



ASEAN FEDERATION OF CEMENT MANUFACTURERS

Advancements in Air Cannon Nozzles to Improve Pyroprocess Performance



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Pyro Process Applications



Cement Preheater Towers & Clinker Coolers



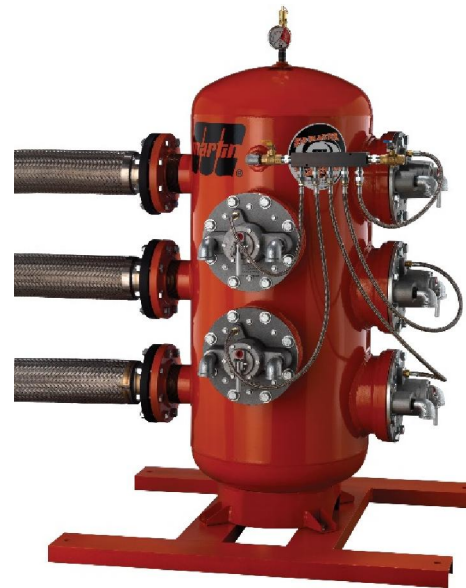
Typical Tower Application



Typical Cooler Application



Air Cannon Types





Standard High Temp Nozzles



Cast Alloy Fan Nozzles

SS Pipe Nozzles



Old Technology: Standard Fan Nozzle



Most Popular Nozzle for Cement Applications



Standard Fan Nozzle Installation

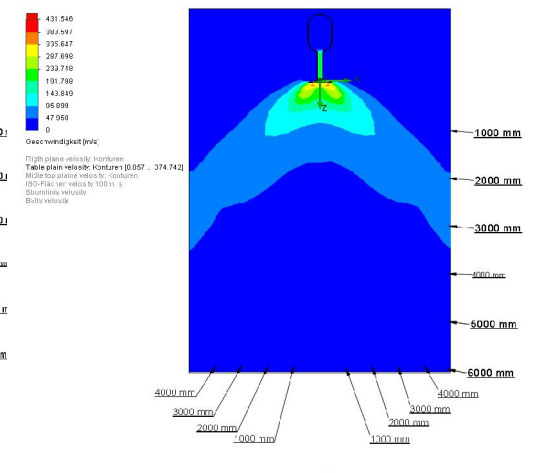
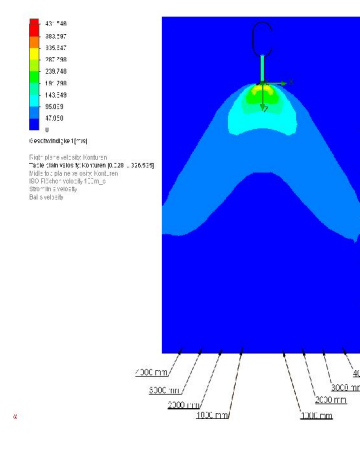
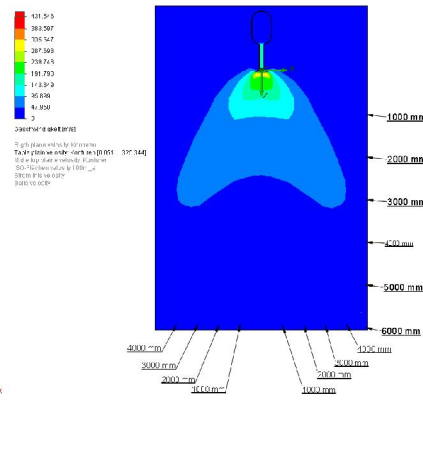
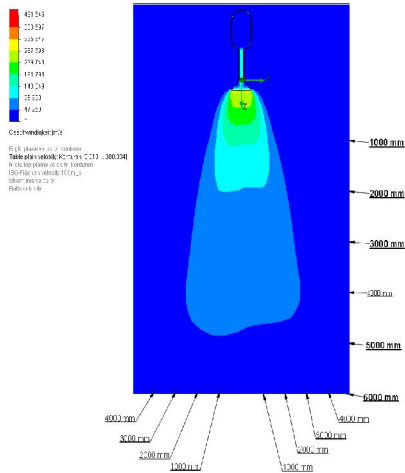
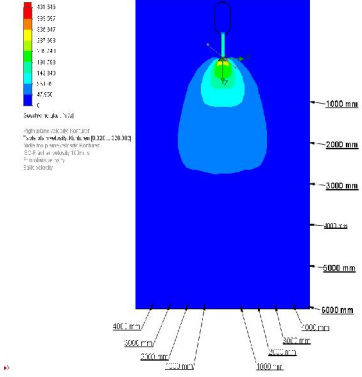
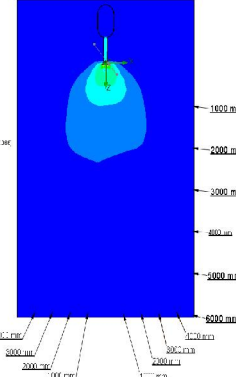
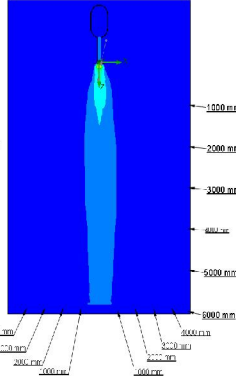
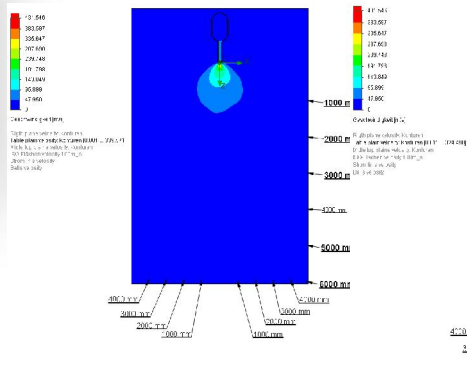




