

# How is a Boiler Made?

AGRICULTURAL AND FOOD ENGINEERING TECHNICAL DIVISION



reported by  
Ir. Hor Kok Luen

Ir. Hor Kok Luen is a graduate from Universiti Sains Malaysia (USM) in 2001 with Bachelor of Degree (Hons.) in Mechanical Engineering. He is currently chief engineer of a established palm oil mill group involved in palm oil mill processing, long fibre plant, short fibre plant, solvent extraction plant, biogas capturing plant and of green energy generation for grid connection. He is currently a committee member of Agricultural and Food Engineering Technical Division (AFETD).



Factory visit: Production lines for integral piping roll and fit

**W**hat is a boiler? A boiler is a piece of machinery that heats water inside it to boiling point. The water can be used for water heating, central heating, boiler-based power generation, cooking and sanitation purposes.

To learn more about boilers, the Agricultural & Food Engineering Technical Division (AFETD) of IEM recently organised a visit to a boiler manufacturer, Boilermech Sdn. Bhd., for 13 participants who included IEM members and engineers.

Mr. Wong Poon Han, the design manager of Boilermech, gave a briefing on the company and its nature of business.

"There are two types of steam boilers: Water tube and fire tube," said Mr. Wong. "Boilers are classified based on the type of fuel used, such as gaseous fuel (bio-methane gas, natural gas, etc), liquid fuel (diesel, petrol, methanol, etc) and solid fuel (biomass fuel, rice husk, wood chips, etc)".

The presentation included the following aspects of boiler systems:

1. The location of pressure containing principal components (steam drum, water drum, superheater, front headers, side headers, tubes and integral piping)
2. The process flow of steam drum and water drum
3. The major materials for steam drum and water drum
4. The marking and cuttings dished end blanks
5. Rolling and fit shell plates
6. Weld & Radiography test (RT) for long seams and weld seams
7. The joint process for shell and dished heads
8. Fit up of nozzles & attachment to shell/head



*Factory visit: A steam drum with completed marking and radiography test on shell and dish heads. Ready for drilling on different nominal sizes of tubes.*

9. The application of Post Weld Heat Treatment (PWHT) & Magnetic Particles Test (MPT) & Hydrostatic Test (HT) in boiler manufacturing
10. The process flow of tubes and headers
11. The process flow of integral piping
12. The process flow of super heaters.

On the issues of quality and safety, Mr. Wong said its boilers are designed to meet the requirements of enforcement agency *Jabatan Keselamatan & Kesihatan Pekerja* (JKKP).

He said two types of carbon steel tubes are used, i.e. the BS 3059 Part II Grade 360 and BS 3059 Part I Grade 320. The selection of the nominal size of the tube is based on design and application requirements. These are mainly size 50.4mm and 76.2mm in diameter. The length of the generating tubes is based on design heating surfaces and market availability (the longest on record is 14 metres).

Mr. Wong said: "A boiler should be designed with high efficiency, high steaming pressure and a capacity with fuel that is available." Environmentally, however, a boiler must be well designed and constructed to perform lower dust concentration, with no dark smoke for the stack emission. Last but not least, the boiler must be able to operate safely.

The participants were then taken on a tour of the factory, after which Ir. Hor Kok Luen presented a token of appreciation to Mr. Wong. ■

### IEM DIARY OF EVENTS

**Title: 2-Day Course on Project Management for Operation & Maintenance Engineers (Postponed from 8 & 9 December 2015)**

**9 - 10 March 2016**

Organised by : Graduates & Student - The Young Engineers Section

Time : 9.00 a.m. – 5.30 p.m.

CPD/PDP : 14

*Kindly note that the scheduled events below are subject to change. Please visit the IEM website at [www.myiem.org.my](http://www.myiem.org.my) for more information on the upcoming events.*