Success Story

AIR LIQUIDE, Jouy-en-Josas, France

OVERVIEW

- **CUSTOMER**: Air Liquide Combustion Research Center develops specific combustion burner technologies with air and / or oxygen.
- **CHALLENGE**: Optimize the drop size inside the boiler to improve combustion efficiency.
- **SOLUTION**: Equip one atomization bench with Sofraser's MIVI 9601 inline viscometer.
- **RESULTS**: Significant improvement of operating modes in boilers' injector designs and in combustion fuel renewal.

Investigating Spray Properties

Air Liquide Combustion Research Center (CRCD) works for Air Liquide group on research & development projects, which focus on using combustion technologies in order to reduce CO_2 emissions and increase industrial plant efficiency. In this context, an industrial-scale atomization bench (ALISA) is developed by Air Liquide in order to evaluate and optimize aspects such as the set-up, operational conditions, and spraying characteristics of an oil atomizer.

To develop efficient atomizers, it is crucial to understand each characteristic of the liquid fuel atomization phenomenon. Atomization quality depends on the atomizer's operating conditions and on fuel oil properties like viscosity and density.

Viscosity Issues in Combustion

In the ALISA atomization bench, the un-burned fuel remains in a closed loop, its evolution in the heating cycles is observed, and then it is returned to the tank. "The inline viscometer is very important," says CRCD's Technician. "It measures directly and provides a quick response. The viscosity, volume mass, and temperature correlations are made which allow vastly improved measures." Thus, the inline viscometer realizes concrete time-savings in the developmental process.

Product Comparison

"We needed a viscosity measurement solution with very good accuracy and repeatability, evolved electronics for distinct operating conditions, easy communication with our systems, and large ranges for temperature and pressure," says the Technician. "**We looked at five different systems. The Sofraser MIVI viscometer came up as best-in-class in each category,** which included a stellar advising relationship with the French distributor, Anael."

R&D Benefits for Spraying

Air Liquide uses the MIVI viscometer on the atomization bench, where fuel is renewed and droplets are created within the spray. Thanks to the MIVI's viscosity measure, the precise moment for fuel renewal is identified and droplet size variance is eliminated. In regards to operating principles, taking droplet size into account while designing injectors is a huge step ahead.

"We now have better fuel characterization and better accuracy in our measures," explains the Technician. "Thanks to this instrument, we clearly have added value to our development processes." These benefits are finally dedicated to all the industrial burners and are used by partners testing with this atomization bench.

Improved Functionalities

After one year of utilization, Air Liquide still appreciates the initially described product characteristics. Even in difficult conditions such as high heat or copious dust, product functionalities are validated with each use. The accuracy is very good, the product is reliable, the offset remains good with no drift, and the 9601's electronic interface allows temperature drift compensation, **facilitating increased latitude in the evolution of the atomization bench regarding higher temperatures.**

Service Makes the Difference

CRCD's Technician commented on the good relations with Frédéric Robin from Anael, Sofraser's French representative. "Mr. Robin initially came to the installation site and identified all mounting characteristics and electrical parameters. He returned to set up the viscosity unit and graphic interface. Overall, we are very satisfied with the Sofraser solution and would not hesitate to recommend it," he said.

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