

ADVANCED WATER HEADERS INTRODUCTION

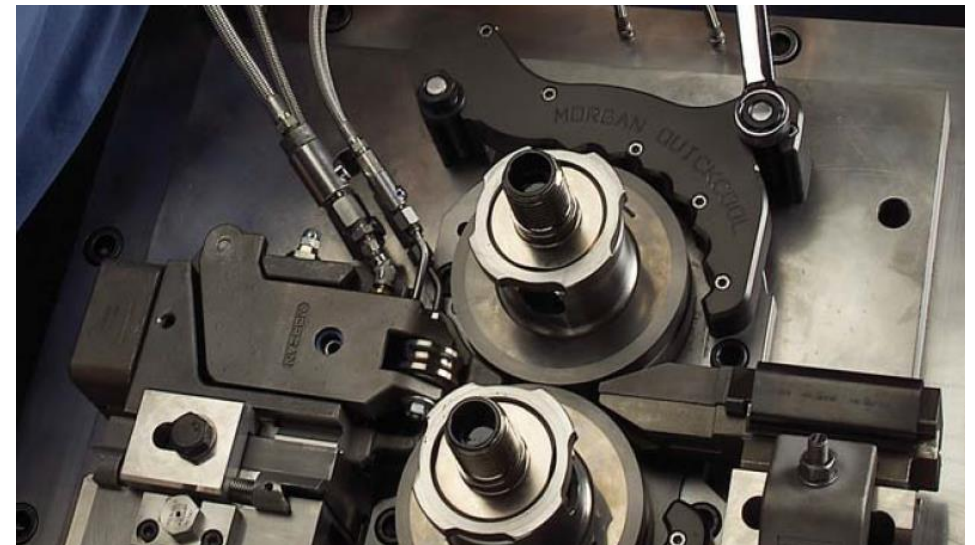
IRD SPRING MEETING 2025

Jacob Marshall, Engineer

Advanced Roll Cooling Headers

Advanced Roll Cooling Headers are a Patented AM / smart sensing design for any size rolling mill stand.

- Quick-change spray nozzle cartridges ensure consistent and optimal cooling of work rolls.
- Increased roll life and decreased operating costs.
- Enhanced safety
- Non-handed cartridge.
- Quickly check wear condition with color wearing indication.
- Distinct cartridge color for each stand size makes identification simple.
- Durable, exclusive polymer cartridge material.
- Smaller footprint, better ergonomics.
- Design flexibility



