

No lack of energy

Despite challenging economic conditions, global energy markets remain highly active, ensuring a busy time for the sector's sub-contract supply chain. Steed Webzell reports

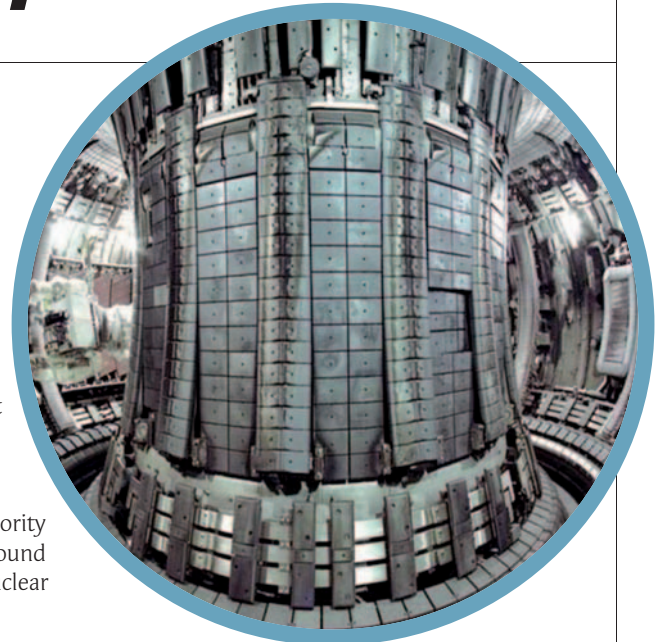
Sometimes where we come from counts for a lot: the UK is the only G7 country other than Canada that is still largely self-sufficient in energy, thanks to its reserves of North Sea gas and oil. Beyond that, the second most important source of electricity – nuclear – continues to play a significant role in the nation's energy portfolio, despite the ongoing debate surrounding the construction of new power plants. And with the country's target to generate 10 per cent of electricity from renewable sources (wind, solar, tidal, wave, hydro, geothermal and biomass-based power generation) by next year, there is plainly plenty of activity in this diverse and interesting sector.

According to the OECD World Energy Outlook 2008, from 1980 to 2006 total world primary energy demand grew by

62 per cent, and to 2030 it is projected to double again. At present, the burning by power stations of fossil fuels such as oil, gas and coal continues to provide the majority of the UK's electricity, but around 20 per cent is provided by nuclear plants.

OPPORTUNITY SPIN-OUT

To ensure this important contribution is maintained, the world's largest nuclear fusion research facility JET (the Joint European Torus) in Oxfordshire is attempting to develop nuclear power technology for the next generation and beyond. Spinning out of the myriad of projects taking place at the Culham facility are a number of opportunities for



Making parts for the Thermonuclear Experimental Reactor means that MG Sanders must cut Nimonic grade 105

suitably equipped sub-contract machining firms.

For instance, as a science and technology feeding project for the International Thermonuclear Experimental Reactor (ITER) project, MG Sanders of Stone, Staffordshire, has won a £4.65 million EU public procurement contract for the supply of components for JET – currently the world's largest Tokamak device (a magnetic plasma confinement system).

AS9100-approved MG Sanders has invested more than £3 million in machine tools and infrastructure in the past three years alone, with its latest acquisition being a twin-pallet, 4-axis Toshiba BMC800 horizontal machining centre, supplied by Leader CNC.

"We machine materials that include our internally manufactured Densamet tungsten, as well as Inconel and titanium," explains managing director Nick Farnsworth. "While some manufacturers are machining Nimonic grade 90, a grade they believe is the highest and hardest available, we are

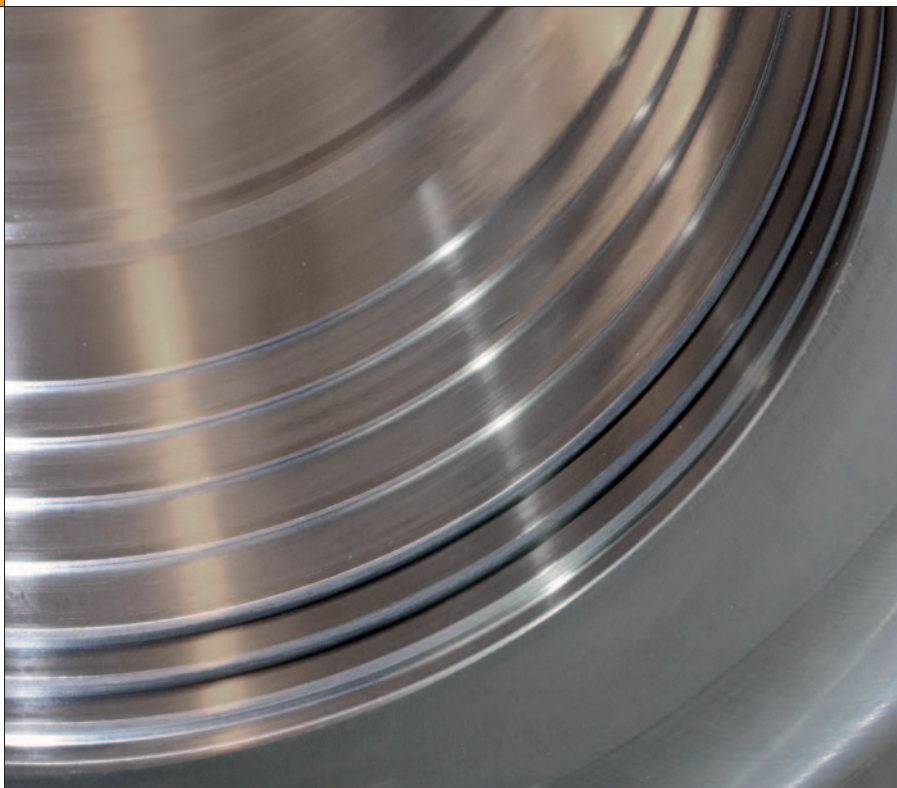
The Renewable Energy Challenge

Young engineers from around the country descended on the Houses of Parliament recently to design, build and showcase winning examples of renewable energy wind turbines as part of National Science and Engineering Week.

