CFD of Biomass Combustion

– present applications

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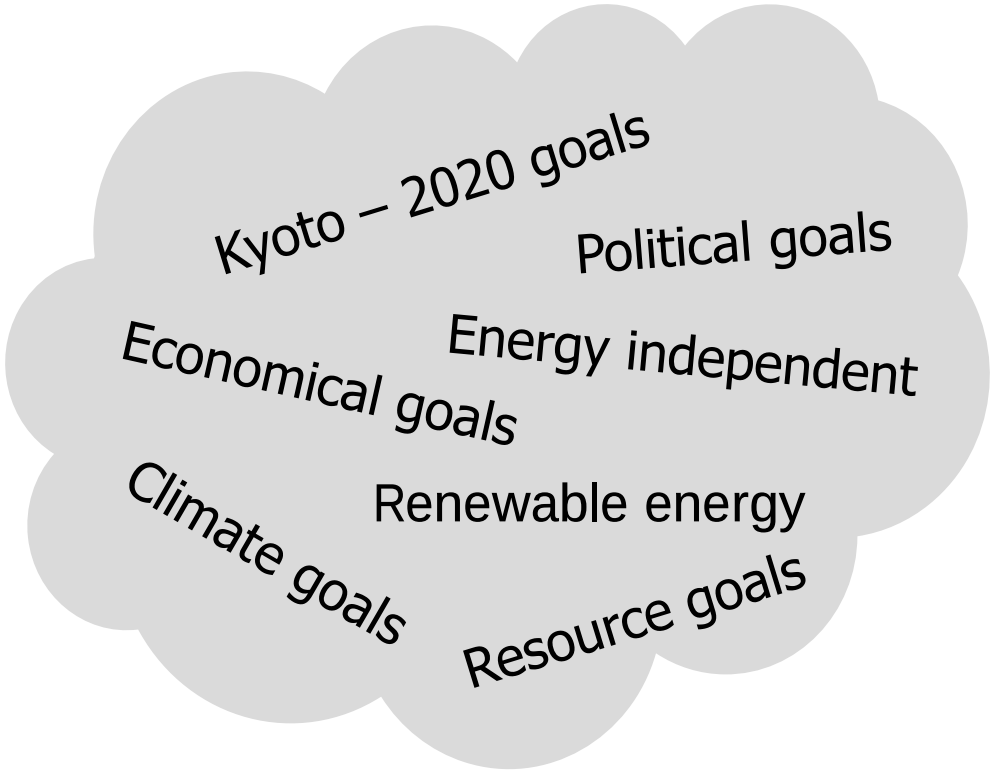
Topic

An industrial oriented use of CFD to solve problems, improve solutions and increase the value from biomass

Improving the potential in Biomass



YOUR personally impact ?