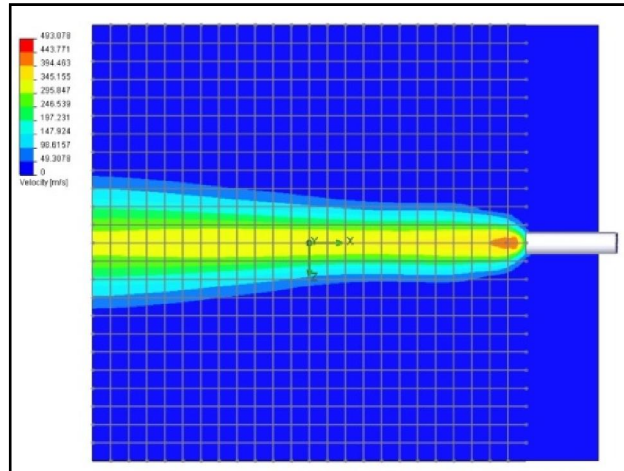
New “Nozzle Concept”

- 1.) Easy Installation (like a pipe nozzle)
- 2.) Wide Area of Influence (like a fan nozzle)
- 3.) Reduce/Eliminate Damage to surrounding refractory
- 4.) No entry required into the tower/cooler
- 5.) Eliminate improper alignment
- 6.) Easy inspection/ Replacement

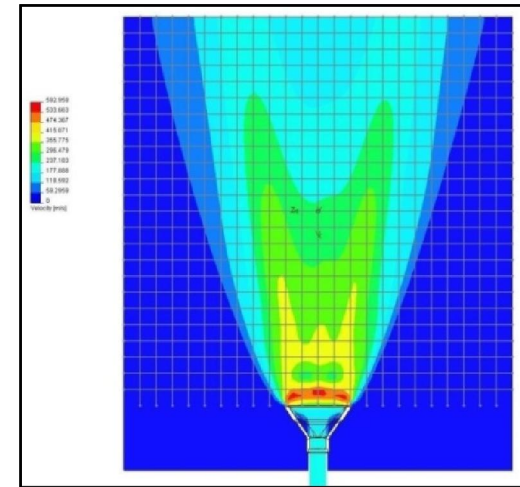
CFD Simulations



CFD Simulation & Physical tests



Standard Pipe Nozzle



Standard Fan nozzle



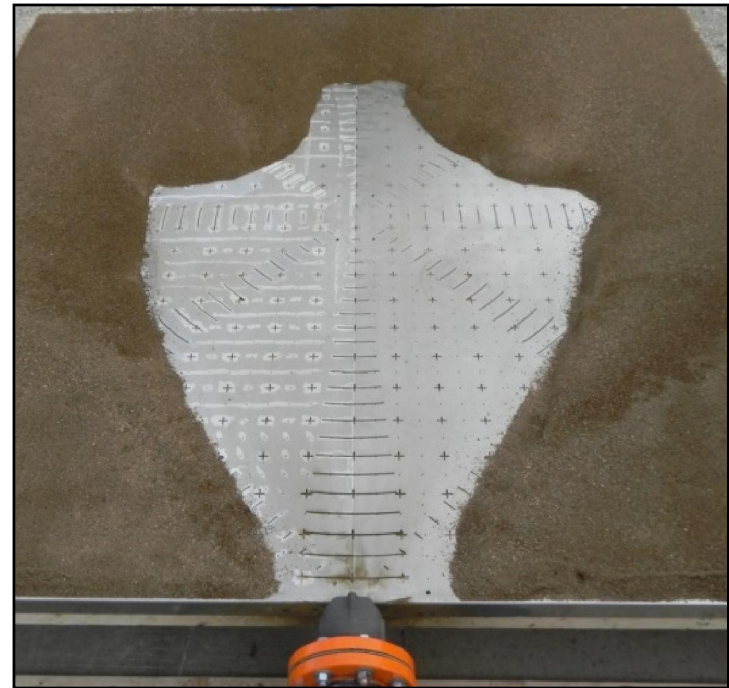
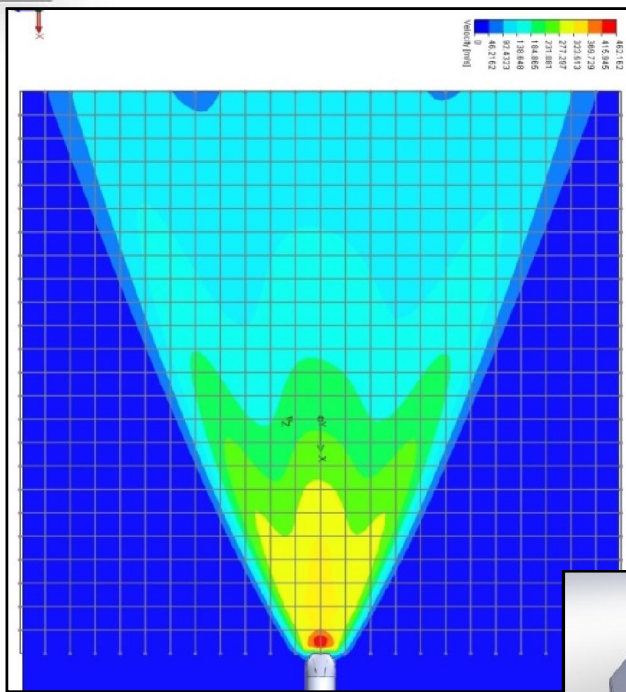
M2015
VIETNAM

