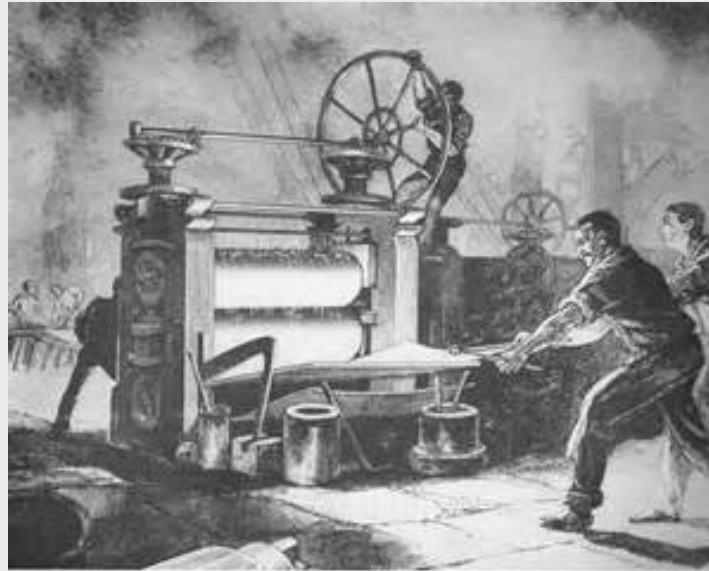




Providing Mill Roll Technology for the Future

Roll Evolution Solutions



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MBI Rolls

Fall IRD Meeting Conn 10/11/2018

MBI ROLLS, LLC Overview

- **MBI Rolls is a leading supplier of mill rolls to the North American steel mill industry. With a significant share of the Long Bar Market, MBI has put together a team of sales and technical personnel with over 100+ years of combined experience in Steel Mill operations, Roll Manufacturing, Sales and Logistics.**
- **In addition we have a team in China and Japan that directly monitor production and final inspection of our rolls. We also work with foundries from India, Korea, Turkey and Thailand.**

TYPICAL HOT STRIP MILL



Application of Roll in HSM stands

	F1	F2	F3	F4	F5	F6	F7
A	HSS	HSS	HSS	HSS/ IC	IC	IC	IC
B	CPC	CPC	HSS	HSS	HSS	HSS/IC	IC
C	CPC	CPC	CPC	CPC	IC	IC	
D	CPC	CPC	CPC	HSS	HSS	IC	IC
E	CPC	CPC	CPC	CPC/ IC	IC	IC	IC

Typical Long Bar Mill



Application of Rolls in Long Bar

Year	Finisher	Leader (oval)	Pre-Leader	Oval	Slitter	Dog bone	Square
1995	PNI/ANI	PNI	PNI	PNI	PNI	PNI	PNI
2000	CPC/CPM	PNI	PNI	PNI	PNI	PNI	PNI
2005	CPC/CPM	CPC/CPM	PNI/ANI	PNI	PNI	PNI	PNI
2010	Carbide	CPC/CPM	CPC/CPM	PNI	HSS	HSS	PNI
2018	Carbide	Carbide	CPC/CPM	HSS	HSS	HSS	HSS

PNI Pearlitic Nodular Iron
 ANI Acicular Iron
 HSS High Speed Steel

Long Bar Evolution

- **Long Bar Evolution.**
 - **Rolling rebar Iron rolls getting 250 tons on Finisher**
 - **Put in HSS roll for Finisher, now getting 1000 tons plus**
 - **Put in HSS rolls in Leader , now getting 1200-1500 tons in Finisher.**
 - **Put in HSS roll in Pre-Leader, now getting better wear in Leader & Finisher.**
 - **Put in HSS before Pre-Leader etc.**

Why is one roll lower cost (\$) then another?

- **Roll Origin**
- **Static Cast or Spun Cast**
- **Grade/ Chemistry/Hardness**
 - **Less nickel. Less moly, Less chrome. These alloys cost \$. You want to make the roll cheaper, you cut down on the alloys. This causes less wear resistance, less turnings, etc.**
 - **Do you actually know what you are getting?**

Cheap Rolls vs Good Rolls

Which one is better?

