

Low-temperature oxyfuel for aluminium melting – Results at SAPA Heat Transfer, Finspång, Sweden.

Summary from presentation at Norcast, Nordic Aluminium Cast House Seminar, Norway, June 15, 2006.

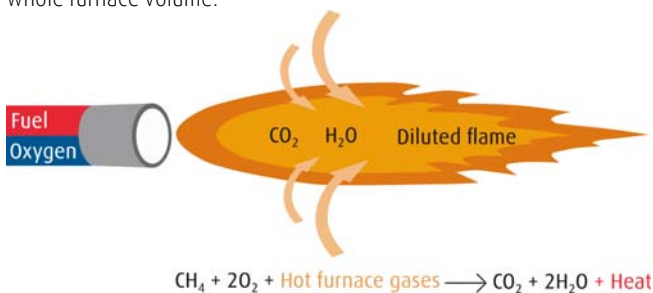
H. Gripenberg, Linde, Sweden
A. Johansson, SAPA Heat Transfer, Sweden

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 installed oxyfuel already 1995 to produce more and to reduce emissions of NO_x. The 28-ton melting furnace was optimised together with Linde in 2002 and in 2005 electromagnetic stirring was installed. To further improve the furnace performance the new low temperature combustion technology was installed by mid 2005.

Lower flame temperature by dilution

Conventional oxyfuel has long experience of application in aluminium melting. By Lindes extensive combustion and customer process knowledge work was conducted to further develop experience on so-called flameless oxyfuel burner technology, successfully applied in steel reheating. The solution is a burner with a flame with the low temperature features as of the flameless burner technology but always detectable with UV sensor. The furnaces 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 NO_x emissions.

Higher melt rate and fuel savings

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



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%

34% higher melt rate

Looking for highest possible melt rate, SAPA employed both electromagnetic stirring solution, EMS from ABB and the new low-temperature oxyfuel from Linde. The EMS facilitates more power input while low temperature oxyfuel delivers necessary power without overheating or dross, 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 temperature. 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