Advanced Headers - Components

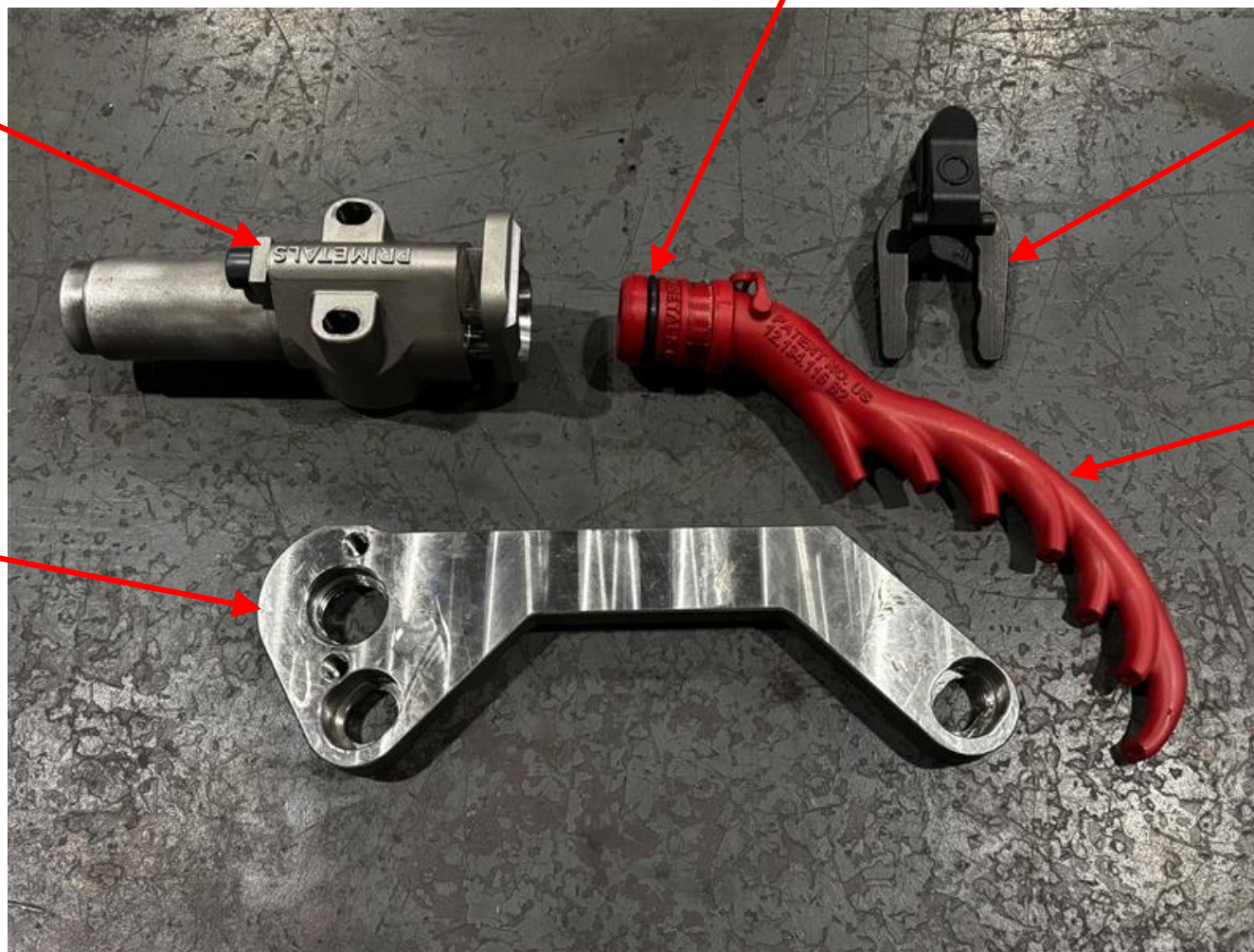
Mounting Block /
Sensor Housing

O-ring

Header Retaining
Clip

Subplate Adapter

Header
Cartridge
NTM K-mill
6"



Advanced Headers – Safety & Ergonomics

1. Reduced possibility of roll failure & cobble.
 - Optimized and consistent cooling across all stands.
 - HMI alerts to check worn or clogged header before a roll fails.

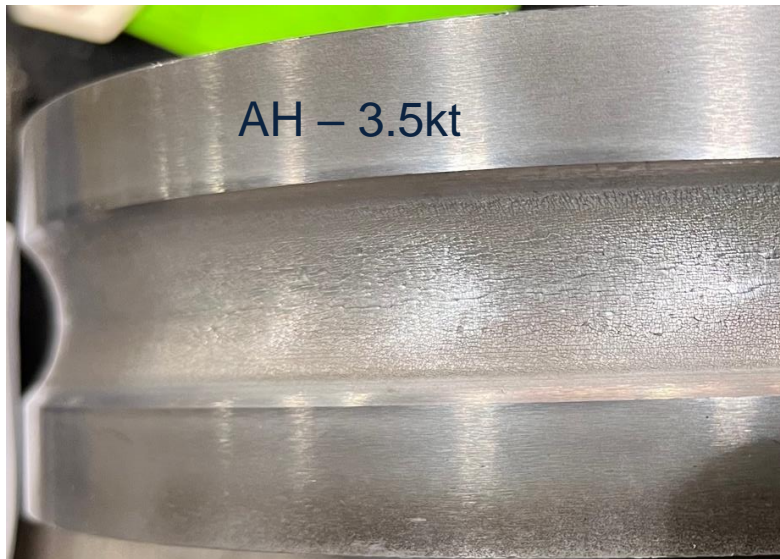
2. Simplified & Decreased hands-on work
 - Tool-less quick-change design.
 - Headers pivot out of the way without tools for easy access to guides, rolls, and seal plates.
 - Lightweight design.
 - Advanced Header - 0.2 lb
 - Traditional Header - 4.5 lb

3. Reduction in time spent near the rolling line
 - Proper operation is verified by HMI, visual checks are unnecessary on R&I stands.

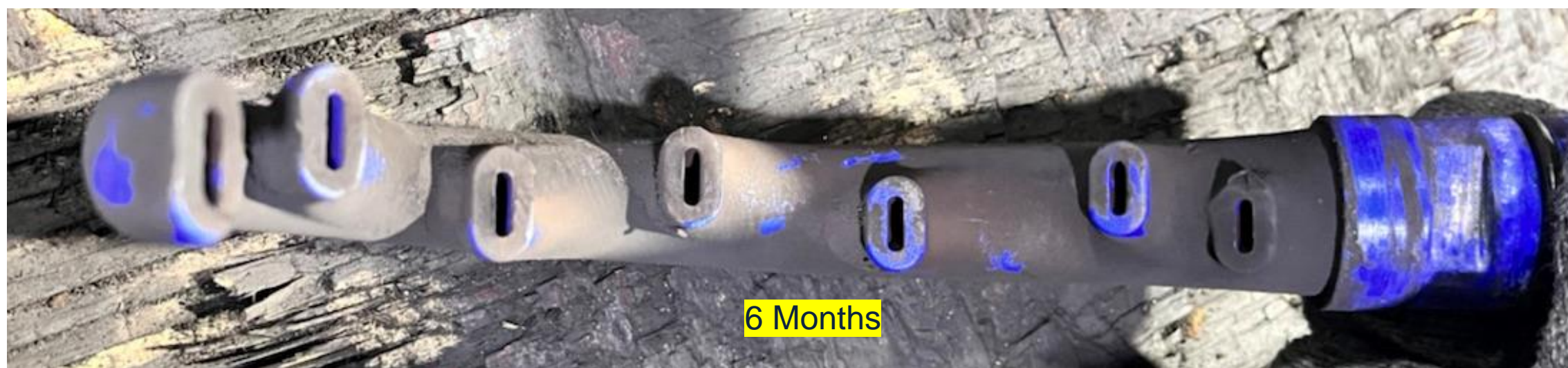


Advanced Headers – Proven Durability

- Individual test cartridge run time of 18+ months
- Roll cooling capability is equivalent to original QuickCool (QC) header when new, and much better than worn QC header.
- Negligible visible wear on cartridge nozzles or interior surfaces over testing duration.
 - Cooling efficiency was maintained over header life.

