BARRACUDA VIRTUAL REACTOR®

SOFTWARE TO MINIMIZE PARTICLE EROSION DAMAGE
Understanding mechanisms and design choices

IMPACT PRONE SURFACES

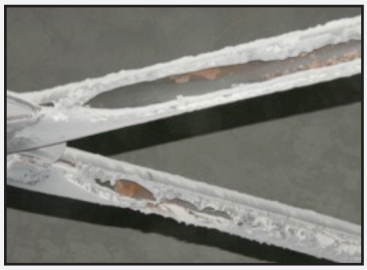
- Cyclones and diplegs
- Heat exchanger tubes and other heat transfer surfaces
- Conveyance and transfer lines
- Termination devices
- Reactor and regenerator walls
- Flue gas lines and components
- Spargers and distributors
- Slide valves
- Structural supports and bracings
- Standpipes and dense-phase conveyance systems

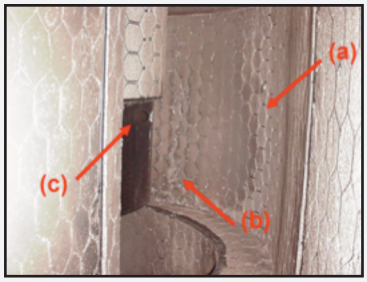
Regions of high erosion concern

Commercial FCC Regenerator

THE IMPORTANCE OF DISCRETE PARTICLES

- Erosion results from particles impacting surfaces
- Erosion is a function of the particle mass, velocity, angle of impact, and material type
- Requires discrete particles to capture erosion behavior
- Account for different erosion mechanisms for bare metal versus refractory-lined surfaces
- Predict where maximum erosion will occur based on geometry and operating conditions
- Provide a quantitative assessment of wear performance by comparison to baseline studies or field inspection data





Longer life = greater reliability = higher profits

cpfd® COMPUTATIONAL PARTICLE FLUID DYNAMICS

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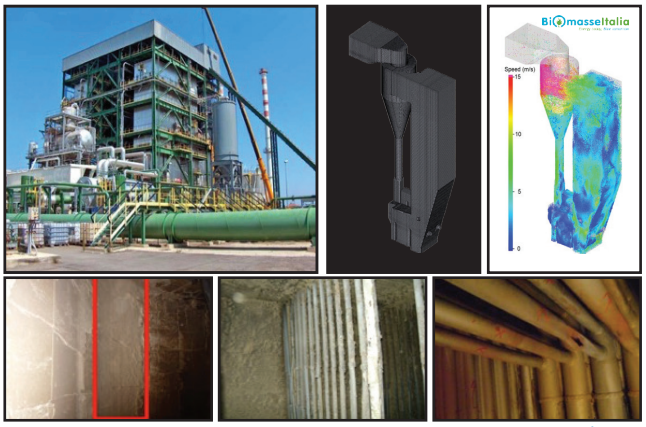
BARRACUDA VIRTUAL REACTOR®

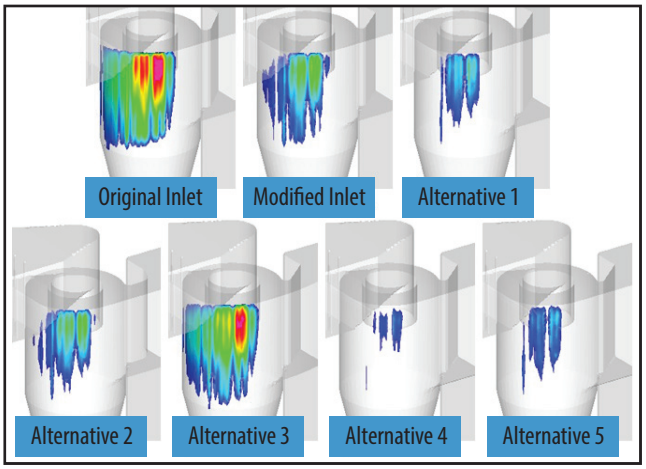
SIMULATE > UNDERSTAND > OPTIMIZE

CFB COMBUSTOR EROSION EXAMPLE

Barracuda Virtual Reactor was used to understand the particle flow patterns in a biomass-fueled CFB combustor to help address serious erosion issues impacting reliability.

The model agreed with historical erosion data and was used to downselect between multiple alternatives for redesign.



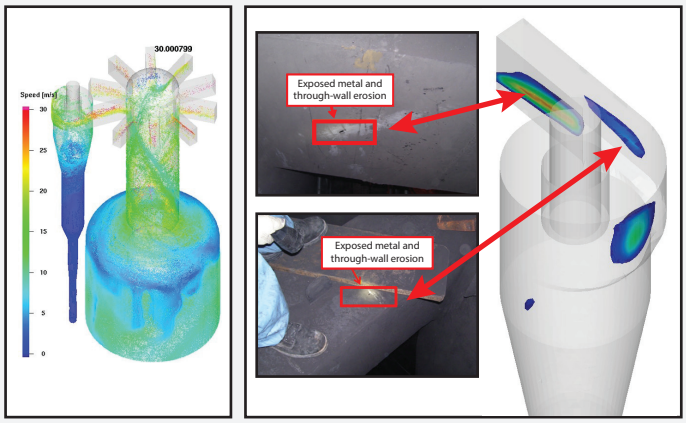


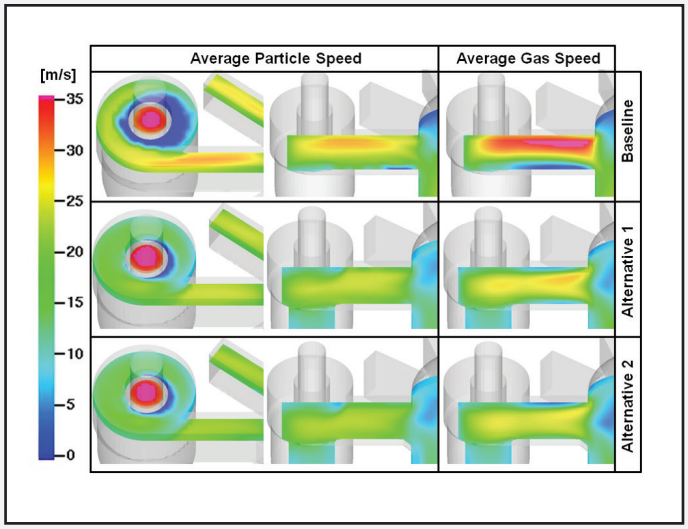
This example is courtesy of Biomasse Italia, Strongoli, Italy

For more information see Blaser, P., and Corina, G. "Validation and Application of Computational Modeling to Reduce Erosion in a Circulating Fluidized Bed Boiler", International Journal of Chemical Reactor Engineering, 10, A51, (2012).

FCC REACTOR CYCLONE EROSION EXAMPLE

The Barracuda Virtual Reactor model was validated against inspection report data and used to understand the root-cause of excessive erosion in an FCC Reactor cyclone system, before being used to evaluate alternative hardware options.





For more information see Blaser, P., Thibault, S., and Sexton, J. "Use of Computational Modeling for FCC Reactor Cyclone Erosion Reduction at the Marathon Petroleum Catlettsburg Refinery", Proceedings of World Fluidization Conference XIV: From Fundamentals to Products, 347-354, (2013).

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