IPCO's heat exchanger plugs seal leaking tubes safer and quicker

After first meeting with IPCO, producer of heat exchanging plugs, almost a year ago at an industry event in the Benelux, where Managing Aging Plants already had a very pleasant talk with the team behind this Holland-based company, we felt it was about time to catch up again. Armand Boogert, Sales Director with IPCO, gladly answered our call and invited us to come visit them in Dordrecht, in the west of The Netherlands. "We can talk over the phone, but I think it would be nicer for you to come over and have a look around our office," Armand stated.

By Jolanda Heunen

As Sales Director, Armand is responsible for all commercial activities within and outside of IPCO. "I started here in February 1991 and the company was founded in December 1989, so basically I joined almost right at the beginning," he tells. Ever since its start the team have been working towards becoming the company that is known in the industry as a true service-provider. "Of course we sell products, but primarily we want to be there for the customer whenever they need us." Service is therefore very important for IPCO, which includes providing training and products that are engineered to perfection.

Already in the early nineties of the last century the company made a very deliberate choice not to focus on just one area or one product. "This is because we believe this could make a company less stable and stability is of course important; not only for us but also for our customers who know that we will be in the industry for the years to come as well," Armand explains. However, within the company, a fairly prominent place is reserved for the IPCO plug, a device that is as simple as it is ingenious.

Made to measure

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exchangers, a type that is found in almost every part of the heavy industry including big refineries and chemical plants. "And all end-users experience the same thing, namely that the tubes inside the shell and tube heat exchanger wear," says Armand. "Whether it is because of corrosion, erosion, thermal activities, or any other cause, sooner or later tubes will start to leak and for a great deal this is completely normal."

Of course the fact that it is normal does not mean it is desired, so plant inspection and maintenance personnel need to consider repair or replacement in case of leakage. "Many heat exchangers have hundreds or even thousands of tubes and it would be silly to replace the whole heat exchanger when you can repair a few tubes," Armand continues. "The tube can be replaced, but sometimes this is not possible, for example when the pipe is in a U-shape. Or sometimes time is limited, a very speedy repair is desired, and then you can block-off the leaking tubes inside the heat exchanger with plugs."

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Basically there are three ways for blocking-off a tube: you can bash in a taper pin, you can use a taper pin and weld it to the heat exchanger, or you can use a mechanical plug. "The taper pin can be okay but you don't know what could happen in time," Armand tells. "Since the heat exchanger vibrates it could fall out one day. When you weld the pin to the heat exchanger it is secured, but there is a very high local heat build-up which will in time result in the cracking of other tubes, thus creating new leaks. We offer a different technique for which we use a hydraulic system, a machine with which you can place a plug into the heat exchanger."

The way this works is: you have a taper pin, a ring, and a breakaway section and with the hydraulic machine the pin will be pulled through the ring. The ring will expand towards the tube where it will create a seal, and when enough power is applied, the breakaway section will break so that the installer knows it is installed correctly. "It is really very easy and can be installed by a factory's own mechanical engineers or a contractor," Armand reassures. "However sometimes there are of course very typical situations, where it is difficult to perform a plugging operation. We have created a very simple instruction, based around the tooling and the plug so it is not very difficult, but we strongly advise to always have trained staff placing the plugs."

X1 and X4

Basically there are two variants of the plug, the IPCO X1 and the X4. Both work identical, however one is limited in size range but can go to extreme pressures – up to 500 Bar not really being an issue. The other has a times four (X4) range, a range of 2–2,5 mm, so much more expansion but a lower working pressure of 100 Bar. "Which is by the way still enough for most applications," Armand adds.

In deciding upon which plug should be utilised it is important to consider pressure, temperature and material. "When we know the exact data, so outside diameter, wall thickness, the material of the tube, pressure and temperature, we can supply the exact right type of plug for the job," Armand continues. "The material of the tube is leading for the choice in material for the plug; when it is a carbon steel tube, we will use a carbon steel plug, and when it is a brass tube, a brass plug will be advised."

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In addition to the plug system, IPCO offer a testing system to be used before the plugging. "With a shell test you can easily see if there is leakage, but it can be difficult to pinpoint exactly which tubes are leaking," Armand explains. "With our tube testing system which is a pneumatically driven hand-held kit you can quickly pressure test each individual tube. Anywhere between 8 and 32 millimetres can be tested with the system. The plugs go in where it is marked after the inspection, and installing an IPCO plug can be done in seconds."

First the Benelux, now Europe

IPCO started producing plugs for two main reasons. "We noticed that approvals were becoming more and more important for the European market," says Armand. "And of course lead-time: as it is an emergency repair product, the lead-time has to be half an hour, one hour tops, and when a certain product is not in stock it needs to be produced and delivered straight away."

IPCO started with serving the Benelux (Belgium, The Netherlands, and Luxembourg) region, but quickly decided to work together with companies in the rest of Europe as well. "Especially in the Benelux we give in-house presentations at the customer to explain what can be done. Outside the Benelux we work with representatives so that in time we can cover at least the whole of Europe," Armand tells. "We would like to have more partners throughout Europe."

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"It is a traditional industry and many companies keep doing what they have been doing for years," Armand continues when asked why the use of a mechanical plug isn't the standard solution. "When there's a leak, you bash in a pin and either weld this or not. However, a pin that is not secured can come out and we already know for almost thirty years that welding is not a smart thing to do." Armand illustrates this by telling about a case where the plugs that were almost ordered by a contractor, were cancelled by the end-user who in spite of the contractor's advise decided to weld because he didn't believe the risk to be that high. "A few months later we heard that all welding, which was performed fully according to specification, had resulted in so many leaks in other tubes that the whole heat exchanger was considered to be scrap and had to be replaced."

"Yes, our plug is more costly than just a taper pin and a hammer, which is because it is designed, well engineered, and needs a machine to be installed, but we have proven that our plug goes in, stays in, and does not cause local heat build-up as is the case with welding – which is by the way more expensive than the IPCO plug when you calculate everything in," Armand concludes.

Did you know?

The IPCO plug is completely certified under ISO and always equipped with full material certification. In addition, it is completely certified under the PED – the Pressure Equipment Directive. "The industry has to comply to full PED certification, all pressure equipment today is under the agreement of PED," Armand tells. "We therefore decided, a long time ago already, that we needed to not just have material and ISO certification, but also have this PED certification in place. This is saving a lot of cost for the industry, for when an IPCO plug is used, everybody knows it's fully certified so the inspector just ticks a box and it's done."