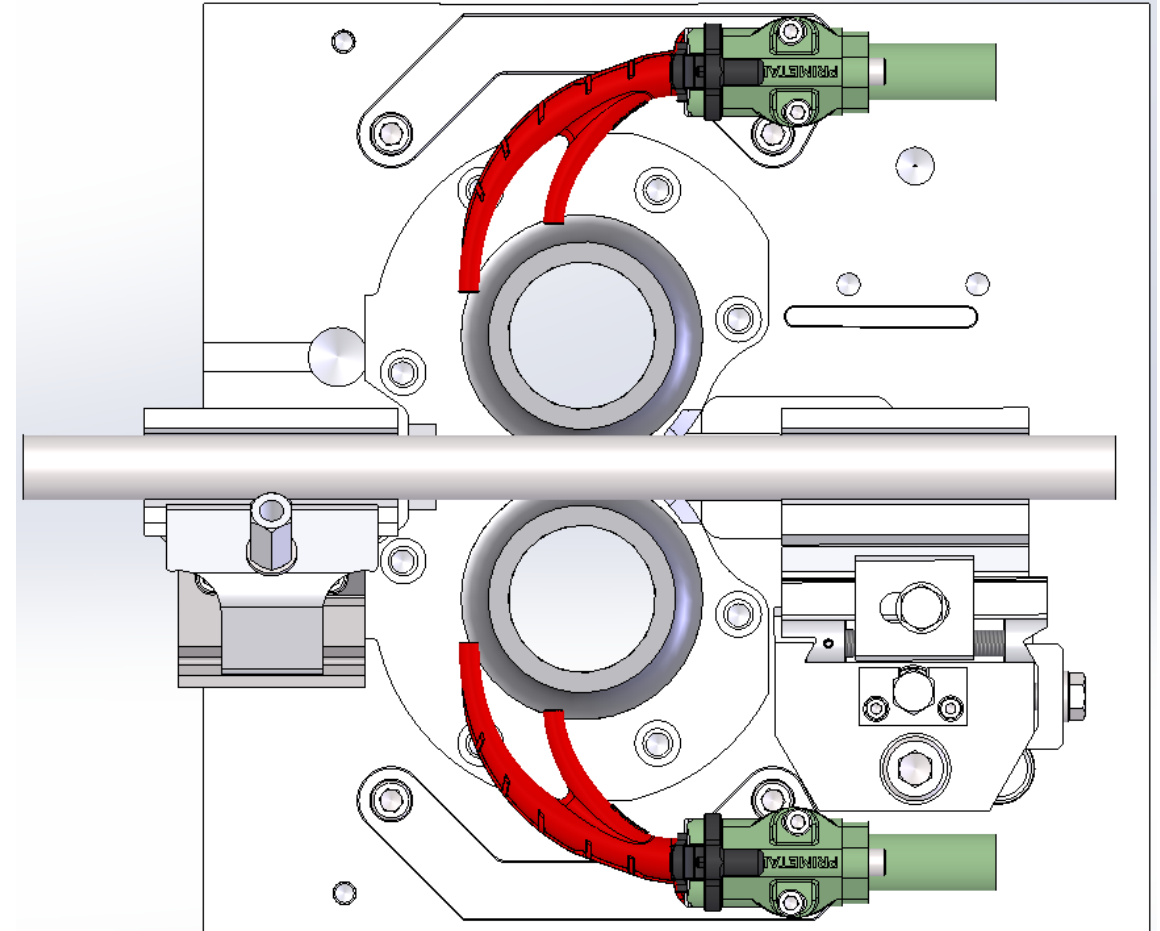


Advanced Headers – Proven Durability

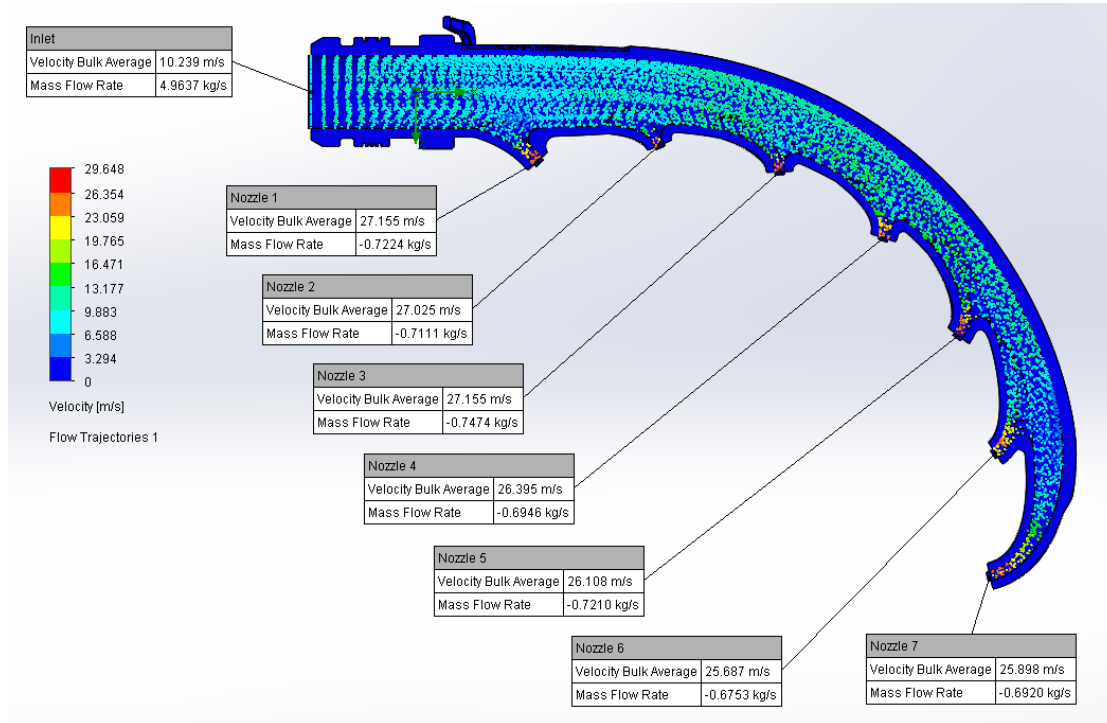


Advanced Headers – Dummy Cartridge

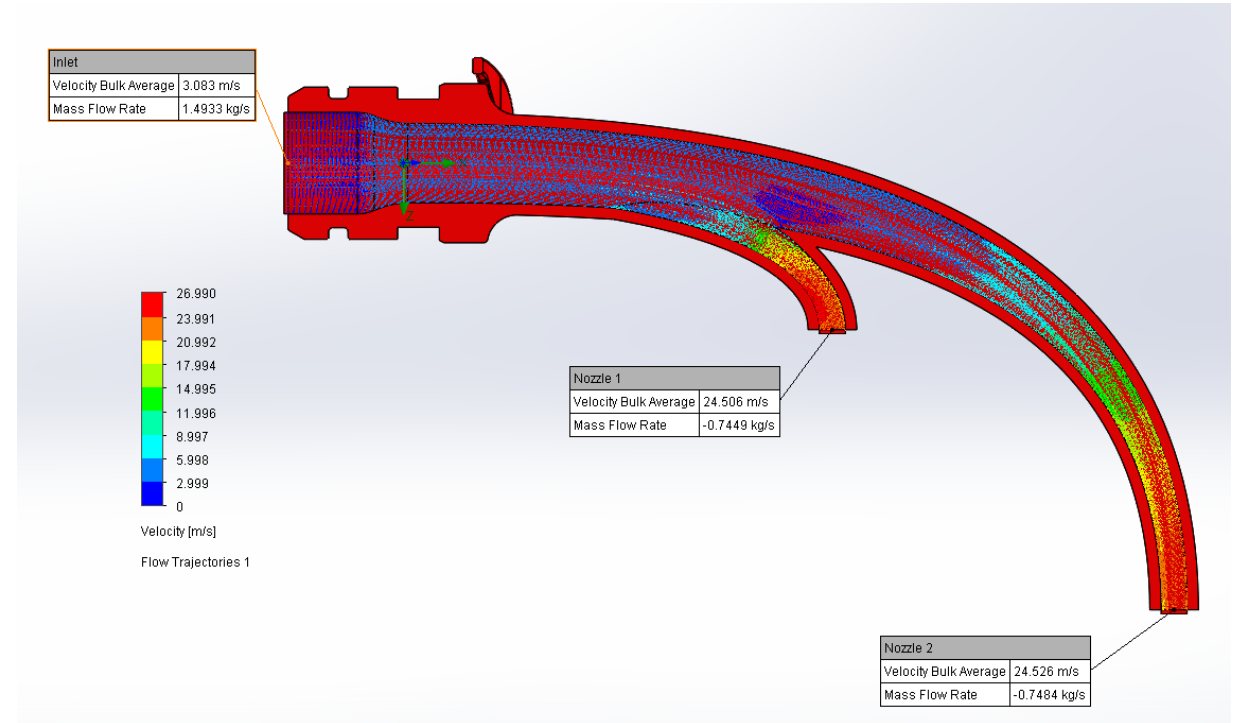
- Dummy cartridges can be swapped into position when a stand is dummied out.
 - Reduces chances of water ingress.
 - Reduces contact water consumption (Up to 70% reduction from a roll cooling header).
 - Directs a reduced amount of cooling water onto dummy pipe and dummy cover to ensure components are kept cool.
 - Shape prevents accidental use with mill rolls in position.



