NEW ACHIEVEMENTS IN EWR ENDLESS ROLLING PROCESS, THANKS TO BILLET K-WELDING TECHNOLOGY

2017 SEAISI CONFERENCE AND EXHIBITION
22-25 MAY
SENTOSA, SINGAPORE
INTRODUCTION
INTRODUCTION

ENDLESS WELDING ROLLING SYSTEM
MORE THAN TWO DECADES
IN PROCESS AND TECHNOLOGY IMPROVEMENT
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<tr>
<th>INTRODUCTION</th>
<th>MAIN AREAS OF PROCESS AND TECHNOLOGY IMPROVEMENT</th>
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<tr>
<td>SPARK AND SPATTER CONTAINMENT</td>
<td>To improve the self cleaning capability, durability of components and maintenance routines</td>
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<tr>
<td>QUALITY OF WELDING</td>
<td>To enable the Automation System to dynamically monitor the quality of each welding cycle</td>
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<tr>
<td>INTEGRATION WITH SPOOLER LINES</td>
<td>To improve the fine tuning, productivity and quality of hot rolled coil production lines</td>
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<td>INDUCTION HEATING APPLICATION</td>
<td>To improve the efficiency of the Plant, reduce costs of scale loss and reduce the environmental footprint</td>
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1. INTRODUCTION
2. MAIN BENEFITS
3. PROCESS TECHNOLOGY
4. INTEGRATION WITH SPOOLER LINE
5. INTEGRATION WITH INDUCTION HEATING
ENDLESS WELDING ROLLING SYSTEM
A WIDE ARRAY OF ADVANTAGES IN PRODUCTIVITY, YIELD AND OPEX REDUCTION
**Main Benefits**

**Increase of Pure Weight Output up to 12%**

As long as the RHF has an unexploited output capacity, that can be reached thanks to the elimination of the gap time and by running the Rolling Mill at the same speed.

**Ease of Rolling Mill Speed, Load and Torque Conditions**

Whenever no unexploited output can be used, the Mill can be operated for the same output at far less severe speed and loading conditions.
**MAIN BENEFITS**

<table>
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<tr>
<th>Benefit</th>
<th>Impact</th>
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<tr>
<td>No head and tail cropping</td>
<td>Up to 0.8% saving</td>
</tr>
<tr>
<td>Drastic reduction of cobbling</td>
<td>Down to 20% of cobbling had in billet-to-billet rolling</td>
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<td>No short bars at the cooling bed</td>
<td>A saving around 1%, even more significant for production of small sizes in slitting mode</td>
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<tr>
<td>Overall higher stability in the rolling mill</td>
<td>Less OPEX in maintenance and parts, better consistency in production and quality</td>
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K-WELDING EWR BILLET WELDING TECHNOLOGY
CONSISTENCY IN OUTPUT AND QUALITY
DAY-TO-DAY PERFORMANCES
SELF-CLEANING CONCEPT
The device self cleans at each welding cycle

PRECISE AND SIMPLE POSITIONING
One Cylinder only to exactly protect/cover the joint area at each welding cycle
THE SPARK KILLER SYSTEM

PROCESS TECHNOLOGY

LOST MATERIAL
around the machine

51%

SCRAP MATERIAL COLLECTED (reused)

WITHOUT SPARK KILLER

DEBURRING 49%

90%

WITH SPARK KILLER

DEBURRING 49%

SPARK KILLER 41%

Over 60% efficiency in Spark/Spatter Containment

data referred to a Square Billet 6 ¼”
A WIDE ARRAY OF DATA AND PARAMETERS TO BE CONTROLLED IN REAL TIME TO ASSURE QUALITY OF JOINTS

- Temperatures at various positions
- Tension and Current between the Clamps and their position
- Melting Depth and Flashing Time
- Upsetting Pressure and Depth
DYNAMIC CONTROL OF THE WELDING PROCESS

PRE-HEATING
- Centering
- Electric Arc Check
- Clamp Positioning
- Dissipation Check

FLASHING PHASE
- Tension and Current Control
- Depth of Melted Material

UPSETTING PHASE
- Pressure Control
- Upsetting Position

ABORT ROUTINE
- No Flashing
- Retreat from EWR mode
- Discharge of billets on emergency bench

ABORT ROUTINE
- No Upsetting
- Retreat from EWR mode
- Discharge of billets on emergency bench

ABORT ROUTINE
- No Rolling
- Retreat from EWR mode
- Segregation of Welded Area and discharge of billets on emergency bench
INTRODUCTION

MAIN BENEFITS

PROCESS TECHNOLOGY

INTEGRATION WITH SPOOLER LINE

INTEGRATION WITH SPOOLER LINE

INTEGRATION WITH INDUCTION HEATING
HOT ROLLED COIL REBAR UP TO 5 TON
THE BEST SOLUTION FOR PRODUCTIVITY
AND QUALITY DOWNSTREAM
MAIN BENEFITS

> Thanks to EWR technology possibility to produce «customized» coil in weight as better suitable for the Customer

> Consistency in geometrical and mechanical characteristics

> Twist-free material

> Negligible scrap at the head and tail of the coil

> Processing by mean of highly automated equipment
K-SPOOL TECHNOLOGY

HORIZONTAL SPOOLING

High stability during coiling, control of weight and rotating masses especially at braking phase

ACCURACY IN LAYER DISTRIBUTION

Sophisticated technology to control the distribution device and assure perfect perpendicularity and highest filling factor
Thanks to EWR technology possibility to produce «customized» coil in weight as better suitable for the Customer.

Consistency in geometrical and mechanical characteristics.

Twist-free material.

Negligible scrap at the head and tail of the coil.

Processing by mean of highly automated equipment.
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INTEGRATION WITH INDUCTION HEATING
ELECTRICAL INDUCTION HEATING
A VALUABLE TOOL FOR PROCESS OPTIMIZATION
AND FOR «GREEN» APPROACH
<table>
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<tr>
<th>Category</th>
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<tr>
<td><strong>WELDING PROCESS</strong></td>
<td>Better control of welding temperature between head and tail</td>
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<tr>
<td><strong>FLEXIBILITY</strong></td>
<td>Easier shift/selection between cold and hot charge mode</td>
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<td><strong>YIELD</strong></td>
<td>Reduction of the scale loss at the RHF</td>
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<td><strong>OPEX</strong></td>
<td>Reduction of gas consumption and mitigation of loss in heating efficiency of the RHF</td>
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<tr>
<td><strong>ENVIRONMENTAL</strong></td>
<td>Reduction of CO2 emission</td>
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