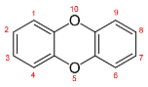
CFD model extensions

Heat transfer

Heat transfer mechanisms
Thermal conductivity

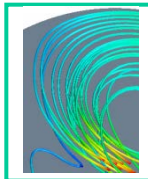
Deposit formation

Ash transport
Deposition mechanisms
Particle sticking propensity



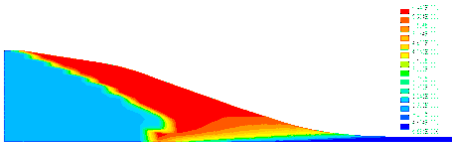
Production of emissions

CO , NOx , KCl



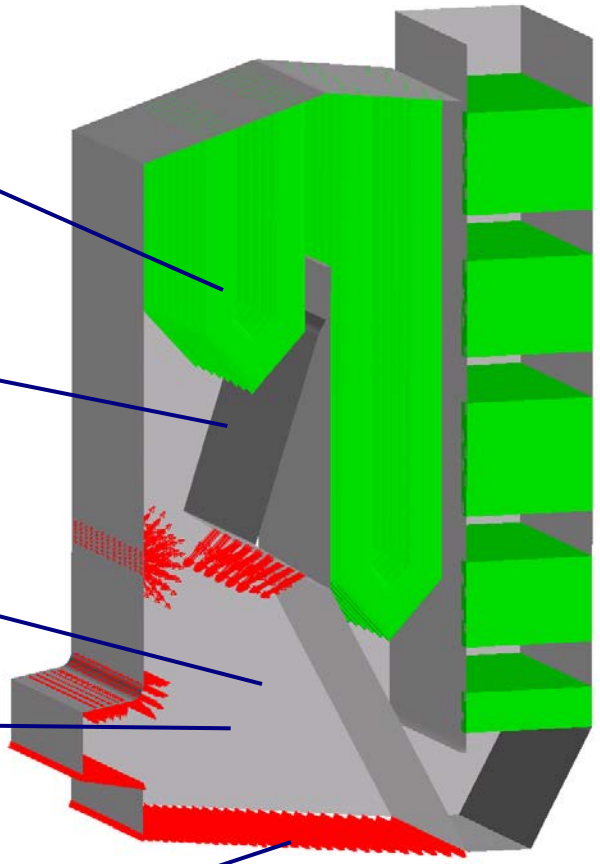
Particle transport

Large non-spherical particle trajectories
Particle-fluid interaction

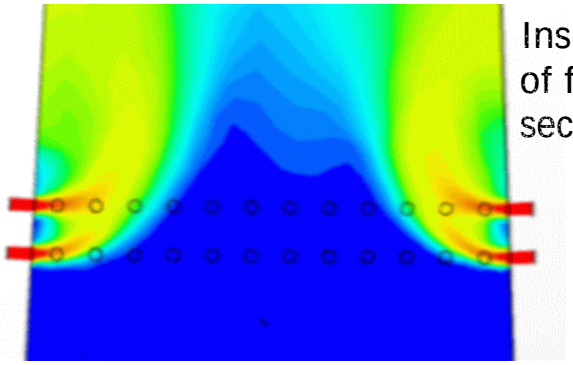


Combustion on the grate

"Walking column" model
Ash formation
Ash release rates

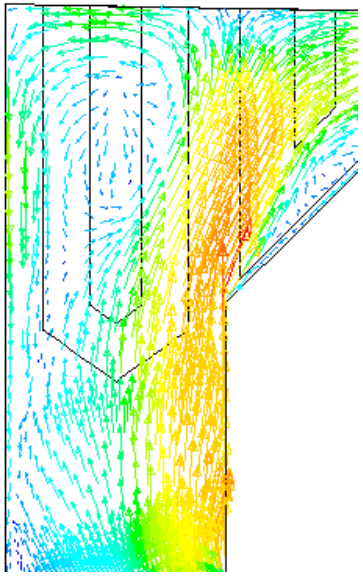


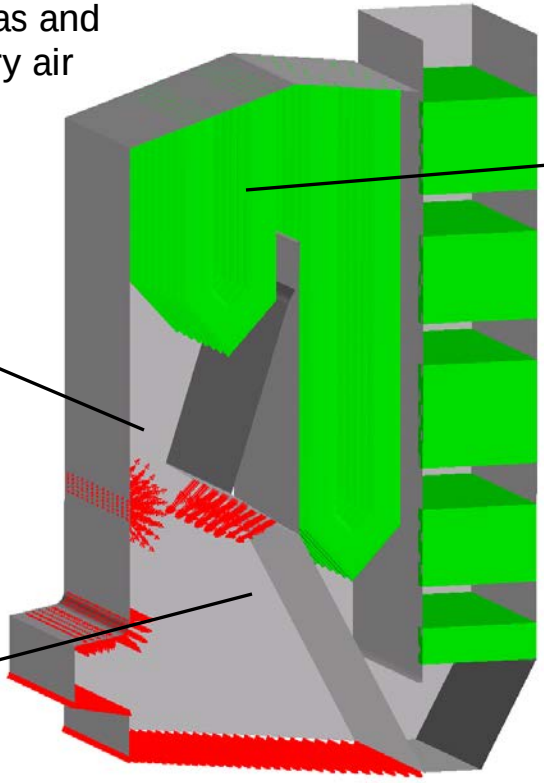
Identifying combustions problems by CFD



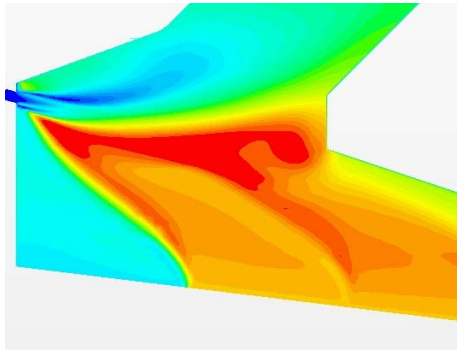
Insufficient mixing of flue gas and secondary air