- **Roll #1 Cost \$1500**

- Ex. PNI

- **Roll #2 Cost \$4500**

- Ex. HSS

Equation for \$ per ton

- **Equation for Cost per ton**
 - **Example roll with 10 passes / 5 turnings**
 - **Each pass 1500 tons average**
 - **(Tons)(# of passes)(# Dressings) = Total Tons. Cost of roll/Total tons= Cost/ton**
 - **1500 tons x 10 passes = 15000 tons x 5 turnings = 75,000 tons**
 - **\$4500 divide by 75,000 tons = \$0.06 per ton**

Roll #1-#2 Comparison Justification

- **Cost \$1500** (PNI Example)
 - 10 passes / 5 turnings (Campaigns)
 - Each pass 500 tons average
 - 500 tons x 10 passes = 5000 tons x 5 turnings = 25,000 tons
 - \$1500 divide by 25,000 tons = \$0.06 per ton
- **Cost \$4500** (HSS Example)
 - 10 passes / 5 turnings
 - Each pass 1500 tons average
 - 1500 tons x 10 passes = 15000 tons x 5 turnings = 75,000 tons
 - \$4500 divide by 75,000 tons = \$0.06 per ton

Value Added Rolls vs Lower Quality Rolls

Let's compare

Roll #1 \$0.06/ton

- **Advantages:**

- **COST (\$1500)**
- **If you have a roll breakage problem, you minimize your losses**
- **None.**

- **Disadvantages:** **No Up Swing!**

- **Unable to get more turnings/ campaigns**
- **Larger hardness drops**
- **More change overs and startups because of roll wear. Thus possible more cobbles.**
- **Excessive roll wear, causing off section rolling's.**
- **Bad surface quality.**
- **Subpar Roll Chemistry ?**

Value Added Rolls vs Lower Quality Rolls

Roll #2 \$0.06/ton

- **Advantages:**

- Better wear resistance
- Minimum hardness drop
- Better chemistry
- More turnings/ campaigns/ less stock removal
- Better cost per ton
- In mill longer, thus less startups, changeovers, & cobbles
- **KEEPING THE MILL RUNNING!**

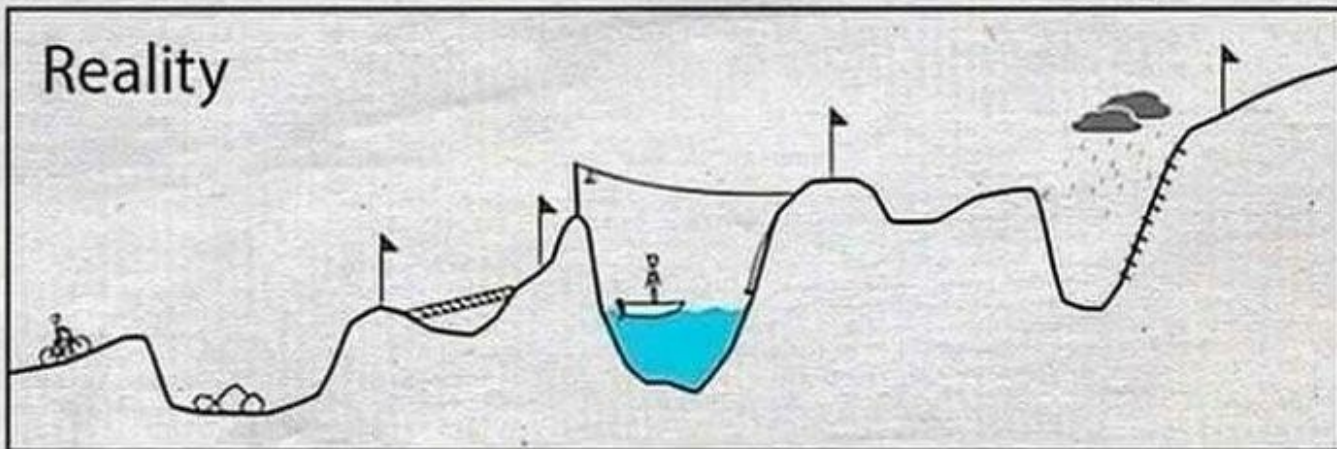
- **Disadvantages:**

- Cost \$4500 (Do not want to break) (Do not want to have water problems)
- None.