24 Technical Symposium & Exhibition

CFD Simulation & Physical tests



New “Round Fan” nozzle



Directs the air flow



New “Round Fan” Nozzle



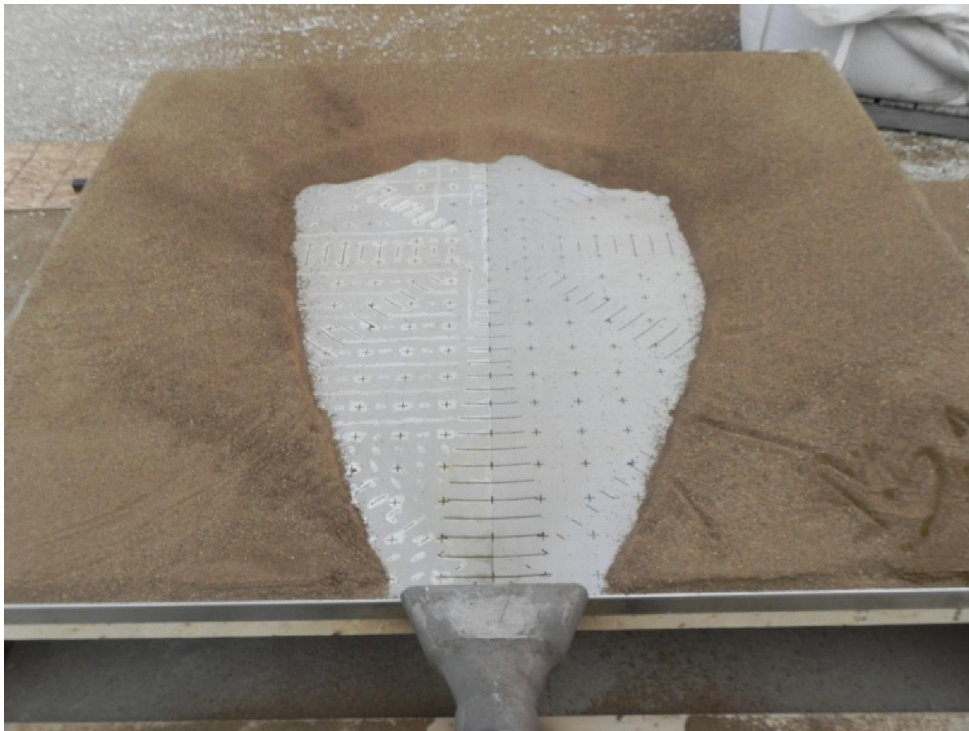


Standard vs. Round

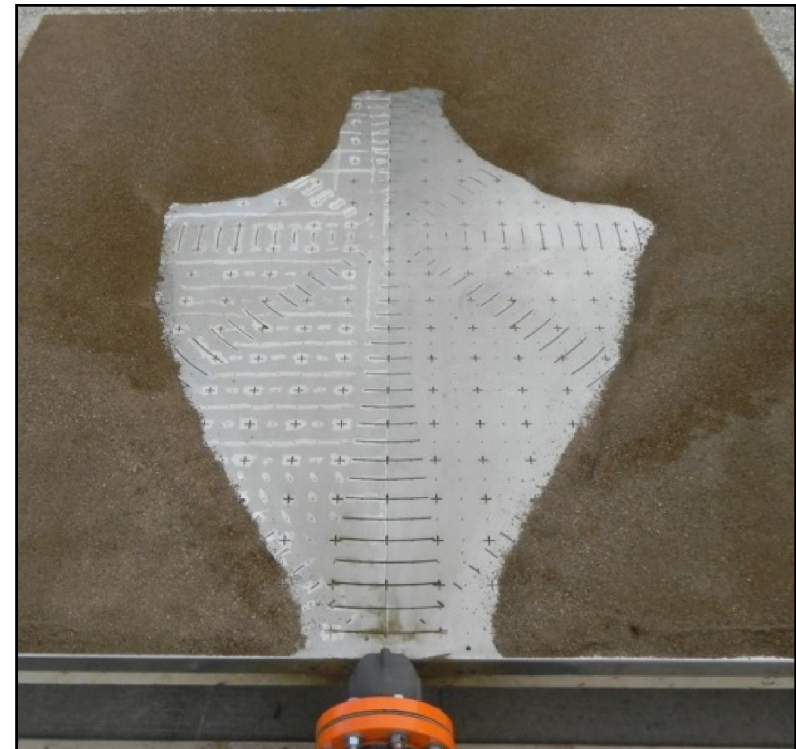




Area of Influence



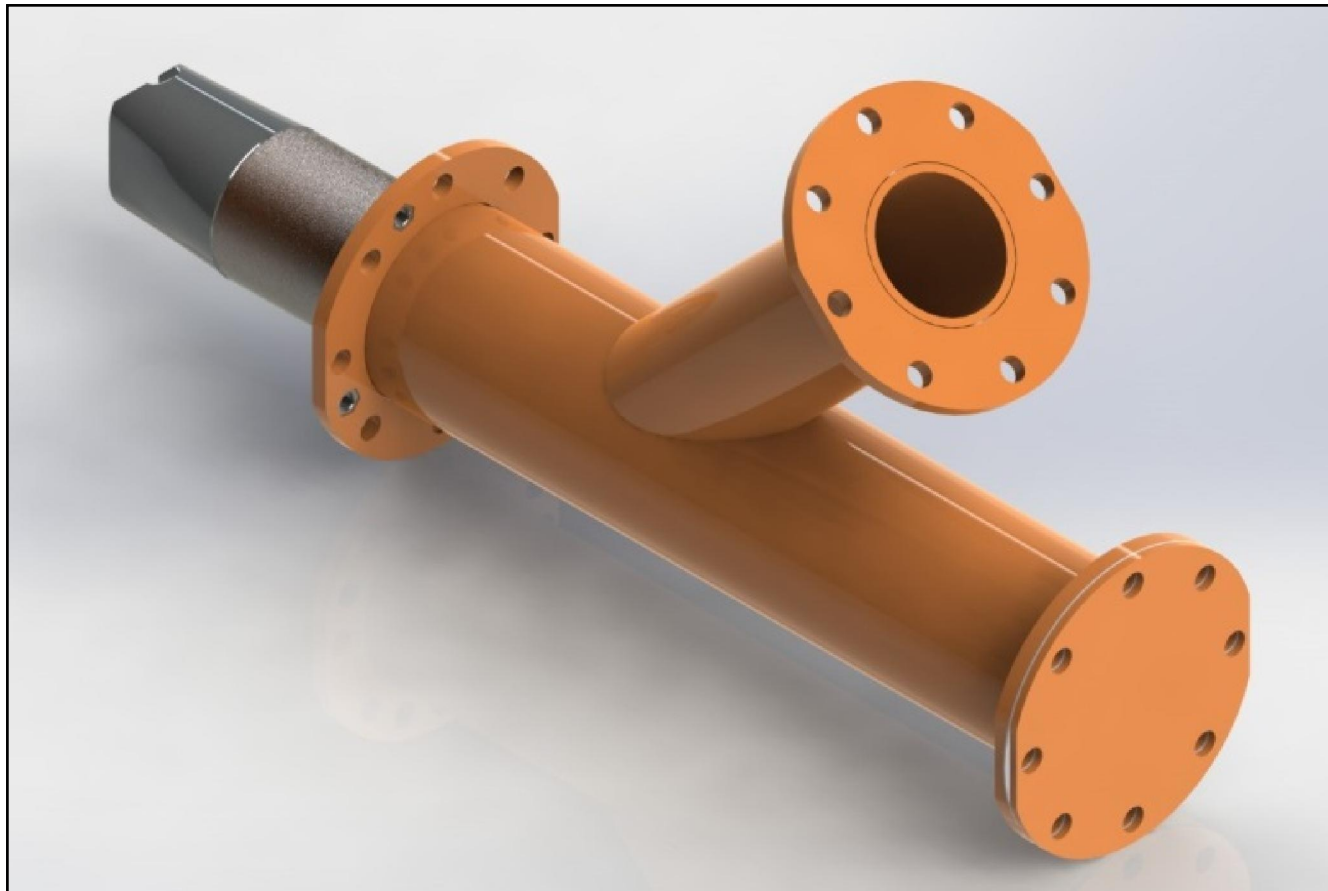