Limited heat transfer due to uneven flow conditions

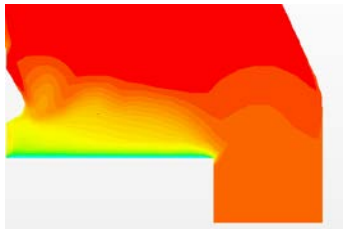




Damages on wall due to excessively high temperature

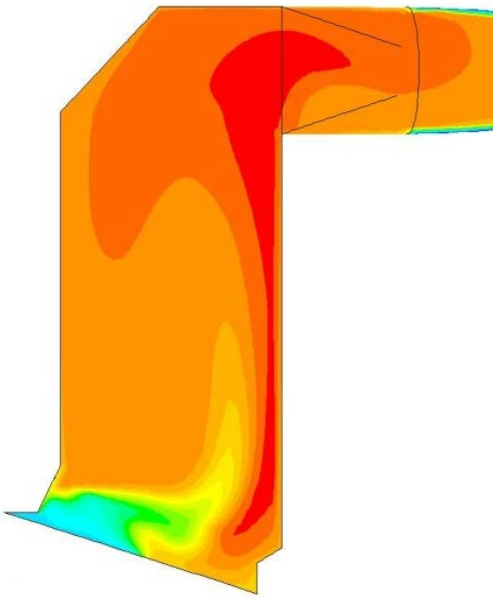


Risk of melting ashes due to high temperature in ash pit

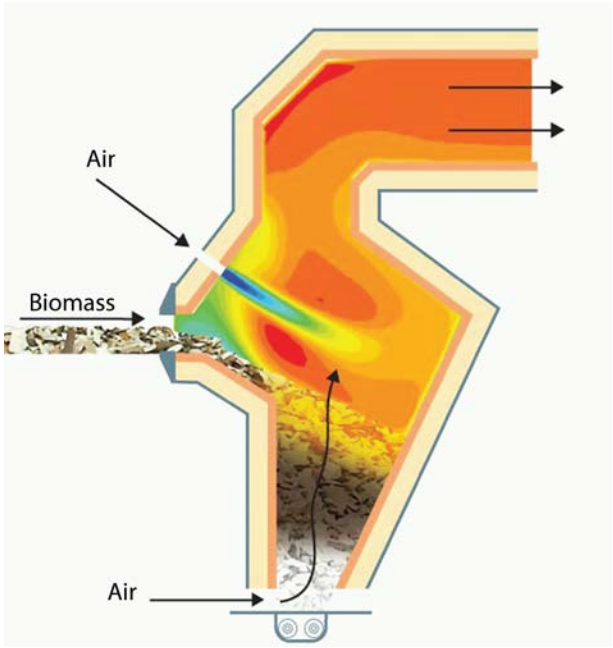


Next generation of biomass furnaces - designed by CFD

Design of 2 MW biomass Furnace
Client: Dall Energy



Initial design



Final design

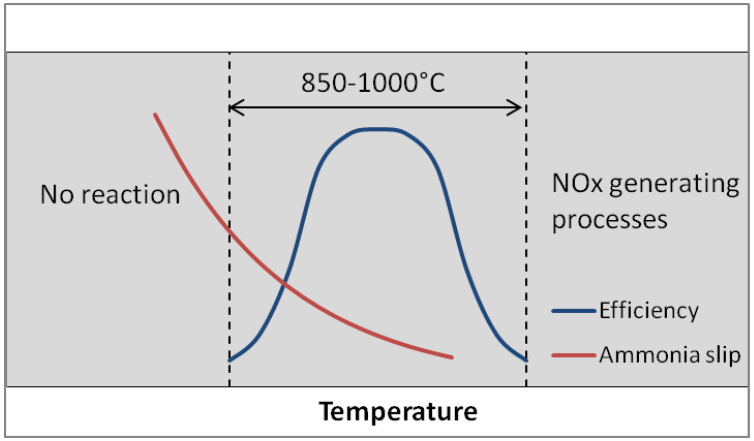
Component	Out of Furnace
Temperature	950-1000 C
Dust	20 mg/Nm3
CO	<2 mg/Nm3
NOx	175 mg/Nm3