Advanced Headers – Dummy Cartridge Water Consumption

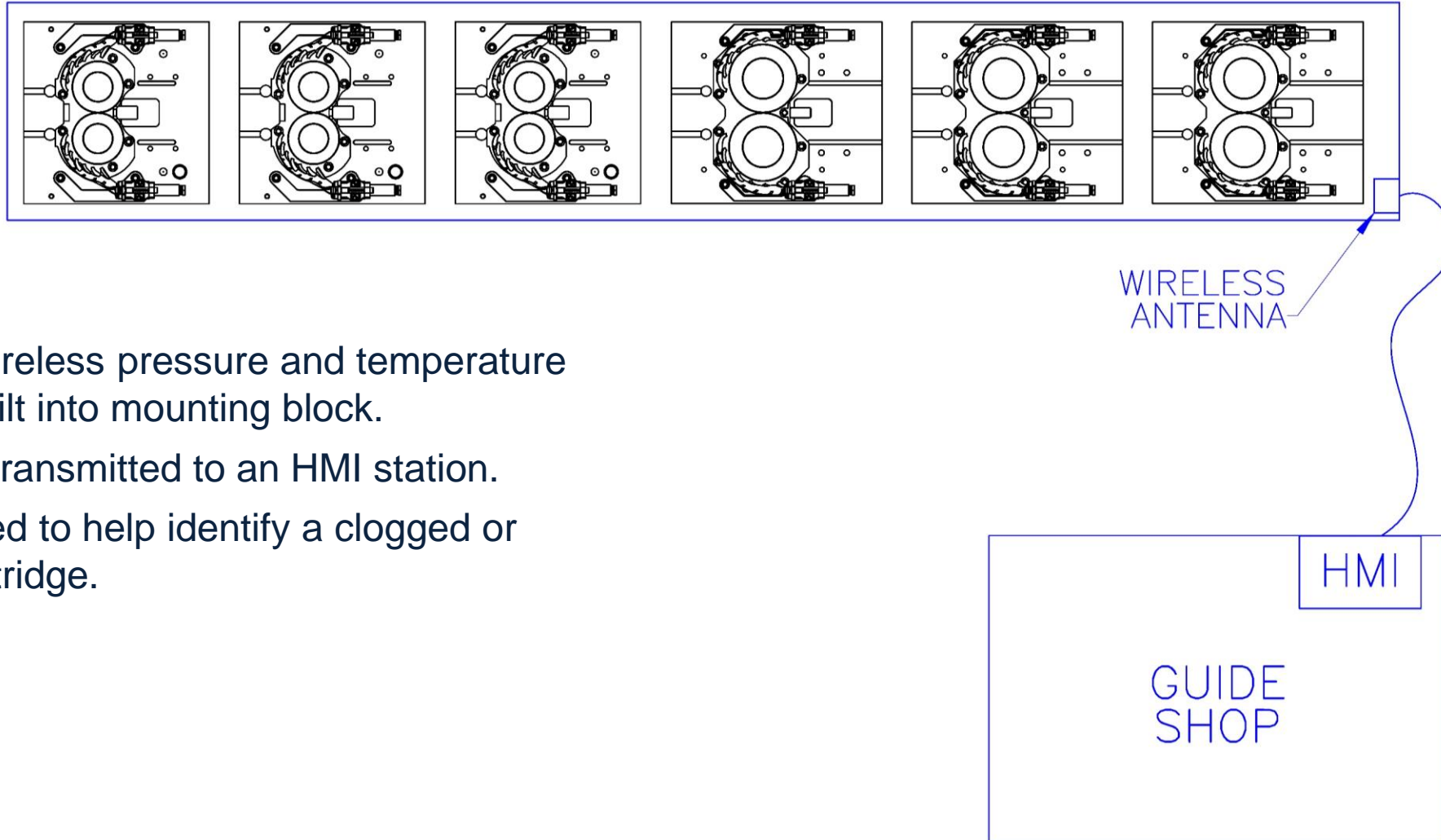


4.5 bar (65 psi) input pressure
 4.96 L/s (78 gpm) mass flow rate
 26.5 m/s average nozzle exit velocity
 Restrictor plates available to reduce flow



4.5 bar (65 psi) input pressure
 1.49 L/s (24 gpm) mass flow rate
 24.5 m/s average nozzle exit velocity

Advanced Headers – Sensors and HMI

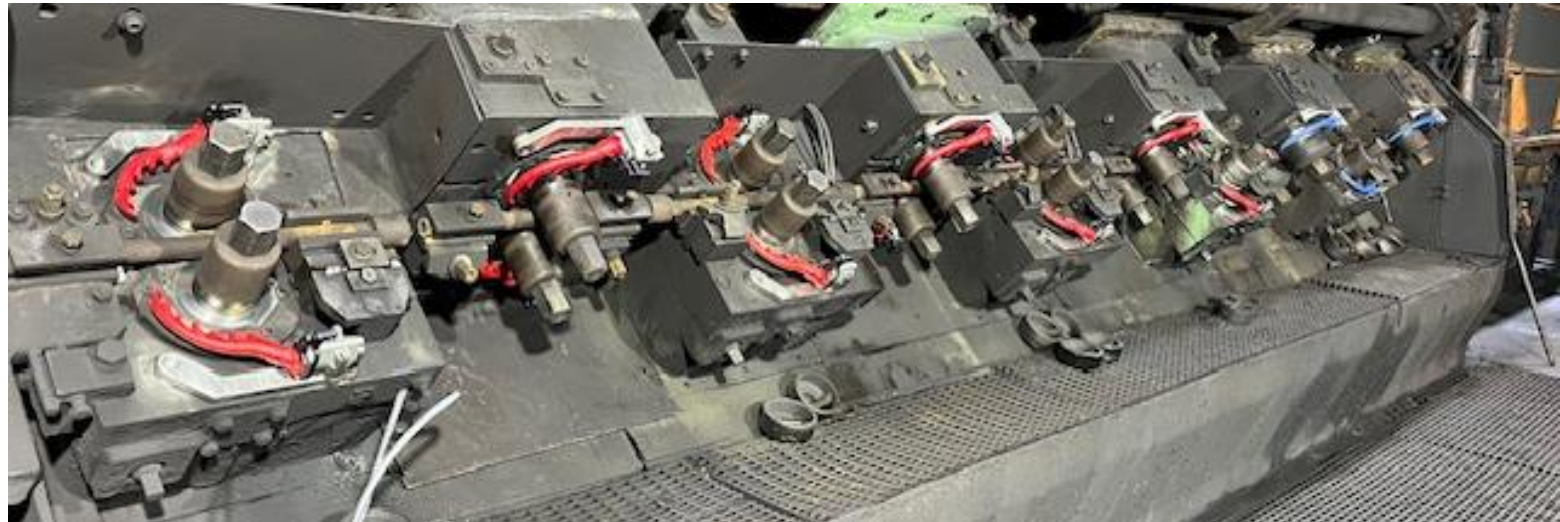


- Wired or wireless pressure and temperature sensors built into mounting block.
- Feedback transmitted to an HMI station.
- Can be used to help identify a clogged or broken cartridge.