Standard Fan



Round Fan

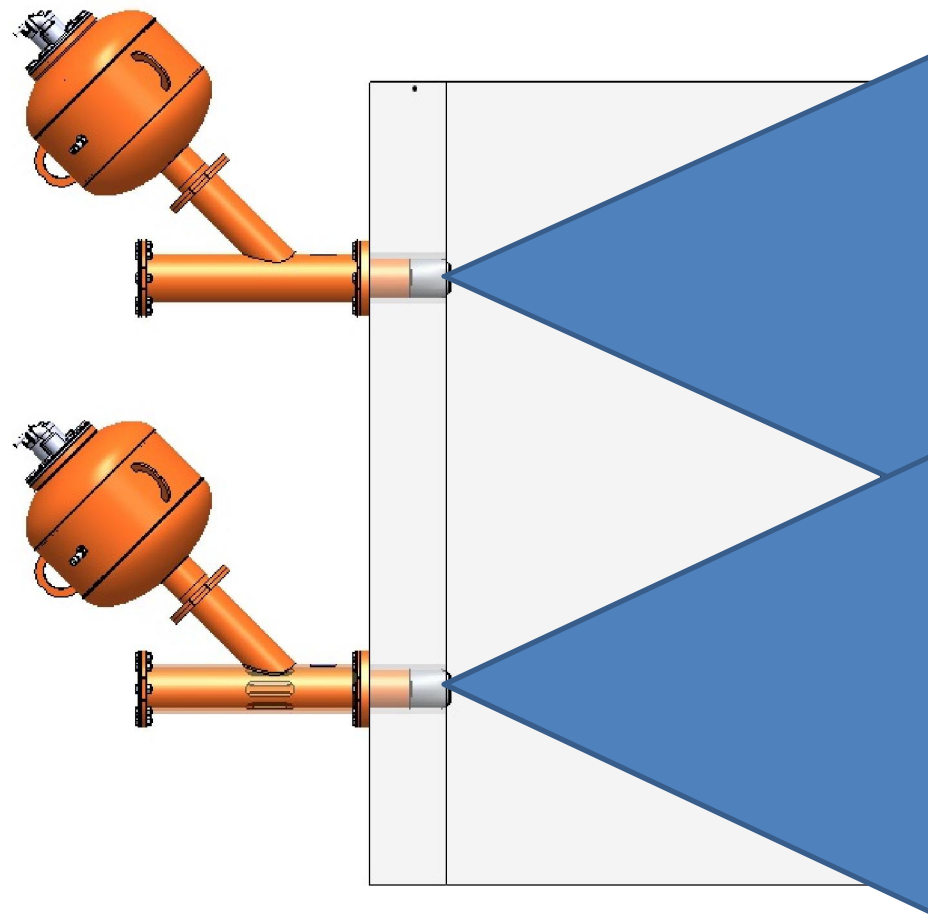


New Quick Change Nozzle



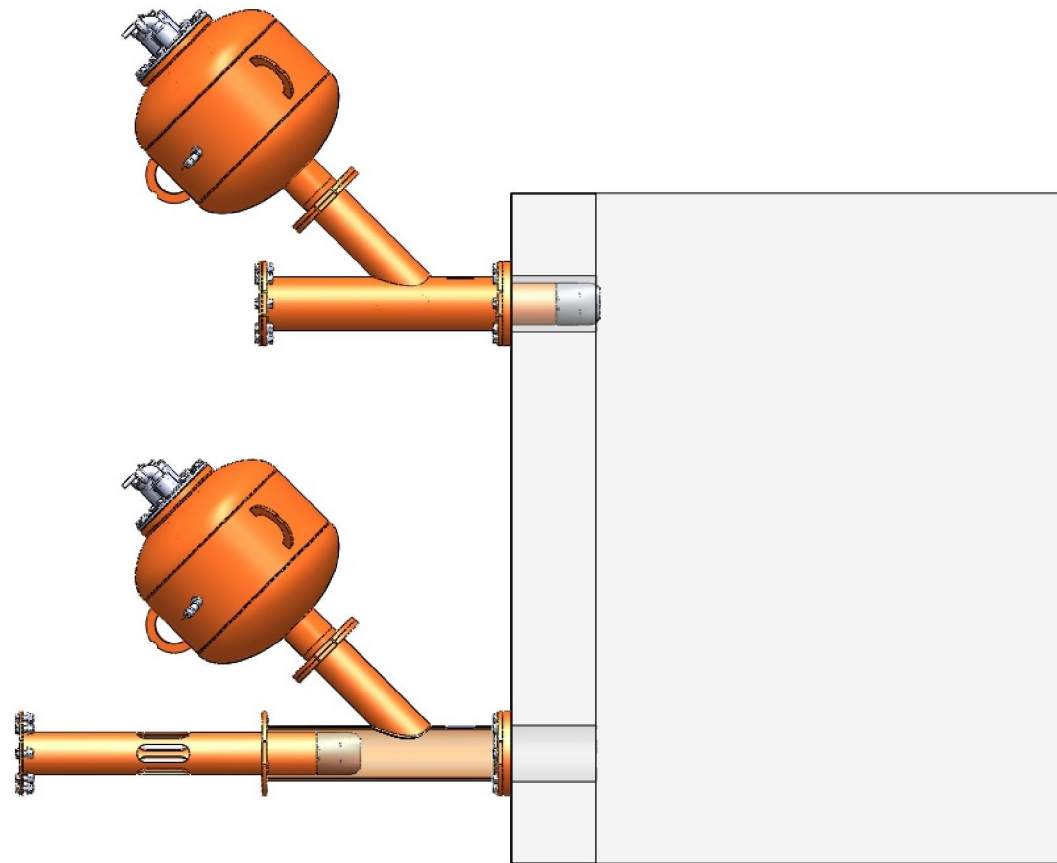


Quick Change Nozzle





Quick Change Nozzle



New Nozzle Installation





Final Installation



Removal & Inspection



Replacement



