Bell bottoms, LPs and CRTs

Sebastian Amos, who leads Gambica's* process control and instrumentation activities, picks up on this issue's 30th anniversary theme, to consider how dramatically things have changed since he was a new graduate three decades ago.

1986 was my third year as a recently graduated engineer in control systems. My hair was longer, and there was more of it. My jeans had bell bottoms, my LP (12" circles of vinyl presenting an analogue representation of music accessed via a needle) collection consisted of Genesis and Led Zeppelin, and digital control systems were in their infancy.

Notable world events included the loss of the Challenger Space Shuttle, the launch of the Soviet Mir space station, and the Chernobyl disaster. On the positive side, the UK and France agreed to build a tunnel, CD players were just reaching the market, and Nissan opened its first manufacturing plant in Sunderland, complete with large quantities of automation equipment.

In the controls world, I designed process control applications on paper using stencils depicting analogue control modules, coded them into a text editor, and compiled them on a DEC PDP11. The resulting code was then transferred to an 8" floppy disk and loaded into the controller. You had to be aware of "divide by 0 errors" and produce a control solution for a bar mill, for example, in less than 60kbytes.

Rockwell Automation launched its PLC5, following in the footsteps of Siemens which had launched its S5 in 1979. The CPUs of the day had 29,000 transistors – a typical quad-core Intel i7 now has 1.9 thousand million (or US billion). Brown Boveri was still using "bit slicing" processors which were much cheaper than the silicon of Very Large Scale Integration (VLSI) at the time.

Communications between devices relied on RS-232 serial links operating at 9,600 Baud, and Modbus reigned supreme. Checksums were minimal and, apart from a cold, no one had ever heard of viruses. Ethernet and the Internet were in their infancy. HMIs were 20" CRTs with block graphics and bespoke keypads.

Thirty years later, the basic design concepts have not changed much and starting with a sketch on paper still remains the best way to analyse a problem before detailed design takes place. However, because the building blocks of code are now self-checking and integrated into HMI and data systems, the focus has moved to structured design following universally accepted standards. For example, IEC 61508 and 61511 are global standards around which to structure a design manual, making the process simple, auditable and transportable.

This does not, of course, remove the knowledge, experience and training of the individual engineers, needed to convert that clean sheet of paper to an efficient and effective control system.

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The next 30 years will be just as exciting and challenging and, like modern jazz, if I knew where we will be, we would be there now. But to maintain the momentum in the UK and keep us at the forefront of the industry, we need to enthuse the current generation and make them want to be part of it. As the recent Engineering UK 2016 report puts it: "Young people's perceptions of engineering careers form a crucial front in the battle for ensuring an adequate supply of engineers and technicians".

It is essential to involve the next generation from the age of 10, or even earlier. Yes, to become an engineer, you have to work hard, but the rewards are plentiful both in money (engineering is the third most highly paid profession) and satisfaction. Where else can you push a button and start a steel processing line, or launch a rocket, or design and test a machine that will drill into a skull under computer control?

The problem of getting the next generation ready is not new. The following quote comes from the *Hackney Gazette* 60 years ago: "A prophetic headmaster warned pupils at Queensbridge Secondary School about the importance and influence of automation on their future."

Delivering his annual report at the school's speech day, the headmaster, Mr P D Glover, said: "To meet this new world of automation when machines will control machines, every child will need highly developed skills to take his or her place in industry – which means a longer period at school."

That foresight brought us to 1986. Since then, we have muddled through, assisted significantly by attracting highly skilled engineers from the EU. Now, with Brexit in full swing, we have a Government that seems to understand the huge benefits to GDP through IPR, design, manufacture and global sales, made possible by engineering, with a focus on developing our own engineering labour stream which will keep the UK a leader in engineering.

I commend the vision of P D Glover. ■

*** Gambica is the trade association for the automation, control, instrumentation and laboratory technology sectors in the UK. For more information, please contact 020 7642 8090 or visit www.gambica.org.uk**