Can You Get Something For Nothing ?

I would like to start this article with a personal anecdote on behalf of my late Grandad M who was a firm believer that "In this life, my lad, you can't get something for nothing !". He was of course referring to the benefits of hard graftderived from his belief that if something is worth having then it is all the better for having worked hard to achieve it. Having grown up with this ethos and being a true Yorkshireman myself I am not capable of seeing this as anything other than true, however, does the concept still hold within our working-world of gas control ?

Traditional mass flow controllers have a turn-down of 50:1 in that the lowest control point is 1/50th of the full scale range. For a gas control project we might require a total measurement span from, say, 0.1 millilitres per minute through to 800 litres per minute and with traditional MFC's we would require a total of 5 instruments to cover this span. Alicat MC Series mass flow controllers have a turn-down of 200:1 and with simple maths we can see that we would only require 3 instruments (with full scales of 20 ml/min, 4 litres per minute and 800 litres per minute) to cover the same range span. Does the cost saving of requiring fewer instruments constitute as "getting something for nothing" ?

Well, I can understand the argument that does n't accept this, so let's add in a number of different gases – Nitrogen, Carbon Dioxide, Argon and Hydrogen. Traditional by-pass MFC's are either calibrated for the specific gas or require conversion factors between these gases. Unfortunately, our gas control project needs the ultimate in accuracy and the measurement uncertainty introduced by k-factors is just too great (Argon for example can have a conversion factor error as much as 2.8% over and above the standard calibration uncertainty). For traditional MFC's, each gas would therefore need its own set of instruments; four gases with five instruments to cover the measurement span. Even if just flowing one instrument at a time a total of twenty instruments would be required to cover the whole spectrum. Alicat on the other handcan have up to 130 gases stored on-board – all certified within the standard calibration accuracy. Just to repeat that, all 130 gases have an equal high accuracy calibration. Flowing just one instrument at a time, same as above, would require only those three instruments previously mentioned to cover the whole spectrum. If we take a nominal value of £1000 per MFC we can see that scenario 1 would cost £20,000 and scenario 2 would only be £3000. Surely this is getting close to having something for nothing ?

Still not convinced ? Let's add in the need to measure both pressure and temperature per gas. A pressure transducer, a temperature transmitter, the fittings required, the cables and installation time/costs could amount to approximately £400, probably more. For the four gases this comes to at least £1,600. An Alicat mass flow controller includes pressure and temperature measurement so there is no additional cost whatsoever. Taking this a stage further - an Alicat can, with the push of a couple of buttons, be re-set to <u>control</u> the pressure whilst measuring the flow. Yet another saving by eliminating extra system components.

If one last fact might help to prove the point then don't forget that Alicat instruments can be used in stand-alone mode; either by using the front screen push-buttons or by adding an integrated potentiometer. There is therefore no need for an additional Power Supply Readout and Control Unit (or a lap-top) and cabling as required by traditional MFC's. Perhaps a further £2,000 saving.

Pulling all of the above together we can see that for our gas control project traditional MFC's will need at the very minimum an investment of £20,000 for the instruments themselves, £1,600 for pressure and temperature measurement and £2,000 for a readout and control module. A total of £23,600. By using Alicat on the other hand, an investment of £3,000 based on the figures above would achieve the same results.

Surely even my Grandad M would accept that you really can get something for nothing ?