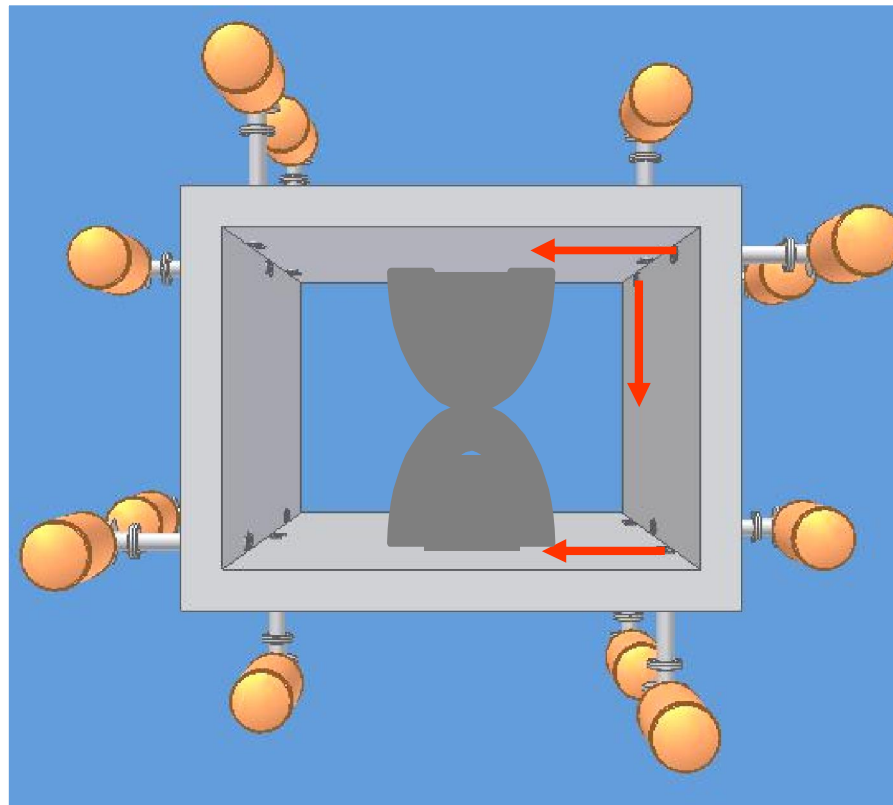


New Martin Quick Change Nozzle

- 1.) Easy Installation
- 2.) Wide Area of Influence
- 3.) Reduce/Eliminate Damage to surrounding refractory
- 4.) No entry required into the tower/cooler
- 5.) Eliminate improper alignment
- 6.) Easy inspection/ Replacement



