EENP AWARDS 2016

BEST PRACTICES (HONOURABLE MENTION)

GLOBALFOUNDRIES®

EDWARDS

Background of Company

Launched in March 2009, **GLOBALFOUNDRIES** provides a unique combination of advanced technology, manufacturing excellence and global operations. With the integration of Chartered Semiconductor in January 2010 and IBM's Microelectronics Division in 2015, GLOBALFOUNDRIES significantly expanded its capacity and ability to provide best-in-class foundry services from mainstream to the leading edge. With more than 18,000 employees and hundreds of customers around the world, GLOBALFOUNDRIES has quickly differentiated itself to develop and produce the semiconductors that are changing the ways we live, work and play.

Edwards Technologies is part of the Swedish-based conglomerate Atlas Copco Group since January 2014. The company has 143 years of engineering and innovation as a leading provider of industrial productivity solutions to a wide range of sectors including process and manufacturing, electronics, renewable energy and petrochemical industries. It also has a global scale and footprint with manufacturing in more than 20 countries, customers in over 180 countries and a staff strength of 44,000 employees.

Project Description

Replacement of Combustion Chamber for Thermal Abatement Units

Thermal abatement units are used to break down process gases such as silane, tetrafluoromethane, ammonia, hexafluoroethane, nitrogen trifluoride, nitrous oxide and chlorine trifluoride for safe disposal into the atmosphere. To reduce liquefied petroleum gas (LPG) consumption, Globalfoundries and Edwards Technologies retrofitted 35 nos. of thermal abatement units by halving the size of the combustion chamber, from 12 inches to 6 inches, and reducing the nozzle size from 24mm to 16mm. To ensure that the gas residence time and destruction efficiency remain unchanged, the total abatement capacity (i.e., the combustor and the weir) is kept constant by increasing the length of the weir. Figure 1 shows a thermal abatement unit before and after the retrofit.

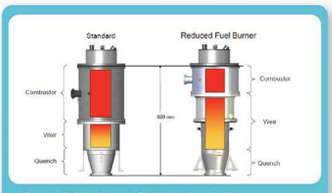


Figure 1: (left) Before retrofit, (right) After retrofit

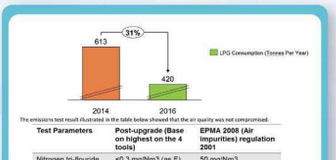
The smaller nozzles have been experimentally shown to give improved performance with fluorine and low dielectric constant materials. The smaller cross section of the nozzles also enabled

(i) the fuel radicals to mix more easily with the core of the process flow, and
(ii) a higher LPG velocity into the combustor so that the process gases can mix with a greater volume of the burner gases before reacting in a smaller combustion region.

The better mixing of process gases with burner gases resulted in an improved abatement.

Results

The annual LPG consumption was reduced by 31% , from 613 tonnes to 420 tonnes. This translated to an annual energy cost saving of US$200,000 and an annual carbon abatement of about 640 tonnes.



The emissions test result illustrated in the table below showed that the air quality was not compromised.

Test Parameters	Post-upgrade (Base on highest on the 4 tools)	EPMA 2008 (Air Impurities) regulation 2001
Nitrogen tri-flouride (as F, F2)	<0.3 mg/Nm3 (as F) <0.3 mg/Nm3 (as F2)	50 mg/Nm3