Performances Modelling Of A Twin Fluid Internal Mixing Nozzles For Industrial Burners

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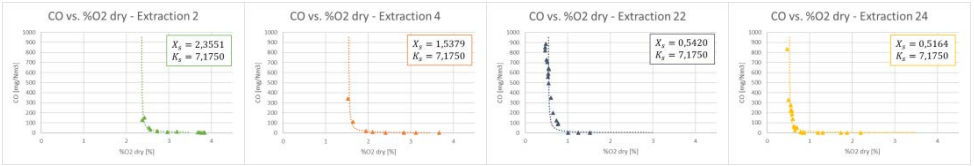
Abstract
At the Centro Combustione Ambiente facility, within the "BE4GreenS" R&D project, sponsored by Regione Puglia using European founds, a series of test is being performed to analyze the performances of different Heavy Fuel Oil burner guns and injection nozzles, by varying the operative conditions and some design parameters. With the aim of improving the parameters design, semi-empirical models are being developed to predict the system performance. The emission of NOx and CO are measured and displayed as a function O_2, the residual oxygen content in the exhaust gasses, that depends on the tunable air excess being varied for each test series. The CO content data are then interpolated by an hyperbolic function under some hypotheses and simplifications, the first one being that air excess is always guaranteed, otherwise for an under-stoichiometric combustion the CO asymptote should be backward inclined instead of vertical but. So two parameters should be determined experimentally for each test series *i*: the position of each vertical asymptote $O_{2lim,i}$, and the curvature of each hyperbole defined by the parameter K_i, in the function $(O_2 - O_{2lim,i}) \times CO = K_i$. By assuming also that for similar combustion systems, e.g. the same furnace and the same gun with similar flame asset and burned fuel, the parameters K_i, specific for each test series *i* can be replaced by a unique parameter K for that set-up, only the specific $O_{2Lim,i}$ have to be determined for each series. This can help in reducing the total number of tests, and furthermore it allows to reverse the function, for example to calculate the air excess that will keep the CO content under a given limit.



A similar linear model for the NOx can then be used to complete the simulation and help in tuning-up the system operative parameters.