Advanced Headers - Conclusion

Maximum cooling efficiency, consistency, and safety.

- Facilitates maintaining cooling efficiency long term.
- Enhances operator safety.
- HMI helps to ensure operating status.
- Design is expandable to other areas beyond finishing mill.



Jacob Marshall
Guides R&D Engineer
T +1 (774) 402-0593
E jacob.marshall@primetals.com

Primetals Technologies
93 Gilmore Drive
Sutton, MA 01590
United States

[primetals.com](https://www.primetals.com)

The information (including, e.g., figures and numbers) provided in this document contains merely general descriptions or characteristics of performance based on estimates and assumptions which have not been verified. These estimates and assumptions have to be analyzed on a case-to-case basis and might change as a result of further product development.

It is no representation, does not constitute and/or evidence a contract or an offer to enter into a contract to any extent and is not binding upon the parties. Any obligation to provide and/or demonstrate respective characteristics shall only exist if expressly agreed in the terms of the contract.

Primetals Technologies excludes any liability whatsoever under or in connection with any provided information, estimates and assumptions. The provided information, estimates and assumptions shall be without prejudice to any possible future offer and/or contract.

Any information provided by Primetals Technologies to the recipient shall be subject to applicable confidentiality obligations and shall be used by the recipient at their own convenience and at their sole risk.

[primetals.com](https://www.primetals.com)

THANK YOU



Charter Steel - Saukville

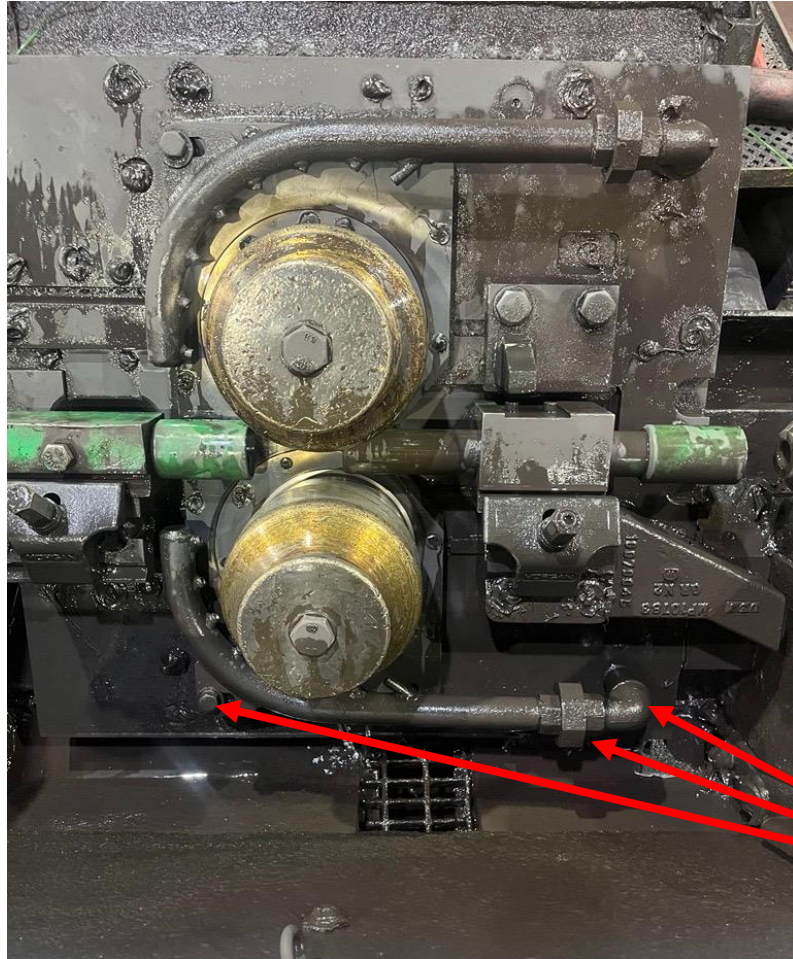
Advanced Water Header Trial



Problem Statement

- Heavy scale and particulate in the mill water tends to plug the spray nozzles on the Finish Mill roll cooling water headers. These water headers are critical to keep mill rolls and guiding equipment from overheating and prematurely failing.
- The process of inspecting and/or changing out water headers in the Finish Mill is timely and poses many ergonomic risks and hazards to operators
- Average time to change out an old-style water headers: 15-20 minutes

