People power

Industry needs a good supply of workers with the right skills if economic recovery is to be sustained. So far the outlook is positive

By Ben Hargreaves

Whiteman: 'It's crucial that the automotive sector survives and thrives in the UK'

Election year is here and there's a haze over prospects for industry that will only start to dissipate once May (or June) has been and gone. Labour's policies, may, of course, be ripped up by the Tories should they come to power. So those engineering diplomas – part of a raft of new vocational qualifications championed by schools secretary Ed Balls – could be shown the door marked "exit" if David Cameron becomes Prime Minister.

That would be disappointing, says Semta, the sector skills council for engineering and manufacturing. According to the organisation's end-of-year report, more than 6,000 students have enrolled on the engineering diploma. Semta chief executive Philip Whiteman says the diploma has been "very successful". He adds: "We hope it is a success we can build on as more consortia are developed to deliver the diploma." If the scheme continues to be supported by a new government, a science diploma should be introduced in 2011.

Whiteman is realistic, though, about the political climate in the run-up to the election and knows that parties will take pains to avoid making commitments they cannot honour. He is guarded about his own preferences for the victor, because Semta will have to work closely with whichever side wins. But he singles out the current government for some praise for its support of the automotive industry – which he views as centrally important to UK manufacturing as a whole – during the financial crisis and recession.

"The recovery happened faster than we anticipated and that was partly due to some of the stimulus the government gave the automotive industry," says Whiteman. New car registrations are reported to have surged in December.

The total of cars sold in the UK was still at its lowest level for 15 years in 2009, but those who praise the car scrappage scheme – Whiteman included – say things could have been much worse. Recent data from the Chartered Institute of Purchasing and Supply show that manufacturing ended the year relatively strongly, in part buoyed by the automotive sector.

Whiteman believes the sector is crucial to manufacturing as a whole because the type of productivity and efficiency improvements made by companies like Nissan point the way forward. Semta has been working to deliver business improvement programmes to smaller companies. Whiteman points out that many suppliers to the motor industry also work in other sectors. If they adopt lean techniques, led by automotive, then other sectors also benefit, he suggests.

"It's absolutely crucial that the automotive sector remains, survives and hopefully thrives in the UK, because many of the component manufacturers in the

Skills by numbers

£60 million: the amount of Semta funding applied for by small- and medium-sized engineering firms to deliver training for staff.
6,343: the number of 14- to 19-year-old students studying for the engineering diploma.
35,400: the number of new engineering and technology sector apprenticeships in January 2009.

automotive industry also supply the aerospace and marine sectors," he says.

Whiteman was also pleased with the Skills for Growth white paper, which was unveiled by Lord Mandelson in November. It provided a spur to advanced apprenticeship programmes, and identified priority areas for boosting skills in low-carbon industry and high-tech manufacturing. More work needs to be done, Whiteman believes, to ensure that higher education turns out the skilled technicians and engineers needed by firms.

Some universities today, he says, tend to release "clone-like" graduates on to the jobs market, with engineering degree courses that are "inflexible". Semta is working to more closely align such courses with the requirements of companies, with a pilot scheme taking place in the aerospace sector. "The quality of graduates doesn't seem to be what it once was," Whiteman suggests.

> Some universities tend to release clone-like graduates

It was good, he says, to see an acknowledgement in the white paper that engineering, science and maths were strategically important subjects. With a high level of unemployment among young people, a greater focus on engineering apprenticeships could help to get kids who are good with their hands into work, he adds. "There are lots of people out there who'd make good apprentice engineers."

Whatever the political climate, Semta will shortly release a report on advanced manufacturing technologies that Whiteman hopes will be digested by those with the power to dictate industrial policy. The report will look at the way in which different kinds of skills need to be combined to turn new technologies into sound commercial prospects.

The UK, he says, is already good at research, but it's translating those ideas into products that requires a combination of skills. In the future, he adds, engineers are likely to need to have a much greater awareness of other disciplines.

"There will be a need to focus more on effective cross-discipline teamwork to develop new processes and products – to commercialise them and get them into the marketplace. Electrical engineers may need mechanical engineering skills," he says.

One of the problems, Whiteman believes, is that higher education tends to give students deep knowledge about a relatively narrow range of subjects. "We're talking about future industry that needs graduates who can work with chemical, mechanical and biological processes – it's a broader curriculum than we've seen before. That's not to say that this change doesn't have to be handled with care: we've had joint honours degrees before, and they were a nonsense," he says. ?

Flying start for aerospace

The forthcoming Semta report on advanced manufacturing will identify aerospace as a key industry in the future of British manufacturing, says Philip Whiteman. This includes civil programmes, defence and the space industry.

"Space is becoming fashionable and popular and uses the same technologies," he says. "You'll have technologies coming through in terms of reducing pollution and noise reduction, product lifecycle management and maintenance, the development of composite materials, and joining materials together in higher-tech ways.

"From an engineering perspective, the key sector for us in advanced manufacturing is the aerospace sector. It's obviously one where we're very strong: we've got a 25% share of the global market. It's going to increase in importance."

THE ARCHIVE

From the abacus to the analytical engine, forerunner of the computer

The history of mechanical calculators is a long one, beginning thousands of years ago with the abacus. But it was only from the 17th century onwards that big steps forward were made with the development of a series of calculating machines.

Blaise Pascal (1623-62) invented the first in 1642, and later in the 17th century Gottfried Leibniz (1646-1716) developed a machine that established the principles upon which almost every mechanical calculator has been developed since. Both of these machines were hampered by difficulties of manufacture, however.

It was not until the 19th century that the first calculating machine to be manufactured in any quantity was invented by Charles Xavier Thomas de Colmar (1785-1870). His machine, first developed around 1820, was known as the "arithmometer".

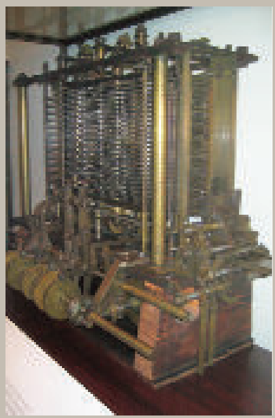
Charles Babbage (1791-1871) was inspired to develop his difference engine by the inaccuracies in data that had been calculated for him, and it was the British government's concern over the inaccuracies in existing tables of mathematical data that led to its funding of his engine.

Babbage's first machine was not only to compute six orders of difference to 20 places, it would also set them in type. He was therefore removing human error from both the computation process and at the printing level, where many errors were introduced.

Babbage worked on his machine for more than 14 years, at a cost of £17,000, but became increasingly concerned with an even more ambitious machine, an "analytical engine," and his difference engine was never built.

After reading about Babbage's difference engine in the *Edinburgh Review*, Swedish inventor Per Georg Scheutz (1785-1873) and his son built their own version, capable of calculating functions to five places using two or three orders of difference. When no buyer appeared for this machine they built a larger one, capable of working to 15 places and four orders of difference, which won a gold medal at the 1855 Paris World Fair.

Babbage worked on his analytical engine for most of the rest of his life. Although mechanical, it included most of the essential features of the modern digital computer. It was split into two main parts: the mill, where the arithmetic processes were carried out, and the store.



Mathematical milestone: Babbage's analytical engine

Babbage also used the idea of punched cards, which had recently been used by Joseph Marie Jacquard in the development of his loom, to control the process.

But Babbage's plans were too ambitious for the age in which he lived, and the manufacturing techniques of the time were unable to provide sufficiently accurate components.

Laura Gardner