Your plan



Reality



Roll #3 (Reality)

- **Cost \$4500** (HSS Example)
 - **10 passes / 5 turnings/ campaigns/ less stock removals**
 - **Each pass 2500 tons average**
 - **2500 tons x 10 passes = 25,000 tons x 5 turnings = 125,000 tons**
 - **\$4500 divide by 125,000 tons = \$0.036 per ton**

Roll #4 (Reality)

Cost \$6000 (CPC Example)

- **10 passes / 6 turnings/ campaigns**
- **Each pass 3000 tons average**
- **3000 tons x 10 passes = 30,000 tons x 6 turnings = 180,000 tons**
- **\$6000 divide by 180,000 tons = \$.033 per ton**

Roughers

- **Cost \$10000** (PNI Example)
 - 3 passes / 3 turnings/ campaigns
 - Each pass 20,000 ton average
 - 20,000 tons x 3 passes = 60,000 tons x 3 turnings = 180,000 tons
 - \$10000 divide by 180,000 tons = \$0.055 per ton

Just one more campaign by buying better value added roll, ex. TR1 \$500.00 more approx.

If you got 4 turnings/ campaigns @ 20000 tons per pass

- 3 passes / 4 turnings/ campaigns
- Each pass 20,000 ton average
- 20,000 tons x 3 passes = 60,000 tons x 4 turnings = 240,000 tons
- \$10,500 divide by 240,000 tons = \$0.04 per ton
 - **If Each pass 25,000 ton average = \$.035 per ton**

Durability Ratio

$$\frac{\text{CPC TON/Pass}}{\text{PNI TON/Pass}} = X \quad \frac{\text{PNI Avg, Redress}}{\text{CPC Avg, Redress}} = Y$$

- **CPC Ton/ PNI Ton = X**
- **PNI Avg Redress / CPC Avg Redress = Y**
- **(X) (Y) = CPC Durability**

Durability Results ex. Rebar Dogbone Passes

13 mm

	CPC	Nodular Iron
Ave. Tons/Pass	1,837	981
Ave. Redress	0.132"	0.235"
Durability Pass	3.33X	1.0X

16 mm

	CPC	Nodular Iron
Ave. Tons/Pass	2,009	1,103
Ave. Redress	0.126"	0.396"
Durability Pass	5.7X	1.0X

Objective: Find better value added rolls because.....

- **Get your roll cost down! Longer roll life**
- **Get better wear**
- **Get extra turnings/ campaigns/ Less Stock Removal**
- **Less lathe time!! Man hours costs**
- **Get better surface quality**
- **Less changeovers/Startups**
- **Less Cobbles/ downtime**
- **Lower Roll & Mill costs/ Less Inventory**
- **Save money\$\$\$\$/ WIN-WIN**



MBI Rolls Value Added Roll Solutions





Who Can Name This Mystery Item?





I want an Everlasting Gobstopper!



Tough Roughers (TR1 & TR2)

TR 1

- MBI Developed
- Enhanced Alloys
- Special heat treatment
 - Better wear resistance
 - Less dressings
 - More tonnage
- Hardness 45-55 HSC

TR 2

- Advanced Material
 - Rare Alloy
- Extended heat treatment process
- All of TR1 benefits +
 - Stronger
 - Anti-corrosion
 - Anti-oxidation
- Hardness 50-65 HSC

SDI Pittsboro – TR2 **35,000 tons on 2 stand**



MP80

- **MBI Developed with Hebei**
- **Special Recipe HSS**
 - **Very high Alloys**
 - **Special Heat Treatment**
- **Lower cost, high value alternative to other tool steel rolls**
- **Hardness 75-85 HSC**

