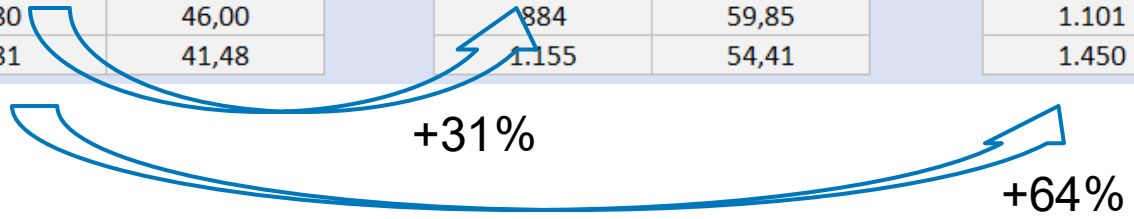
- Cobbles or water interruption:
  - On cobbles, keep water on until removing the bar
  - Always wait until roll naturally cools off to put cooling back
  - Avoid temperature shocks

BAR TEMPERATURE MATTERS

- Significantly increases loads in the roll:

	REFFERENCE			
	Stand 4	Stand 5	Stand 6	Stand 7
Passform Shape	Round	Zeppelin	Round	Zeppelin
Passform Width	80	100	50	70
Pass Height	30	32	48	30
Reduction, %		30%	30%	30%
Speed (m/s)		**0,7**	**1,0**	**1,5**

Rolled Material	**High Carbon**					
Rolling Temperature	**1000**	°C	**900**	°C	**800**	°C
	Load/strand [kN]	Torque [kN·m]	Load/strand [kN]	Torque [kN·m]	Load/strand [kN]	Torque [kN·m]
Stand 4						
Stand 5	1.336	73,33	1.746	95,92	2.186	120,17
Stand 6	680	46,00	884	59,85	1.101	74,60
Stand 7	881	41,48	1.155	54,41	1.450	68,34



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HYPERION & MBI ROLLS – CARBIDE COMPOSITE ROLL RE-PROCESSING/SCRAP BUYBACK

- MBI Rolls – Hyperion's exclusive agent for U.S. and Canada
- MBI's sister Company Master Roll Manufacturing - New Carlisle, Indiana offer the following:
  - Carbide Ring removal/installation
  - CIC, Carbide Ring and Arbor reconditioning
  - Carbide Scrap Buyback Program

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Key Roll Mill Benefits

- With the team no longer measuring live bar sizes, the stands with carbide hold size during our continuous campaigns
- Slight improvement in life in the stands following the carbide rolls
- Oval passes don't wear into a round
- Faster turnarounds/changeover requiring fewer rougher changes and adjustments

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Benefits of Carbides During Redress

- Average redress is 72.5% less material removal than traditional Eh Alloy rolls
- Average tons per campaign increased by 287%
- Total campaigns before scrap dia. increased by 340%

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Key Benefits of Carbides In the Roll Shop

- 36 less crane moves, to build one set of carbides vs the three sets of rolls to run the equivalent tons
- Less time spent building roughers in the shop. Its about a 1.5-hour process to mount the hubs, assemble, and build them into the assembly

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Key Benefits of Carbides In the Roll Shop

- Flexibility to run anything in the cycle without concerns about making the gaps
- **Allows us to plan rougher changes based on down days, versus the cycle**
- **Less time spent in the lathe, it takes longer to cut a new 450 than redress a carbide. It takes 10 new sets of eh moly rolls to cover the tons a single carbide set can produce.**

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The “High” Costs

Set	Material	Avg Tons	Avg Redress	Max Dia-Scrap	Avg Campaigns	Avg Total Tons	Avg Cost/Ton	Crane Moves
7-22	Carbide	42000	0.140”	2.56”	18	768000	$0.06	18
7-24	Carbide	38000	0.165”	2.56”	16	589576	$0.08	18
7-23	Eh Alloy	14000	0.600”	2.56”	4	59733	$0.07	54
7-20	Eh Alloy	14000	0.550”	2.56”	5	65164	$0.05	54
5-23	Carbide	43000	0.150”	2.56”	17	733867	$0.07	18
5-21	Eh Alloy	14000	0.550”	2.56”	5	65164	$0.05	54
5-25	Carbide	44000	0.150”	2.56”	17	750933	$0.07	18
5-19	Eh Alloy	14000	0.500”	2.56”	5	71680	$0.05	54

