Opening a new chapter in Hydraulic Testing

The price of Personal Computers has continued to fall, as has many of the associated components of hydraulic test systems – so why has the cost of complete systems remained so high. Are they really that complex and hard to produce?

To understand the products provided today we need to understand how they have evolved.

A brief history

The roots of hydraulic test systems stem from the 1950's when a small group of innovative engineers formed the Little Gem Valve Company. Little gems they were, these small, fast, reliable, production electro-hydraulic servo valves (EHSV). They were snapped up by the aircraft and aerospace industries that were rapidly expanding at the time and, in the 1960's, were applied to more general testing and renamed Moog valves.

In order to use these devices, to precisely control huge forces, it required a knowledge of hydraulics actuators and pumps, transducers, conditioning, electronics and the control issues of closing feedback loops to the EHSV's. So, to provide this combined expertise and complete test solutions, several small companies emerged.

These "Test Solution" companies slowly grew through the 1970's to embrace the advancing fields of hydraulics, electronics and transducers and continued to make complete solutions in-house.

In the 1980's the advent of digital control and Digital Signal Processors (DSP) massively increased the functionality, so this technology with the new control and analysis methods were also brought in-house. The Test Solution companies grew bigger and bigger, providing bigger and better solutions.

In the early 1990's the technologies continued to thrive with significant advances in solid state and surface mount technology. At this time it also became apparent that the test systems would need to provide data acquisition, as well as control. Simultaneously the Personal Computer established itself as the engineer's interface for both control of test rigs and for the final analysis of data. As the Test Solution companies slowly turned to address this fact they met with a PC technology explosion of both hardware and software.

Over ten years computer speeds and memory requirements increased a thousand-fold and there were six major releases of PC operating system. Basic data storage moved from floppy disc to DVD. Serial communications (ideal to communicate with the remote Digital Controllers) went from RS232 at 9600 baud to USB 2 at 400 Mega bits per second (a four hundred thousand times increase). Software advanced in assembly, compiled, visual programming and engineering languages while incorporating object orientated code and databases. If that wasn't enough it then reeled in powerful advances – such as the Internet.

The current state

The smaller companies that could not adapt or survive the recession in the early 1990's soon died away. The larger companies that could survive had no chance to keep up. The time, from conception to market, for new systems was over five years, so the products were well out of date when they were released. To prevent it being re-written, old software has been ported across many platforms. It was further necessary to generate layers and layers of software to allow older systems

to be maintained. The products continued being built completely in-house, in theory to protect the technology, but as they were now so complex and quickly out of date, it was no longer the case. The systems therefore remain closed and inflexible with complexity and costs rising, despite the falling costs of all associated technology.

There are two options to tackle this scenario. If it is hoped that the technology will slow down enough to catch up, then funds can be diverted into marketing - pushing costs up further still, with no benefit to the end user. Alternatively you must accept the problem and address it.

The solution

The problem arose due to a rapid explosion in technology that has shown no signs of relenting. It is necessary to harness it, not to re-invent it. Many specialist companies are sustaining the rapid growth; it is important to use them. It is only necessary to build in-house the parts that are specific to hydraulic testing.

It is not just a case of jumping on the band wagon; the advances must be incorporated wisely. For example, the PC is very fast and widely used, but it is designed to interface with a person (via keyboard, mouse and screen) and external peripherals – not for deterministic and real-time control of test rigs.

It must also be accepted that software will not provide the holy grail solution. A spectacular environment that can simply do everything the user would ever need is a myth, and would be out of date before it is half written. Software works best when it is simple, efficient, effective and well designed. It must be also be structured to move onto new hardware, with the minimum of fuss.

The result of taking these steps is that it encourages open, modular and flexible systems with clear interfaces between the user, PC, DSP, software, electronics and hydraulics - perfect for developing and upgrading. The systems are more intuitive to use on the software front and more flexible on the hardware.

Other benefits also follow - lower development and overhead costs, more efficient design and manufacture, and systems that are easier to service and support. The designs will be higher specifications and more up to date. These benefits further ensure that high quality is readily affordable.

Tiab Limited have adapted and refined this approach over ten years and are now squaring up to the big, well established companies overseas. Our roots stem from the hydraulic test industry and Formula One, where efficiency and versatility are key. We now provide commercially available digital control systems. Together with our partners we provide complete modular test solutions that have opened a new chapter in hydraulic testing.

Please refer to www.tiab.co.uk for further details.

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