November 23, 2012 saw the Opening Ceremony of Danieli Centro Combustion’s new Research and Test Center. Present at this event were local authorities, the press, top management from the Danieli Group and officials of the University of Genoa. The new research centre was installed in Hangar No. 1 at the Savona Campus area and totally upgraded by Danieli Centro Combustion. This Center will allow testing of various combustion system prototypes to accomplish significant reductions in fuel consumption, and also the negative impact on the environment, with the objective being to make highly efficient and trustworthy innovative systems available to industry.

Targets are:
> Reduced atmospheric emissions (NOx, CO) in compliance with international rules and regulations;
> Maximized use of low-cost fuels (coke-oven gas, blast furnace gas, producer gas and heavy fuel oil);
> Reduced combustion consumption and CO2 emissions;
> Flame shape optimization and improved temperature uniformity.

A significant investment was made by Danieli in this project, and will give added value to the technological competences already established by the Group alongside the expertise of the Polytechnic.

The test center’s configuration is as follows:
One main pilot furnace with 3,000 kW thermal power able to test lateral or radiant burners with diffused or flat flames, flameless combustion, regenerative burners with a furnace temperature ranging from 1,000 °C to 1,350 °C and flame temperatures that may vary from 1,500 °C to 2,200 °C and above.

The furnace is equipped with a draught stack from which residual heat from waste gas is used to heat combustion air to 600 °C via a heat exchanger, which has been fitted inside the stack. A closed-circuit camera appropriate for use at high temperatures constantly controls the
flame image when burner power varies. A series of ceramic thermocouples and optic pyrometers allow detection of flame temperature, while a waste gas analysis system constantly measures NOx, SOx, CO, CO2, etc. To simulate thermal absorption of a feedstock in an industrial furnace, the chamber is fitted with a water-cooled pipe system that is connected to a closed-circuit cooling tower; this system allows continuous recycling of industrial water and has no negative effect either on the environment or on the University of Savona’s water supply. A second pilot furnace has been dimensioned to accommodate installed thermal power ranging from 30 to 500 kW and small, high-speed radiant burners, auto-recuperative burners and our free-flame or radiant tube burners. This furnace is capable of reaching chamber temperatures quickly, similar to specific industrial applications (900 - 1,200 °C). The test center’s plant design allows connection to auxiliary tanks to simulate both high-energy combustion gas values (LPG 20,000 - 28,000 Kcal/Nm³) or extremely low energy values (BFG 750 kcal/Nm³, PG 1,200 kcal/Nm³, COG 4,000 kcal/Nm³) deriving from primary steel processes with integrated production cycles.