Low-temperature oxyfuel for aluminum melting.

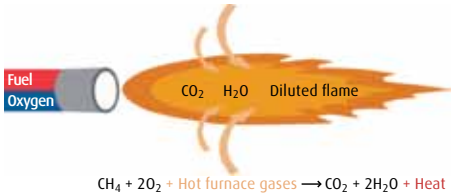
Results at SAPA Heat Transfer, Finspång, Sweden.

Customer problem and background

SAPA produces heat-exchanger strip for the automotive market. They melt various shapes of rolling mill scrap, wire mill scrap, and primary ingots. SAPA had already installed oxyfuel (1995) to melt more aluminum and reduce emissions of NOx. The 28-tonne melting furnace was optimized together with Linde in 2002 and in 2005, when a electromagnetic stirring was installed. To further improve the furnace performance the new Linde low temperature combustion technology was installed by mid 2005.

Lower flame temperature by dilution

Conventional oxyfuel technology has been used for many years in aluminum melting. Linde employed its extensive combustion and customer process knowledge to further develop so called "flameless" oxyfuel burner technology, previously applied in steel reheating. The solution for aluminum melting is a burner with a low temperature flame that is always detectable with a UV sensor. The furnace flue gases are mixed into the flame to achieve a dilution that both lowers the flame temperature but also disperses the energy effectively throughout the whole furnace volume.



By effective dilution the flame temperature is lowered, resulting in uniform melting with less dross and NOx emissions.

Going from conventional to Low-temperature oxyfuel, melt rates are further increased and dross reduced at SAPA Heat Transfer, Sweden.

Melt rate	+10%
Energy consumption	-10%
NO_x emissions	-90%
Dross	-9%

Higher melt rate and fuel savings

The melting process has improved since the installation at SAPA in 2005 of the new Linde Low-temperature oxyfuel technology. The scrap melt down is more uniform, leading to higher melt rate and fuel savings. The lower flame temperature and a more uniform furnace temperature distribution have proven to result in an increase in heat transfer to the batch, an increase in burner power input, and a reduction in dross and NO_x formation.

34% higher melt rate

Looking for the highest possible melt rate, SAPA employed both an electromagnetic stirring solution, EMS from ABB, and the new Low-temperture oxyfuel from Linde.

The EMS facilitates more power input while Low-temperature oxyfuel delivers necessary power without overheating or increased dross formation, which for SAPA resulted in a 34% higher melt rate and further reduced levels of dross.

Conclusion

The new developed Low temperature oxyfuel technology provides lower flame temperatures and more uniform furnace temperatures. This has resulted in higher productivity, fuel savings, less dross formation and lower NO_x emissions at SAPA.

Low-temperature oxyfuel burner

Power: 0.2-2 MW
Diameter: 300 mm
Cooling: self-cooled ceramic stone

Supervision: integrated UV cell
Ignition: integrated

Linde North America, Inc.
575 Mountain Ave
Murray Hill, NJ 07974 USA
Phone +1.800.755-9277
sales.lg.us@linde.com www.lindeus.com
www.lindemetallurgy.com

1748_0212