CMC TX - MP80 Results

**Objective – to maximize tonnage
in a rebar slitting application.**

Material	Tonnage
IRON	1,500
CPM9V	3,000
MP80	5,000

Sterling Steel MP80 Results

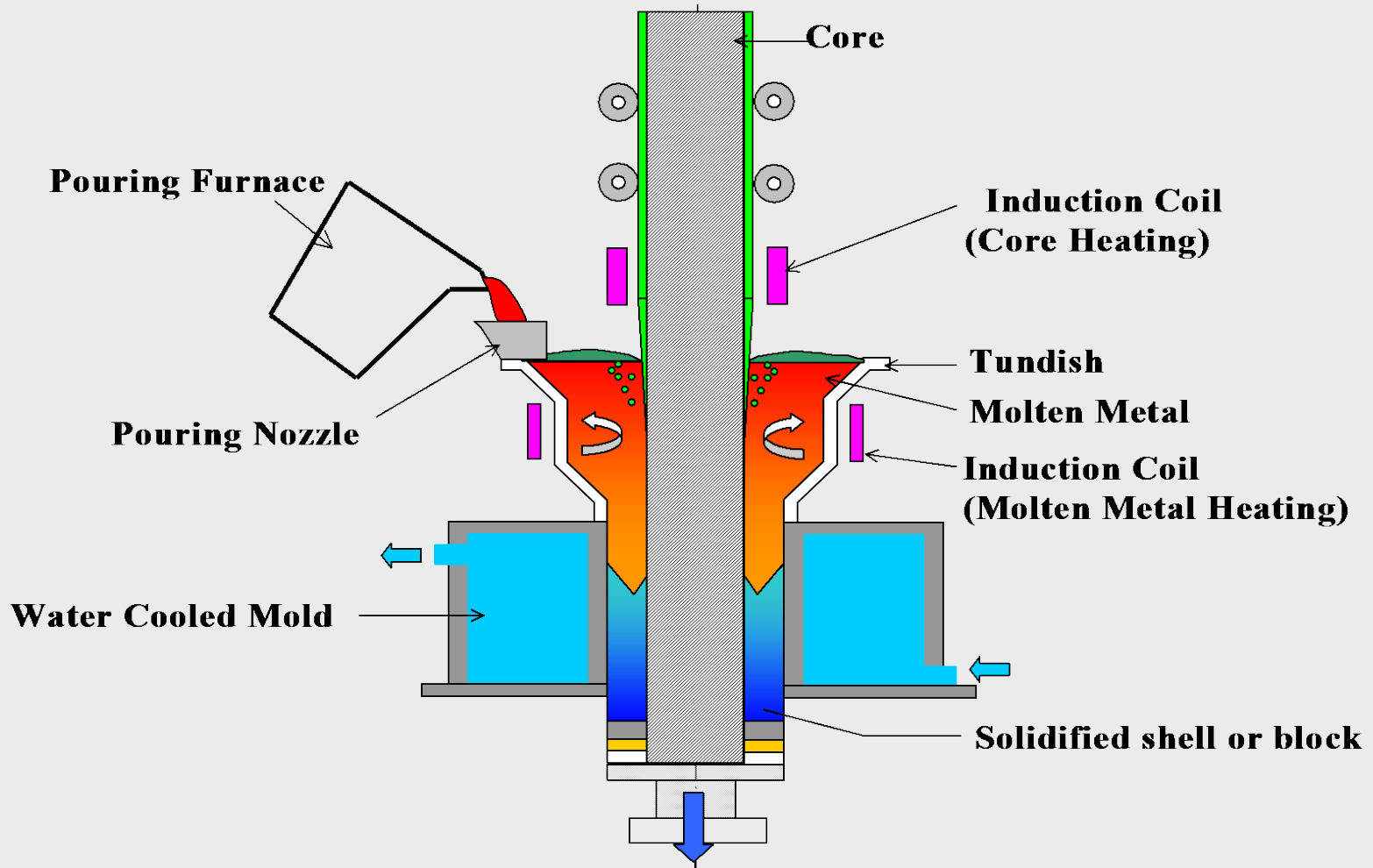
**Objective – to achieve 7,500 tons in 10 stand
to reduce need to change during
campaigns rolling rod**

Material	Campaign	Tonnage
Iron	All	3,000
MP80	1	8,428
MP80	2	8,395
MP80	3	7,697
MP80	4	8,329



- **Invented the CPC Process**
 - **Continuous Process Cladding**
- **MBI – Exclusive North American
Long Product Partner**