Old Style Headers



- | Hazard(s) | |
|---|--|
| <input type="checkbox"/> Flying Objects | <input type="checkbox"/> Puncture |
| <input checked="" type="checkbox"/> Extreme Heat | <input type="checkbox"/> Sparks |
| <input type="checkbox"/> Respiratory | <input checked="" type="checkbox"/> Sharp Objects |
| <input type="checkbox"/> Overhead Work | <input type="checkbox"/> Extreme Cold |
| <input type="checkbox"/> Falling Materials | <input type="checkbox"/> Overhead Work |
| <input checked="" type="checkbox"/> Tool Usage | <input type="checkbox"/> Slip / trip / fall |
| <input type="checkbox"/> Machinery | <input type="checkbox"/> Electrical |
| <input type="checkbox"/> Lifting | <input type="checkbox"/> Vehicle |
| <input checked="" type="checkbox"/> Caught
Between | <input checked="" type="checkbox"/> Repetitive
Motion |
| <input type="checkbox"/> Struck by | <input type="checkbox"/> Noise |
| <input type="checkbox"/> Chemical
Contact | <input type="checkbox"/> Stored Energy |

- Control(s)**
- ☐ Elimination
 - ☐ Substitution
 - ☐ Engineering
 - ☐ Administrative
 - ☒ PPE
 - ☒ Behavior

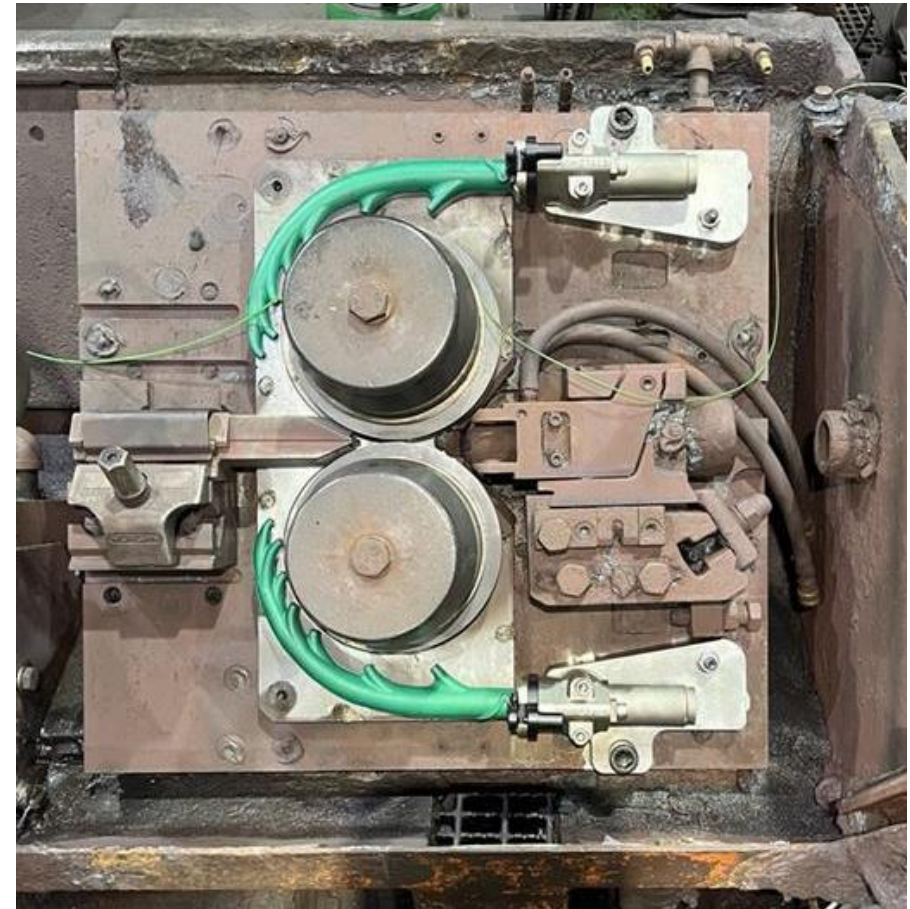
Operators are forced to remove multiple fittings and bolts within a tight area before they can remove the water headers when worn or plugged

Primetals Advanced Water Header Trial

- Installed (2) sets of Primetals Advanced Water Headers on Stands 19 and 20



Post Install testing and verification



Stand 19 Advanced Water Header Install

New Process



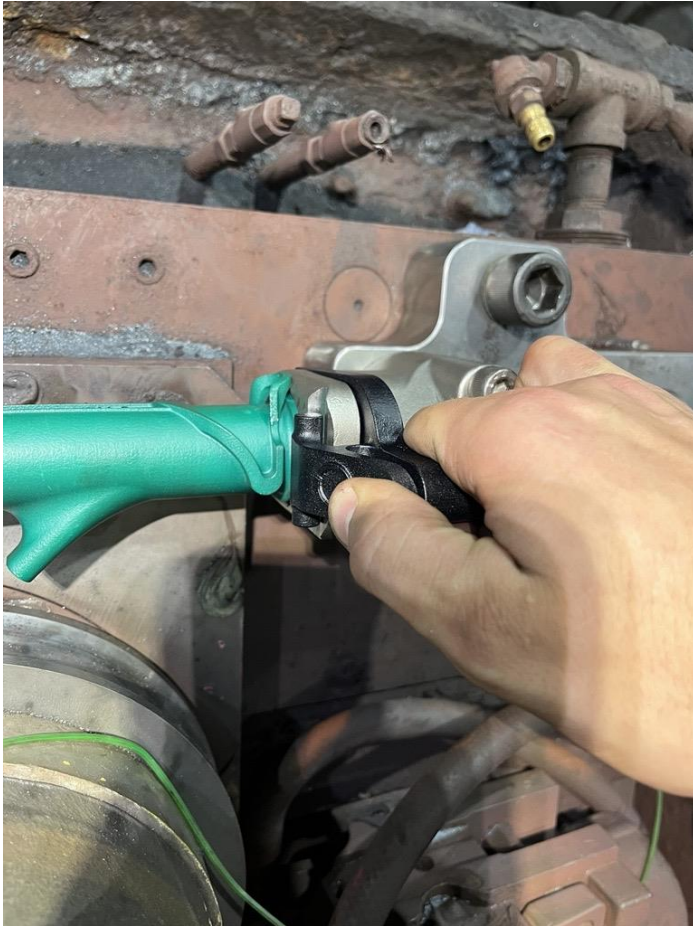
Hazard(s)