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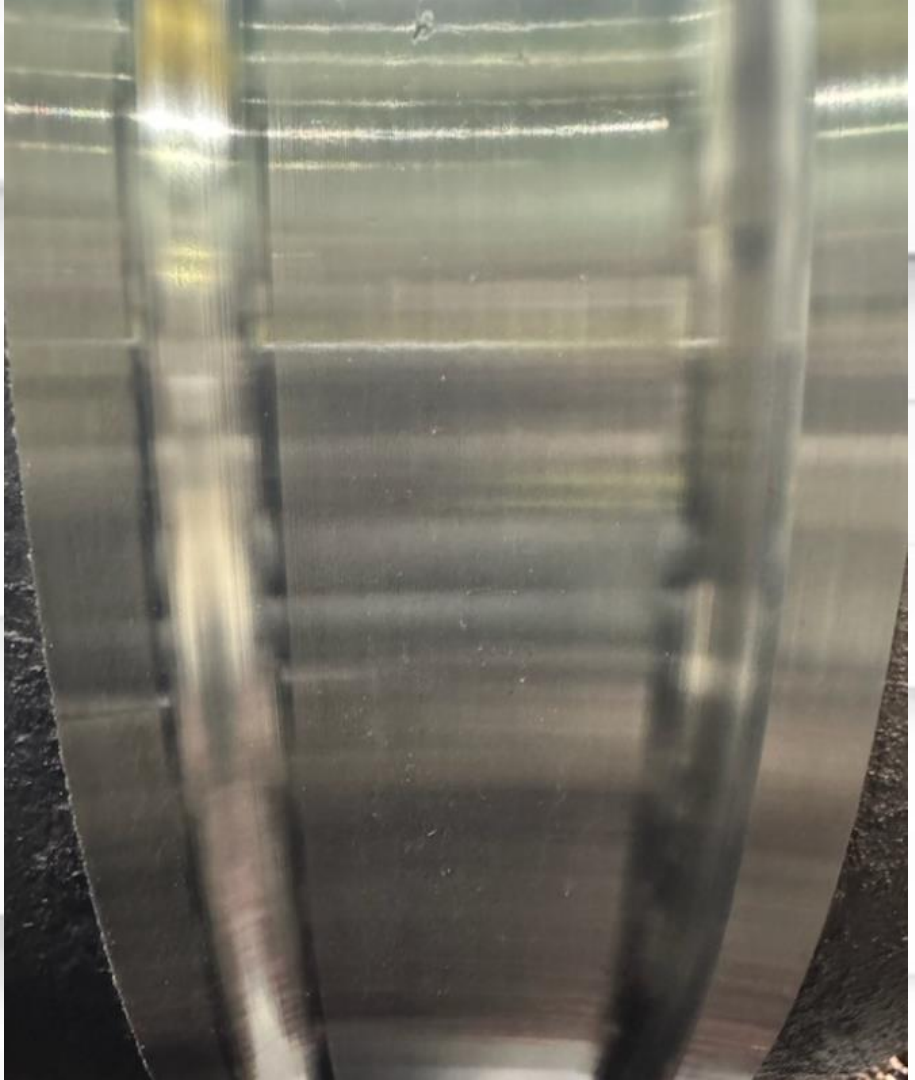

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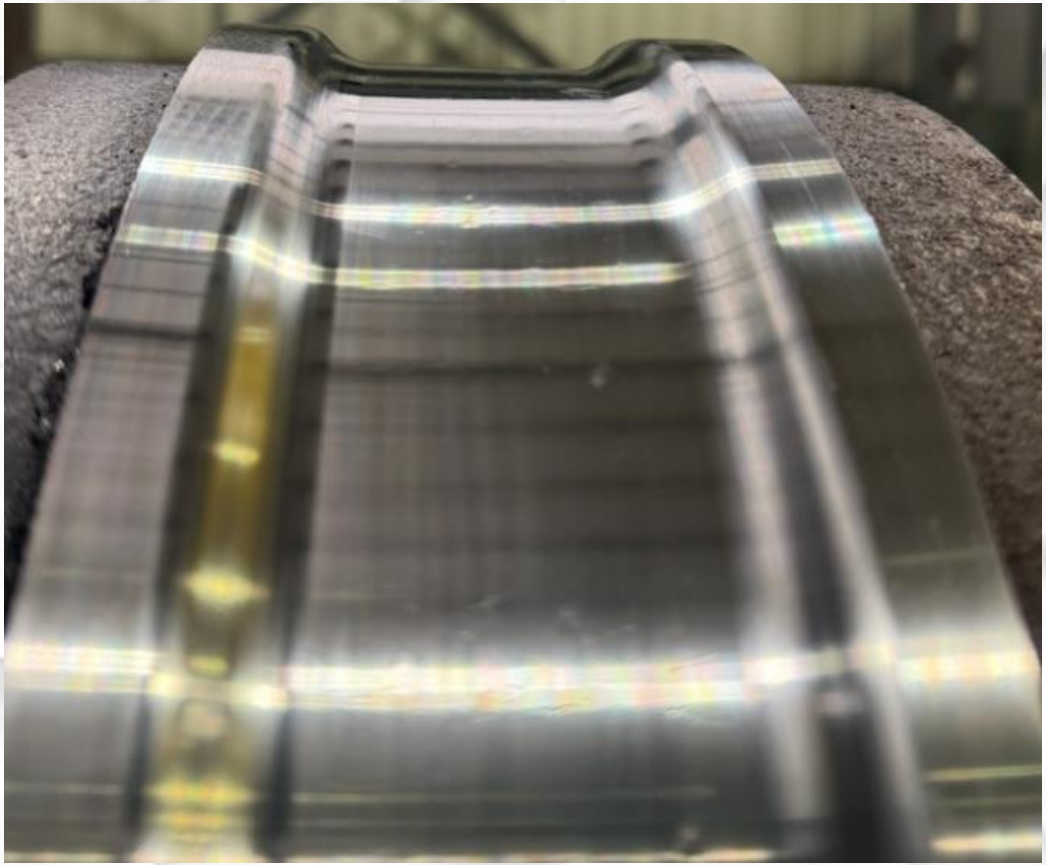

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Where we are headed

- Currently running these consistently in 5 and 7 stand
- **New order just showed up to add 6 stand to the mix**
- **We run two different 8 stands depending on product, so carbide doesn't make sense there currently**
- **Would like to add 4 stand but the speeds there are not conducive to the carbides cooling needs**
- **Trialing water headers to increase tons per campaign**

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Thank you

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