Description of CPC Process



Features of CPC-process

1.High and multi-alloying without segregation

High hardness Carbides and matrix

Homogeneous structure

2.Rapid solidification

Fine Structure & Beautiful surface texture

3.Strong and tough Core

Heavy load and severe rolling

Surface texture in No.15 stand (oval) of rebar rolling mill

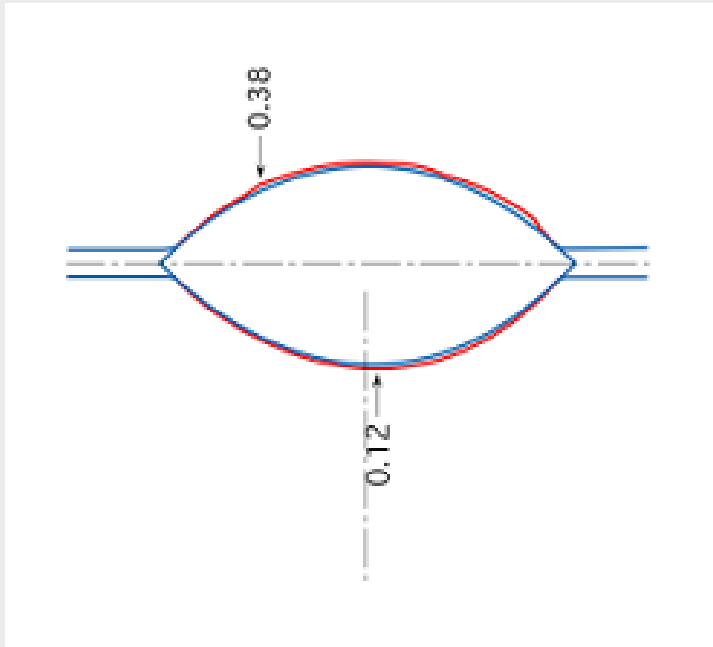


**CPC process
(Rolling amount:1,287ton)**

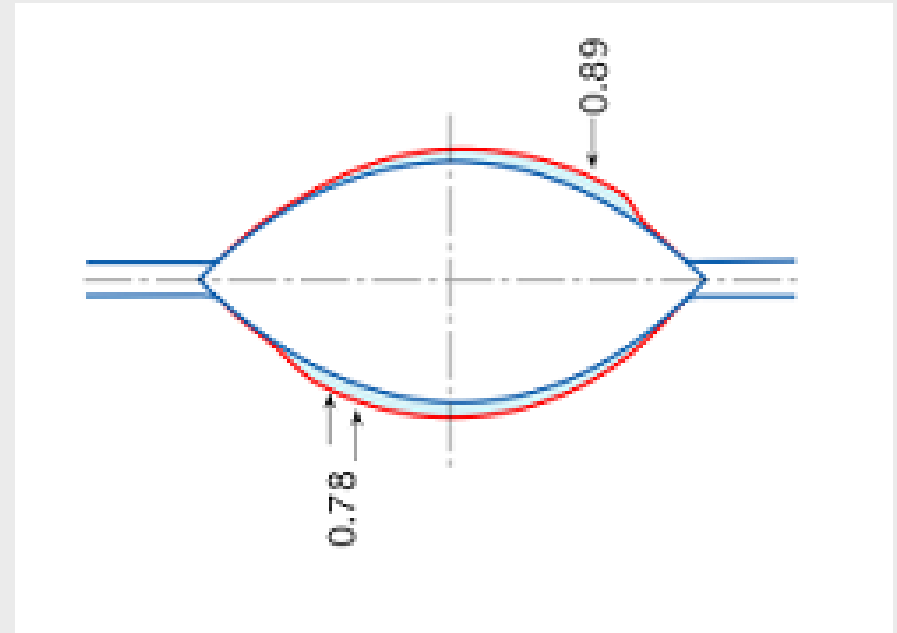


**HSS Roll Centrifugal Casting
(Rolling amount:1,208ton)**

Pass profile and Wear-loss



CPC process
(Rolling amount:1,287ton)



HSS Roll Centrifugal Casting
(Rolling amount:1,208ton)

Rebar Leader Pass

13 mm

	CPC	CPM9V	Nodular Iron
Ave. Tons/Pass	1,283	1,052	200-250

16 mm

	CPC	CPM9V	Nodular Iron
Ave. Tons/Pass	2,360	1,440	300-350

Take Aways

- **Don't be afraid to try new grades**
 - **Don't get in a rut of "Good Enough"**
- **Track and report the results**
 - **Share with Management & Roll Suppliers**
- **Focus on the big picture**
 - **Safety, Man Hours and Durability**
- **Educate Purchasing**
 - **Cheaper is rarely better**



When the Heat is on...Let it Roll

Thank you!
Any Questions
