

The IGA Intellect system has been extensively used within the UK, but recently the first system was installed in Taiwan, in the Far East.

# Intellect in Taiwan

After the severe earthquake experienced by Taiwan in 1998, which caused extensive damage both to buildings and the natural gas supply pipework,

John Fu, President of Yung Loong Engineering Corp. (design and manufacture of gas control and metering systems) contacted IGA to investigate rumours of a pressure profile system specifically designed to reduce gas leakage in distribution networks.



## Why?

Controlling the pressure within a gas distribution network is a proven and cost effective way of minimising operating costs, and reducing leakage and frequency of pipeline repairs.

Traditionally this has been achieved by utilising time control, whereby a pilot is connected to a time control

module, which reduces the outlet pressure of the station by a set amount at certain times of the day. However, to achieve good control, a large number of clocks and pilots are required. A more modern system is closed-loop control. This monitors the pressure at the lowest point of the network, and

via a dedicated telemetry link, sends a control signal to the pressure reduction system to either increase or decrease the station pressure to achieve a constant pressure at the 'low point'. This, however, can be very expensive.

## What is Intellect?

IGA's Intellect system is a completely self-contained battery-powered pressure profiling system. It is specifically designed for gas distribution Pressure Reduction Systems (PRS), and utilises well-tryed

and trusted components. It combines the best aspects of the previous two systems, the simplicity of time control and the accuracy of closed loop control and, in addition, provides network analysis capabilities and can be retrospectively fitted to the control system of any type of regulator.

At the low pressure points of the system, data loggers are installed. These are fitted with either standard telephone lines or GSM cellular systems so that data can be remotely retrieved and alarm actions automatically sent via a Computer to raise or lower the station outlet pressure.

## How does Intellect Work?

IGA's Pressure Profiler is a programmable pressure control valve, at the heart of which is a microprocessor which reads a station setpoint from an outlet pressure profile previously downloaded to the Profiler. A pressure transducer constantly monitors the station outlet, and the signal from this transducer is compared by the microprocessor to the current profile setpoint. If the difference between the station outlet and the setpoint is greater than a predefined 'dead band', the microprocessor then instigates a control action to either increase or decrease the control pressure signal to the integral control pilot, which in turn controls the main station regulator.

The integral control pilot consists of two diaphragms of equal size. The control pressure signal is applied to one and outlet pressure to the other. The result of this is that an increasing control pressure signal decreases station outlet pressure and a decreasing control signal increases station outlet pressure. The control signal chamber is linked through a safety system to outlet pressure. If for any reason the control signal is lost, the pressure in this chamber will slowly equalise through the safety system to outlet pressure, enabling the station outlet pressure to rise to the maximum profile setpoint.

The complete system is managed by PMAC (Pressure Measurement and Control) software developed by Technolog©. This software makes it possible to remotely communicate with the Intellect, to collect logged data, make configuration changes and develop profiles.

One of the keys to successful leakage reduction is to correctly identify the low points on the system. If these are not correctly identified, then it will not be possible to generate a significant decrease in the overall system pressure to significantly reduce leakage. By successfully identifying these low points and setting a minimum district pressure at this point, it is possible to maintain sufficient gas pressure for the customers use, whilst simultaneously minimising gas leakage.



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**What was installed in Taiwan ?**

For the trial in Taiwan, the requirement was for two profile control systems. One was to be connected to an Intermediate Pressure Reduction station (IP=10bar) to profile the district pressure supplying a range of Medium Pressure Reduction stations (MP=2bar). The second was to be installed on one of the MP stations, to profile control a single feed low pressure district (LP=25mbar).

**How was it installed ?**

Having received firm interest from Taiwan and obtained system schematics of the stations to be fitted with Intelect systems, new systems schematics were created showing how the Intelect system could be integrated into the existing system and



any modifications that would be necessary to the pipework. The necessary components were ordered and shipped to Taiwan.

IGA's Richard Ecclestone went to Taiwan to assist Yung Loong with the installation and commissioning process. Initially the customer preferred to install only the IP to MP profile system and then install the MP to LP system once they were satisfied with the system operation.

The IP system was installed and the station re-commissioned in only one day, this demonstrates just how trouble-free the system is to install and Yung Loong's excellent efficiency in converting the system (Three streams were converted by just two fitters). Once this work was completed, the GSM cellular communication system was installed and configured.

With the communication system successfully operating, it was then possible to retreat to the luxury of the office, especially because a typhoon chose to strike Taiwan at this moment, the configuration process could then be completed remotely, including setting the alarm set-points, developing profiles and collecting recorded data.

It was decided that initially the system would be run in a manual mode. The system can be program-

med to automatically determine optimum pressure profiles for maximum leakage reduction. It was felt that by running the system this way, it would provide an ideal opportunity for the network operators to experiment with different pressure profiles to learn how the system behaved in response to these changes.

After monitoring the IP/MP station performance the customer was sufficiently satisfied to give permission to convert the MP/LP station to profile control, again this was successfully carried out in one day. The next task was to locate a suitable low pressure extremity point.

A day was then spent walking around a residential area in the search of a suitable location, ideally one that was situated above the recent flood water levels! With the low point now installed, the remaining commissioning tasks could be completed remotely in the office.

With both systems now operating correctly, the final task was to programme alarms into the system to automatically increase district pressures in the event of a low pressure condition at the extremity points.

While in Taiwan, Richard was able to not only assist Yung Loong in the installation, but also to give them training on how to commission the system, and to the operatives on how to run the system.

Only a month has passed since the installation of the above systems, and there is already interest for further stations to be converted. After several years of successful operation in the UK, Intelect has now made its mark in Taiwan.



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