Result

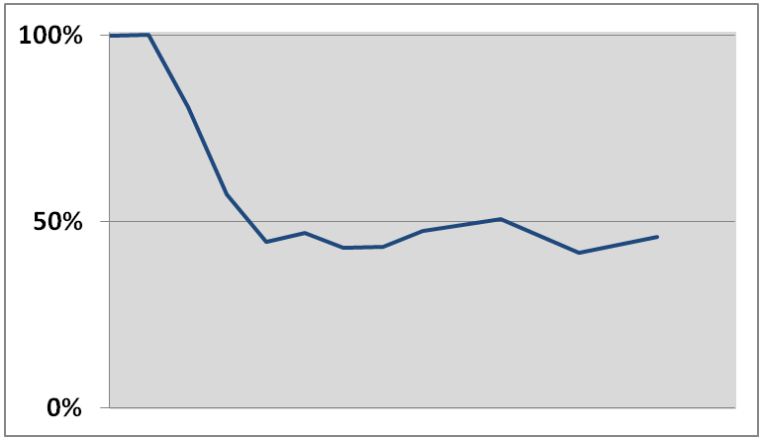
Air pollution

NOx Reduction by SNCR

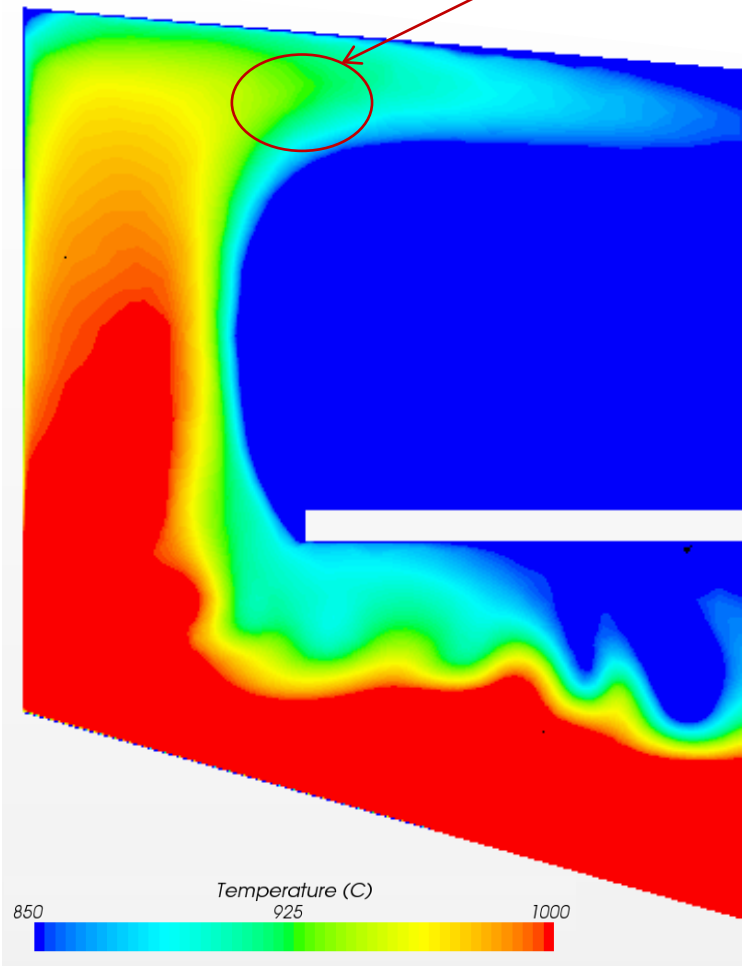
SNCR Efficiency



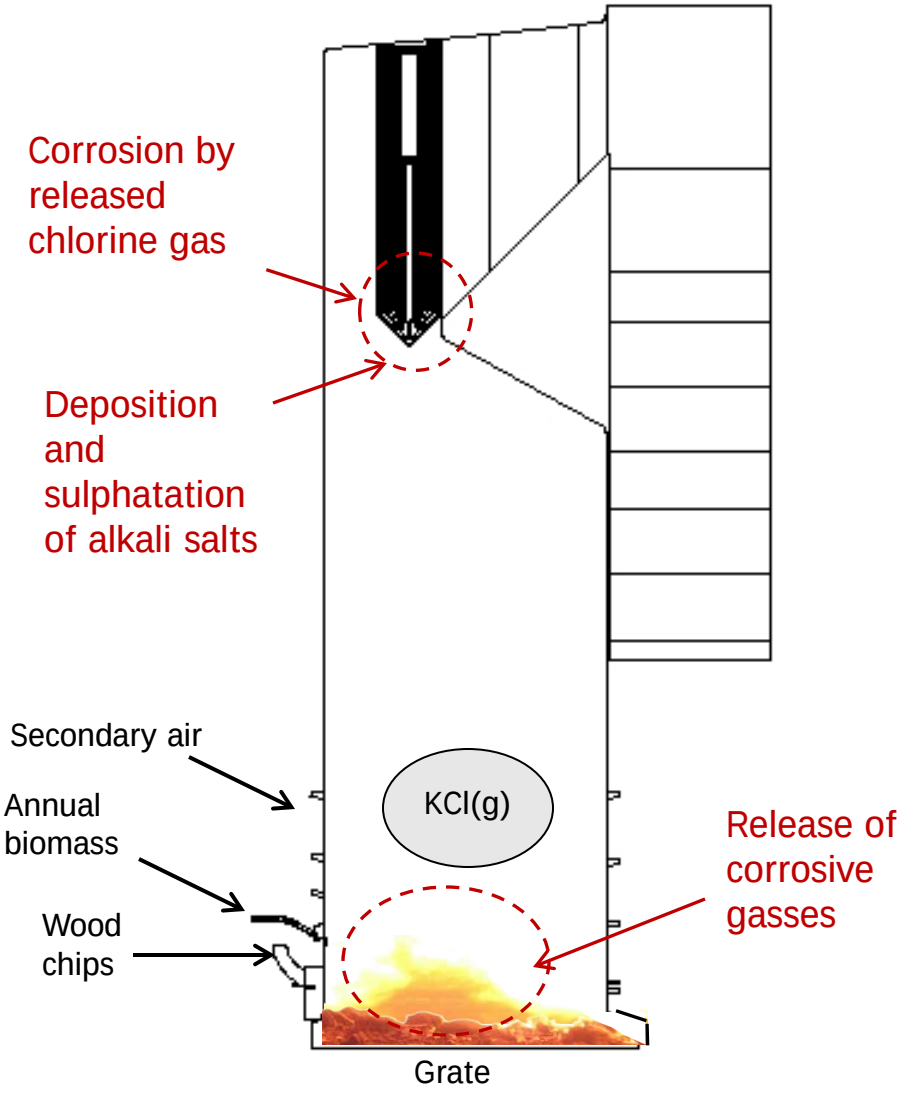
Resulting NO_x level in fluegas



SNCR position