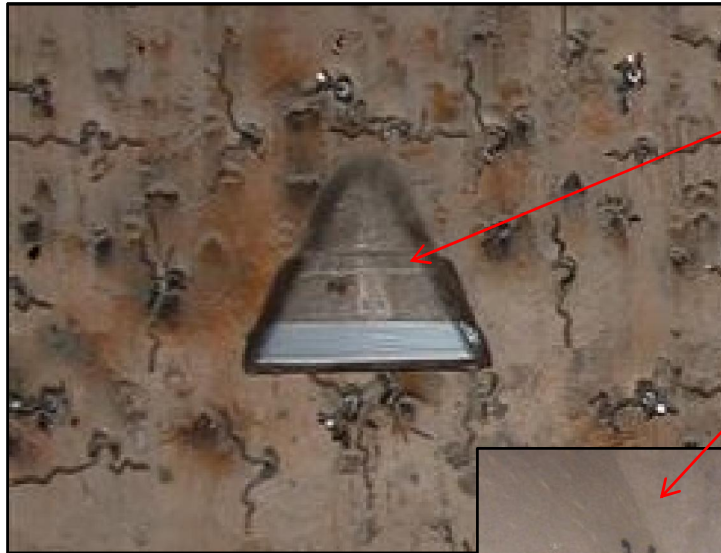
Cleaning riser duct walls



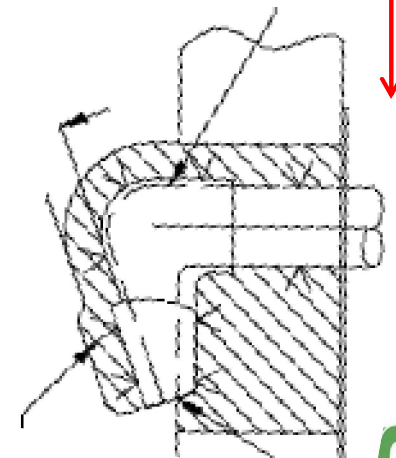
*Top View
(Looking Down the Riser Duct)*



OLD TECHNOLOGY: 90° Cast Alloy Nozzles



- Installed from inside the preheater
- Anchors welded to the nozzle
- Refractory attached to the anchors