- | | |
|--|---|
| <input type="checkbox"/> Flying Objects | <input type="checkbox"/> Puncture |
| <input checked="" type="checkbox"/> Extreme Heat | <input type="checkbox"/> Sparks |
| <input type="checkbox"/> Respiratory | <input type="checkbox"/> Sharp Objects |
| <input type="checkbox"/> Overhead Work | <input type="checkbox"/> Extreme Cold |
| <input type="checkbox"/> Falling Materials | <input type="checkbox"/> Overhead Work |
| <input type="checkbox"/> Tool Usage | <input type="checkbox"/> Slip / trip / fall |
| <input type="checkbox"/> Machinery | <input type="checkbox"/> Electrical |
| <input type="checkbox"/> Lifting | <input type="checkbox"/> Vehicle |
| <input type="checkbox"/> Caught
Between | <input type="checkbox"/> Interaction |
| <input type="checkbox"/> Struck by | <input type="checkbox"/> Repetitive
Motion |
| <input type="checkbox"/> Chemical
Contact | <input type="checkbox"/> Noise |
| | <input type="checkbox"/> Stored Energy |

Control(s)

- ☐ Elimination
- ☒ Substitution
- ☒ Engineering
- ☒ Administrative
- ☐ PPE
- ☐ Behavior

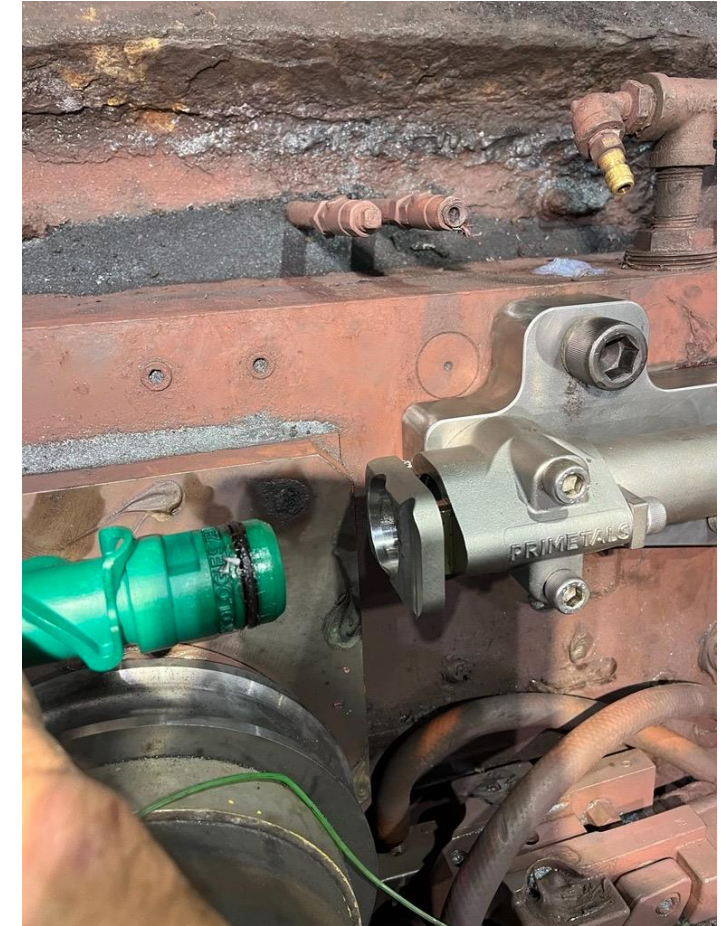
New Process – Three Simple Steps



1. Unclip Mounting Clip



2. Remove Mounting Clip



3. Remove Water Header



Additional Notes / Comments

- Average time to change out Advanced Quick-Change: 30 seconds
 - 96% reduction in changeover time from old-style water headers
- Water headers and Mounting Clips are 3D printed, resulting in reduced lead-times for critical spare parts
- Trial was performed on 19 and 20 stand in partnership with Primetals
- Trial yielded positive results. Plan to install on remaining finish mill stands in 2025
- Additional benefits (aside from Safety improvements):
 - Reduced roll wear (cost savings)
 - Shorter lead-time for critical spares
- New design allows for pressure sensors to be installed on each assembly
 - Able to alert operators in real-time when water headers become worn and/or clogged to prevent cooling related roll failures

Roll Wear Comparison



Rolls 19 std (1/4") - 1902 tons - Old headers



Roll 19 stand (1/4") - 1963 tons - NEW HEADERS



Roll Wear Comparison



Top roll 19 std (7/32"). - pass on the right 1273 tons – old headers
Pass on the left 1834 tons – NEW headers



Bottom roll 19 stand (7/32") – pass on the right 1273 tons – old headers
Pass on the left 1834 tons – NEW headers





THANK YOU!