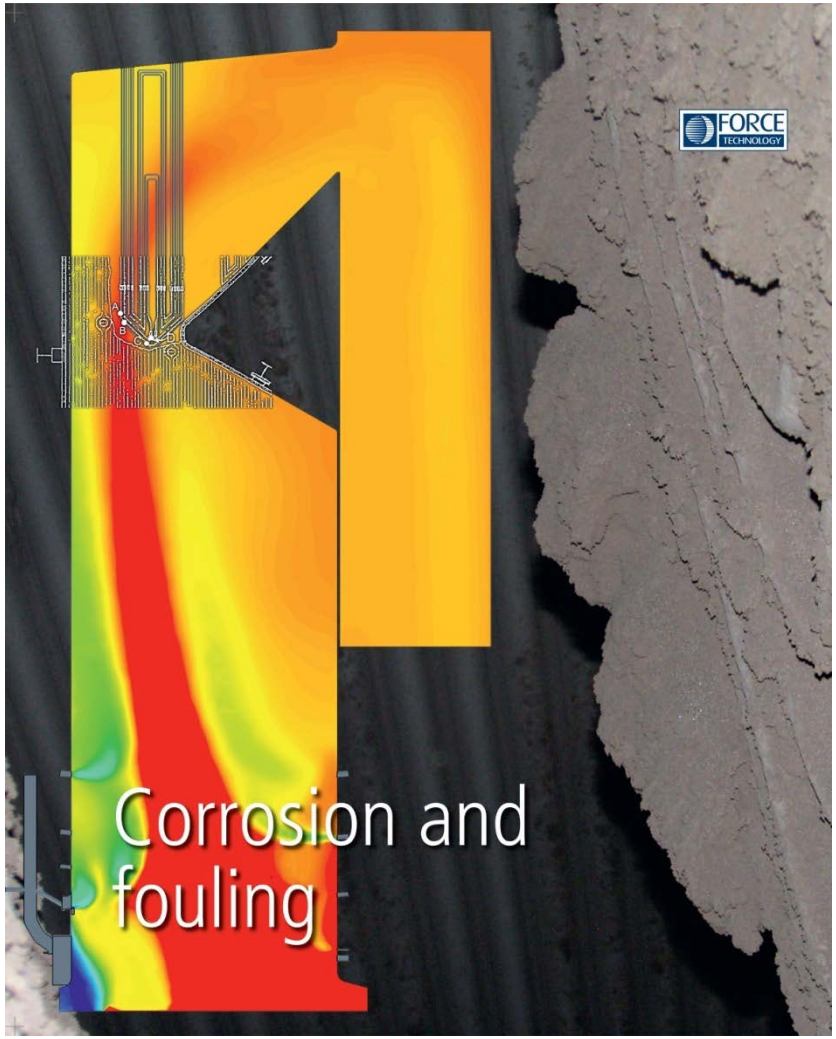


Corrosion Prediction

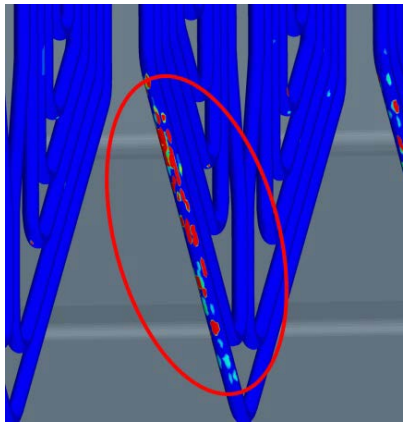


Corrosion Risk Evaluation

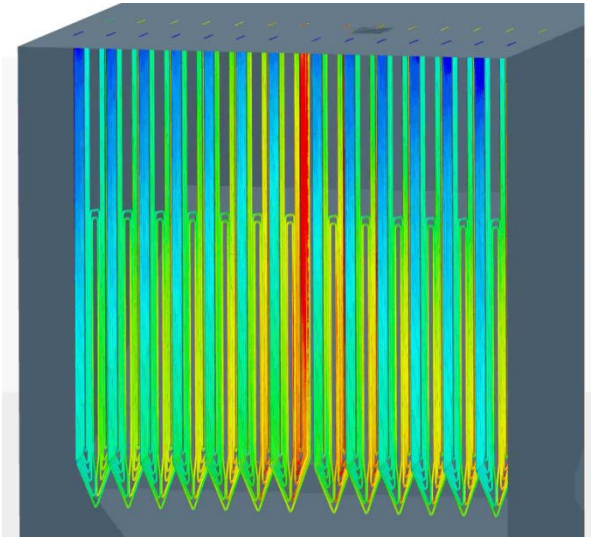
KCl concentration



Deposition of particles



Risk based on metal temperature



The Core message

CFD can help you to investigate and visualise problems which otherwise was impossible to measure or find.

CFD can assist you in optimising flow and combustion from biomass.

CFD provides you with a powerful tool to reach your personally goals within biomass.