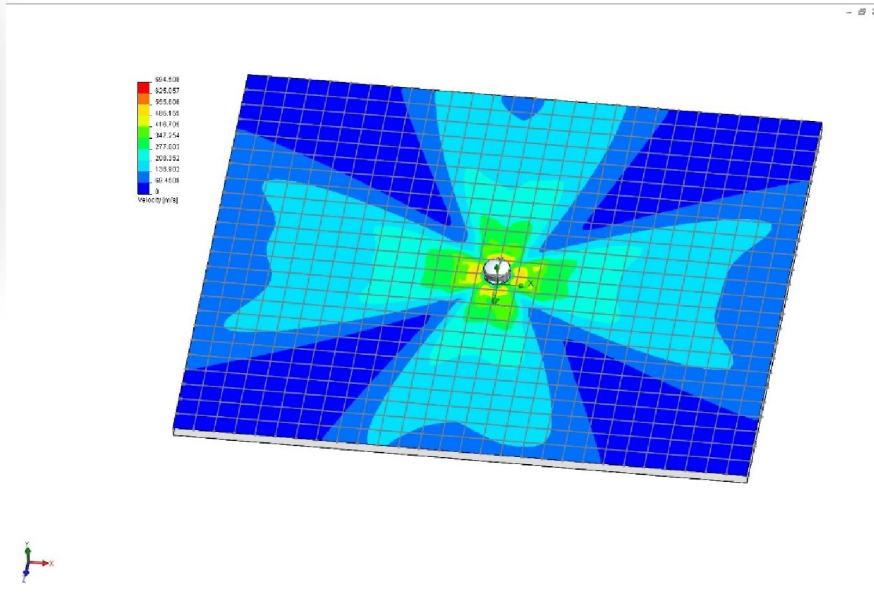




OLD TECHNOLOGY: 90° Cast Alloy Nozzles

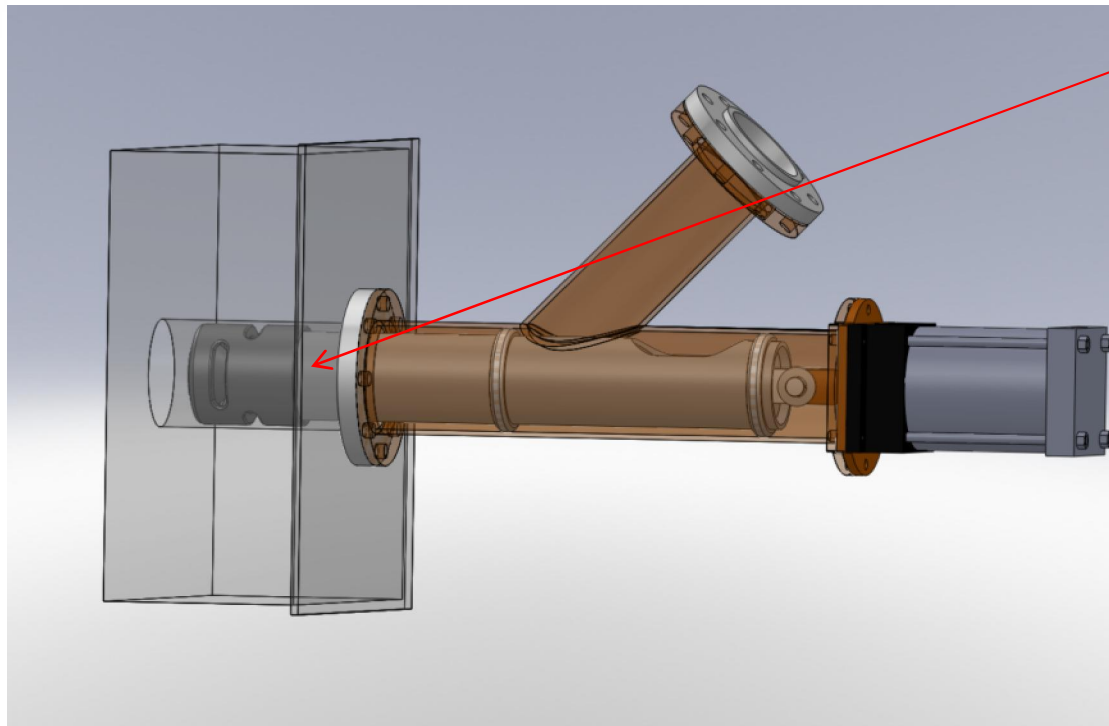


CFD Simulation & Physical tests





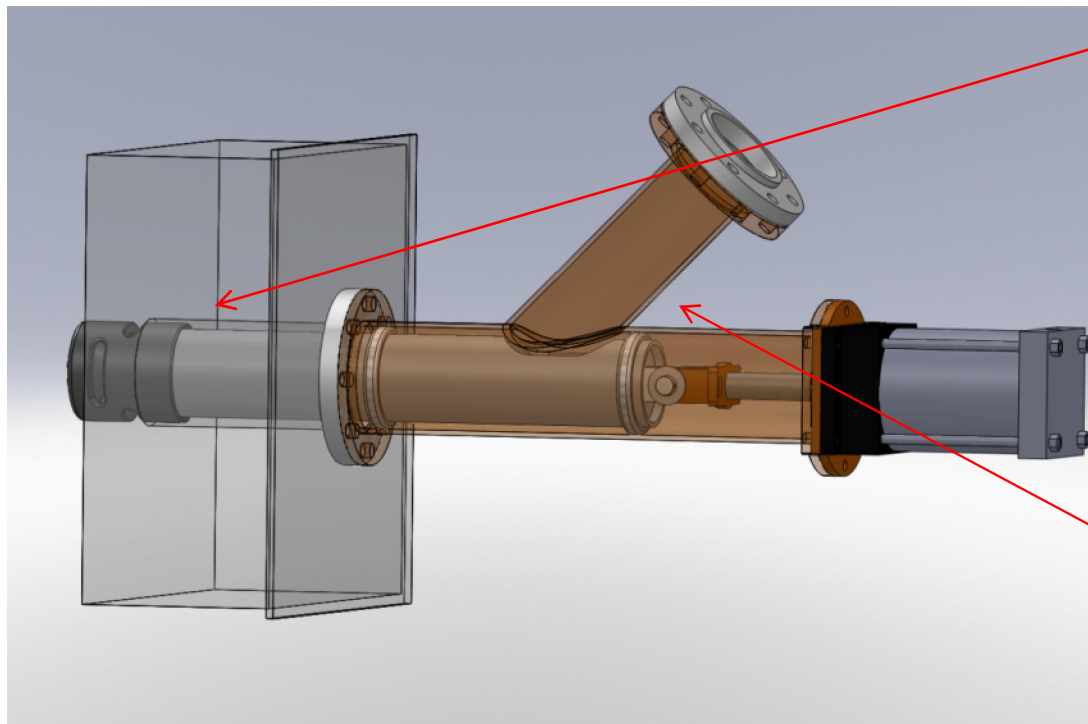
NEW TECHNOLOGY: Retractable Nozzle (360 Degree)



- When retracted, nozzle is recessed into refractory to protect the nozzle.



NEW TECHNOLOGY: Retractable Nozzle (360 Degree)



- Extended position projects nozzle beyond refractory to prevent damage
- When extended, nozzle provides 360 degree blast pattern
- Discharge port aligns with cannon discharge

