

# **STEAMAX – A Novel Approach for Corrosion Prediction, Material Selection and Optimization of Steam Parameters for Combustion of Bio and Waste Derived Fuels and Fuel Mixtures**

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## **ABSTRACT**

Concerns about the environment, limited natural resources and economical aspects have in recent years increased the interest in the use of bio- and waste derived fuels for power production. The variety of bio- and waste derived fuels used in power production today is very broad, including wood chips, bark, forest residue, demolition wood, agricultural waste, sludges and municipal solid waste (MSW). Fluidized bed combustion is a commonly used technique due to its fuel flexibility low emission levels.

The demand for higher efficiency and reduced emissions combined with the varying composition and quality of bio and waste fuels is however a big challenge. Bio and waste fuels often contain high amounts of alkali metals and chlorine, often in combination with low amounts of sulfur. These qualities increase the risk for operational problems such as corrosion, fouling and bed sintering.

When designing and utilizing boilers for bio and waste derived fuels thorough knowledge about the fuel composition and the behavior of the fuel in the combustion process is needed. Also the interaction of different fuels in co-combustion is essential. Difficult fuel fractions are often cheap, and being able to burn them in a suitable fuel mixture is highly interesting from an economical point of view. The broad variety of fuels and fuel mixtures burned today require tools for optimization of combustion parameters, boiler design and superheater materials.

This paper presents a calculation tool, STEAMAX, developed by Metso Power for calculation of corrosivity, material selection and optimization of steam temperature for a given fuel or fuel mixture. The calculation method is based on advanced multi-phase multi-component equilibrium calculations using the commercial software ChemSheet. The input to the calculation is the fuel composition. The STEAMAX tool has been verified with a large number of existing boilers and successfully used in the design of several new boilers and boiler re-builds.