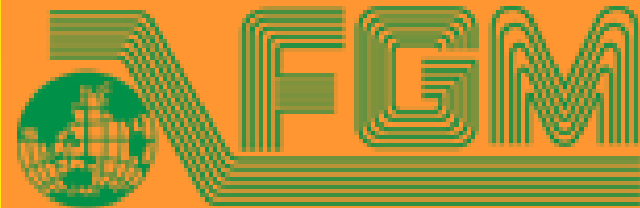


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Efficiency For Survival

Advanced Oxy-fuel Applications Enhance Furnace Melting Efficiency

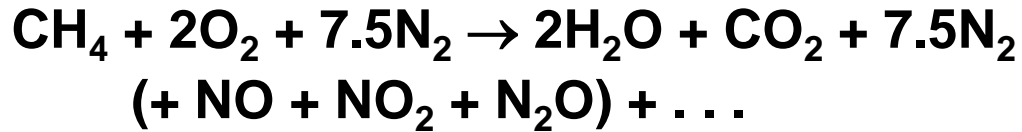
*Richard Huang
Glass Industry Manager
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Sept. 2013*

*Edi Tampubolon
Commercial Manager
Air Products Indonesia*

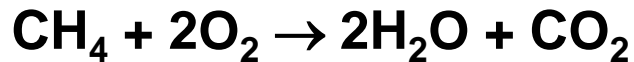


What is Oxy-fuel?

AIR-FUEL



OXY-FUEL

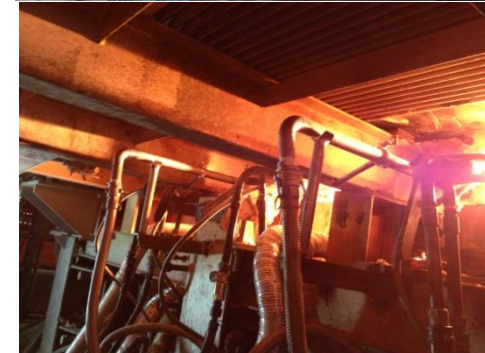


- **NITROGEN AND NO_x NEARLY ELIMINATED**
- **LARGE REDUCTION IN FLUE GAS VOLUME**



What Advantages By Oxy-fuel Application?

- **Production increase up to 25%**
 - **Case 1, float glass has gained production increase with oxy-boost to 10% from 560TPD to 620 TPD by adding 38TPD oxygen**
 - **Case 2, container Glass has gained 10% production increase by applying oxy-boost with 10TPD oxygen**
 - **Case 3, specialty glass has gained >25% production increase by applying partial conversion with 15TPD oxygen**
 - **Case 4, Amber container glass has gained 8% production increase by lancing with 7TPD oxygen**



What Advantages By Oxy-fuel Application?

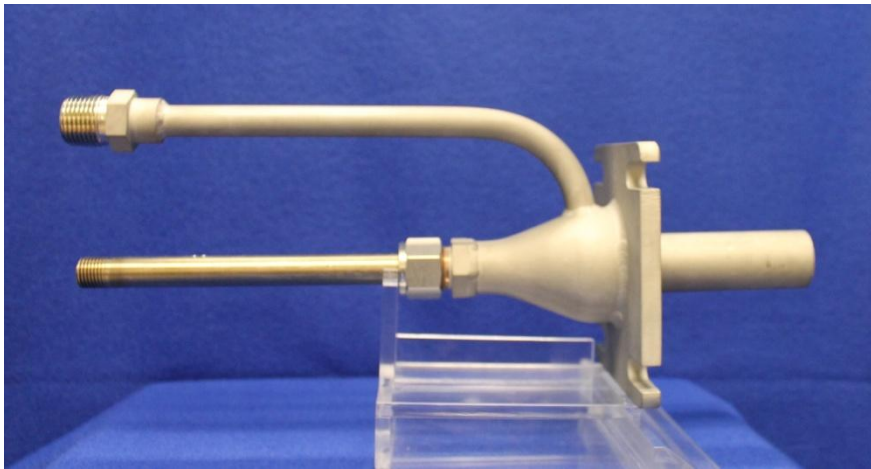
- **Furnace life extension up to 15%**
 - **Case 1, Float glass has gained 15% furnace life extension by Integrated Boost and lancing**
 - **Case 2, Container glass has gained furnace life extension of 18 months after crippled recuperator**
 - **Case3, Specialty glass has gained furnace life extension after major failure of heat exchanger**



What Advantages By Oxy-fuel Application?

- **Combustion cost improvement**

- **Recuperative E glass furnace has gained 35% fuel saving by full oxy-fuel conversion**
- **Specialty glass has gained >60% fuel saving by Cleanfire GC burner which could be used at Forehearth application as well**



What Advantages By Oxy-fuel Application?

- **Emission reduction up to 80%**
 - **Case 1, glass wool furnace has gained NOx reduction by full oxy-fuel conversion up to 80%**
 - **Case 2, E glass furnace has gained substantial emission reduction without SCR and meet government registration**
 - **Case3, Container glass has gained NOx reduction by lancing**
- **Lower initial investment by full oxy-fuel for green field glass furnace project.**



Thank you

tell me more

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