

# TALK ON “PROCESS SELECTION, USING AS AN EXAMPLE CO<sub>2</sub> REMOVAL PROCESSES”

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The Oil, Gas and Mining Technical Division held a talk on March 6, 2004 entitled “Process Selection, Using as an Example CO<sub>2</sub> Removal Processes”. The talk was presented by Ir. Lim Seng Beng, a Lead Process Engineer of IGL Oil & Gas Consultants Sdn. Bhd. at the IEM Conference Hall.

The presentation commenced at 10:30, with Ir. Lim starting by focusing the audience's attention on the key presentation points. He started the presentation proper by discussing the objectives and targets of a CO<sub>2</sub> removal process, in terms of total volume flowrates (320 MMSCFD sales gas) and CO<sub>2</sub> reduction rates (from 45–60 mole % to less than 8 mole %). Ir. Lim then highlighted the benefit of removing CO<sub>2</sub> at source offshore, rather than further downstream. He referred to concerns of CO<sub>2</sub> causing excessive corrosion, reducing transmission pipeline duties and absorbing unnecessary compression energy.

Ir. Lim followed on by presenting the selection methodology used to choose the appropriate technology to remove CO<sub>2</sub>, incorporating selection criteria such as proven technology, ability to include H<sub>2</sub>S and Hg (mercury) removal, size of the CO<sub>2</sub> removal package, vendor performance guarantees and cost. He then took the audience through the technologies that were considered for this process: chemical and physical absorption,

cryogenic distillation, and membrane separation. Also discussed were hybrid solutions, which attempts to extract the best of the above processes, and combine them into what are considered more effective solutions. An example of this is to use the combinations of physical and chemical solvents. For each of the available options, he presented a summary of each technology, which included the principals involved and special chemical concoctions and compounds used. Summarising each technology's pros and cons, Ir. Lim demonstrated that membrane separation was the most fit-for-purpose technology, on the basis of compactness and lightness.

Ir. Lim then provided a more in-depth look at membrane technology. He discussed the theory behind membrane separation, which separates different species according to their rate of diffusion into and through the membrane material. He discussed options on how to optimise membrane configuration, including the use of two membrane skids in series to minimise product loss. He carried on to discuss items considered in optimising membrane performance. These covered the pre-treatment process, compression and energy requirements. He then compared two types of membranes, the hollow fiber CTA polymer from Cynara and spiral wound CA/PI from UOP, and explained

the drivers that decided on the choice of membrane used for the process under consideration.

As pre-treatment of feed gas is important in maintaining the performance of the membranes, Ir. Lim spent some time discussing the importance and function of the system. Among the requirements of the system are removal of contaminants, dehydration of feed gas and particle filters. He then rounded off the session by discussing the ancillaries required by the pretreatment/membrane system. The session was then opened to the floor.

The question and answer session was lively, with the audience of about 20-plus participants asking for clarifications on technical aspects of the choice made. Some participants were interested in how different criteria onshore and offshore gave different optimum answers for offshore and onshore facilities.

The talk ended at 12:00 noon. ■

## ENGINEERS JOKE

An engineer, a mathematician and an arts graduate were given the task of finding the height of a church steeple (the first to get the correct solution wins \$1000).

The engineer tried to remember things about differential pressures, but resorted to climbing the steeple and lowering a string on a plumb bob until it touched the ground and then climbed down and measured the length of the string.

The mathematician laid out a reference line, measured the angle to the top of the steeple from both ends and worked out the height by trigonometry.

However, the arts graduate won the prize. He bought the vicar a beer in the local pub and he told him how high the church steeple was.