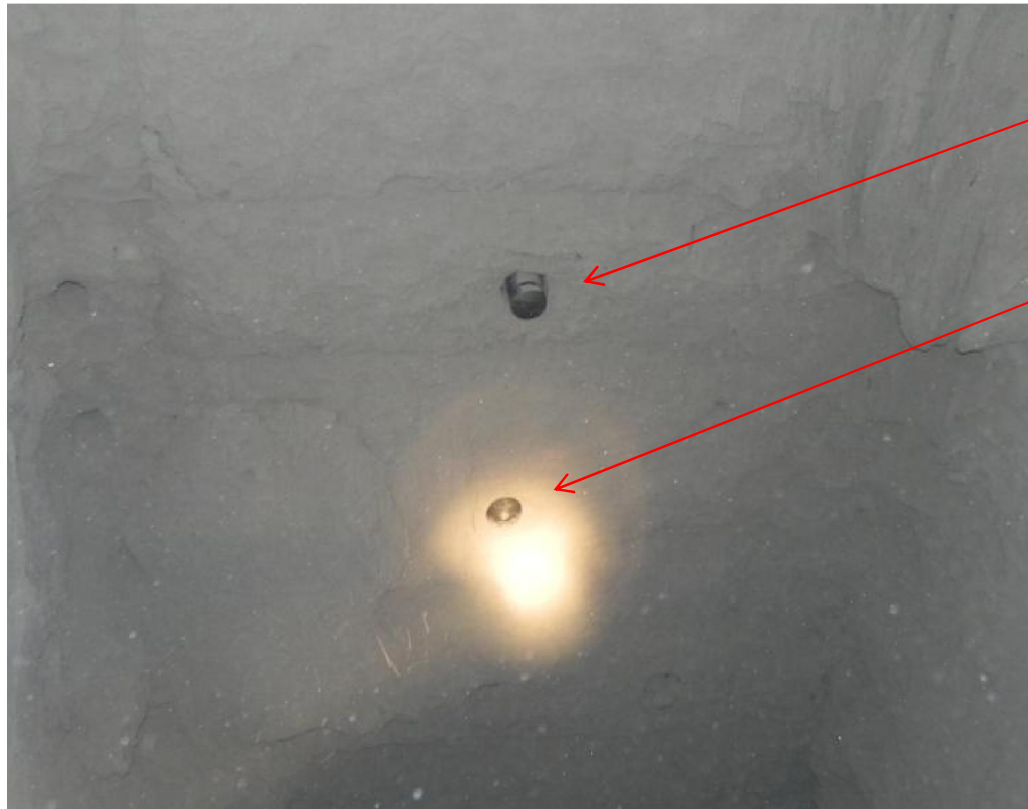


Retractable Nozzle Installed





Retractable Nozzle Installed

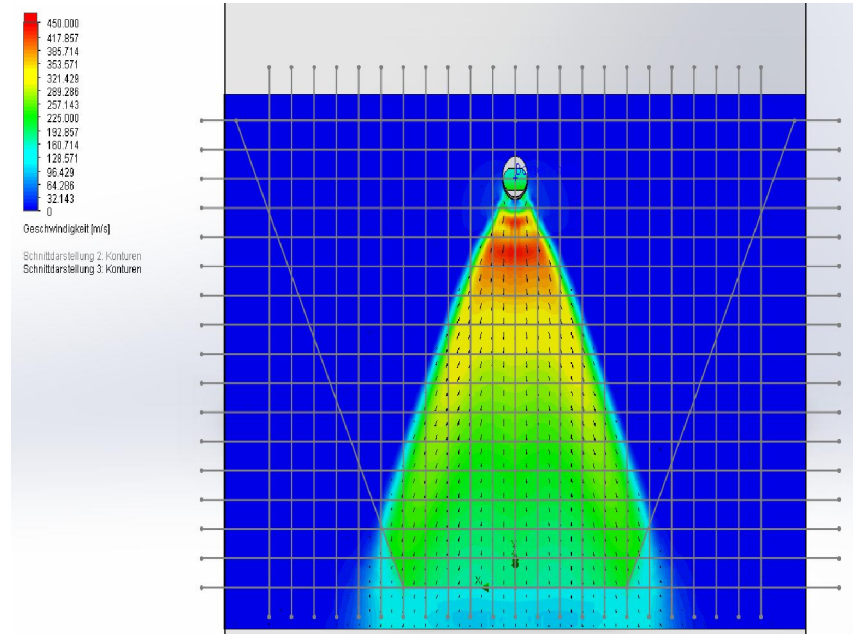
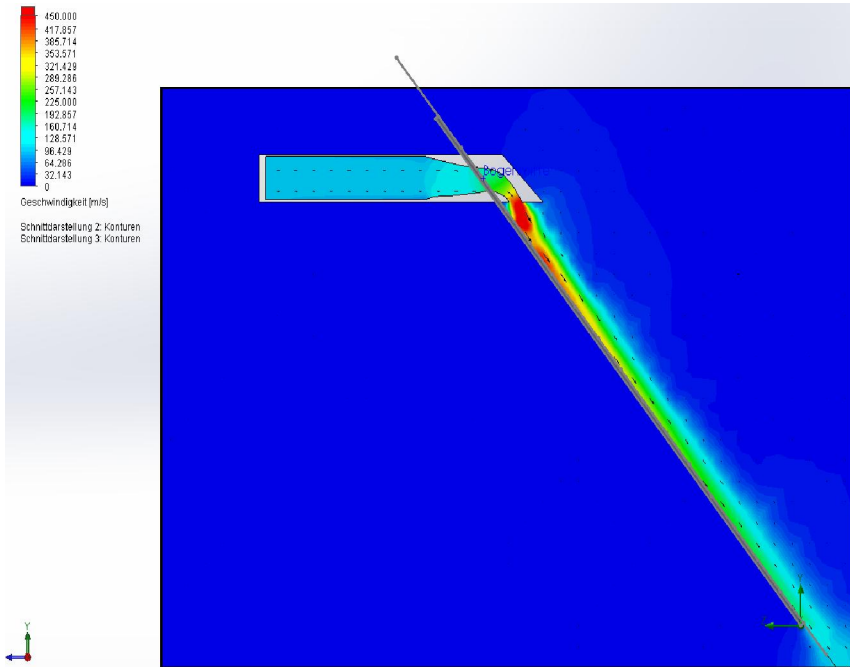


- Extended through the refractory
- Recessed into refractory

Inside view of the riser duct

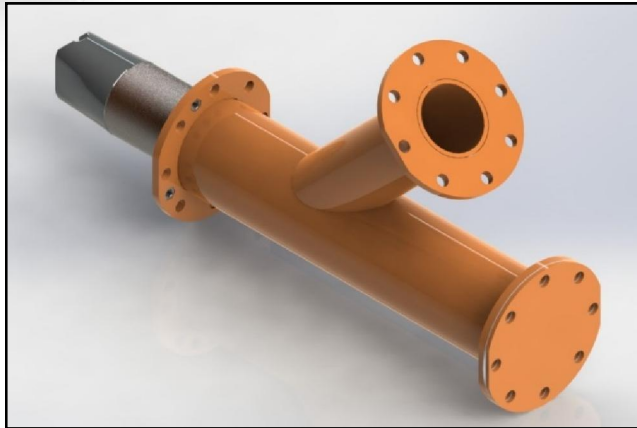


Coming Soon: Kiln Inlet nozzles

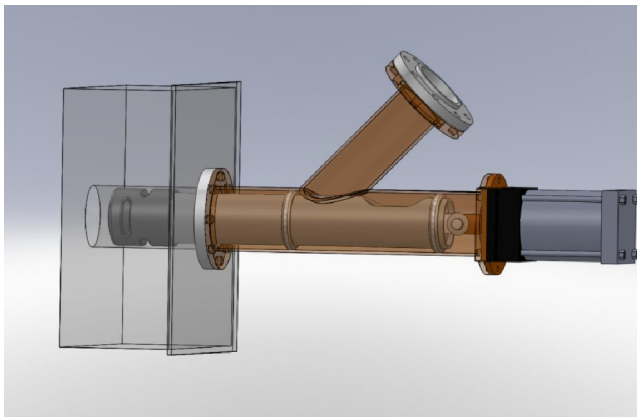




In summary:



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Questions





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Advancements in Air Cannon Nozzles Do Improve Pryoprocess Performance

THANK YOU!



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