The Renewable Energy Challenge, which was organised by the Smallpeice Trust and the Engineering and Technology Board (ETB), was attended by 13- and 14-year-olds from six schools across the country.

Prompted by the ETB's recent Engineering UK report, which stated that many potential engineers claim to be inspired by 'a green agenda', the ETB and Smallpeice Trust set about challenging students from Cardinal Newman RC School; Handsworth Grammar School; Mosslands School; North Leamington Community School and Arts College; and Turves Green Girls' School and Community College to design, build and market a mini wind turbine for the creation of sustainable energy.

"It is really encouraging to see talented young students build high quality wind turbines and present their work to a distinguished group of guests," said Dr Andrew Cave, chief executive of the Smallpeice Trust. "It gives a strong sense of confidence regarding young engineers for the future."



Top, Banks Precision uses its Okuma's Turn Cut facility; above, Cooper and Turner is using Kasto saw technology to cut fasteners accurately to length in support of the wind energy sector

machining Nimonic grade 105, which is even more of a challenge, particularly at 4 mm depth of cut and speed of 250 rpm."

The new BMC800 has an ISO 50 taper spindle driven by a two-step motor that delivers 22 kW of power and reaches maximum spindle torque at 159 rpm. Since its introduction, the 22 tonne Toshiba BMC800 has been continually machining billets that cost up to £10,000, leaving no room for scrap parts. Over a day can be spent blocking some billets.

One of the first jobs for the JET project was to machine the Inconel carriers that hold the tungsten plates, which make up the Divertor strike point of the JET Tokamak chamber. The specialist carriers will work in the vessel where plasma temperatures of 100,000,000 °C are generated.

Another energy sector sub-contract machine shop recently to invest in a new horizontal machining centre is Bank Bottom Engineering of Huddersfield. Part

of the Hystat Group, Bank Bottom has nurtured a strong track record in the supply of parts for sectors such as power generation, oil and mining.

The company is reporting significant advantages in turning large, eccentric parts on a new Okuma MA600-HB horizontal machining centre, supplied by NCMT, instead of on a vertical turning lathe. Cutting cycles are at least twice as fast, loading times are almost zero, a considerable amount of money is being saved on fixturing costs, and accuracies within 10 micron are held easily.

To achieve these economies, even when producing one-offs, Bank Bottom Engineering is using the so-called 'turn-cut' function in the control of the machine. The technique is said to be more effective than established ways of creating turned features on a machining centre using a rotary table or facing head.

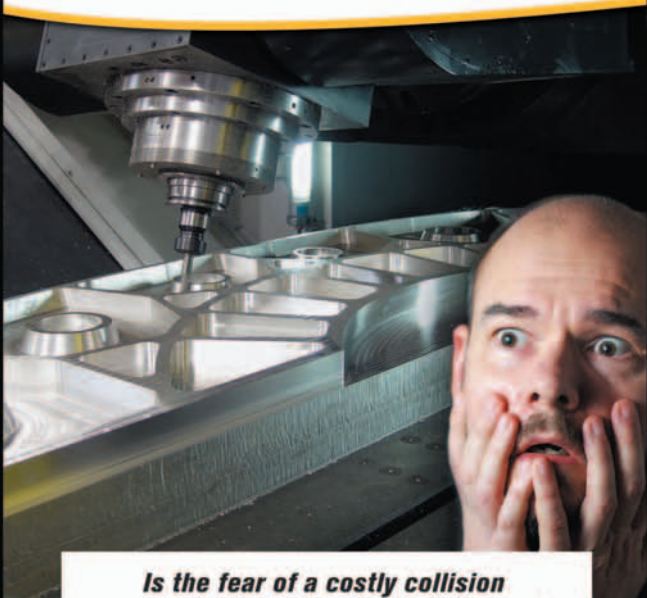
The 'turn-cut' function in the Okuma OSP-P200M control allows a single-point turning tool clamped in the spindle to turn a static component. Advantage is taken of the rigidity of the major linear axes and feed rates of up to 60 m/min to circular-interpolate the spindle in the X and Y axes rapidly, while feeding the tool forward in Z. The control software orientates the tool continuously in the spindle, rotating it at precisely the same speed as the interpolated X/Y path and in synchrony with it.

The tool therefore cuts at the correct rake angle at every point throughout 360° to ensure efficient and precise metal removal. Cylindrical bores, ODs and other features are turned easily by keeping the X/Y travels constant, while tapers, grooves and other profiles can be turned by varying the amplitude of circular interpolation.

Renewable energy is, of course, where much recent attention has centred. At the Low Carbon summit in London last month, the government began to set out a national vision for the transition to low carbon, not just as an environmental and economic imperative, but as a huge commercial opportunity.

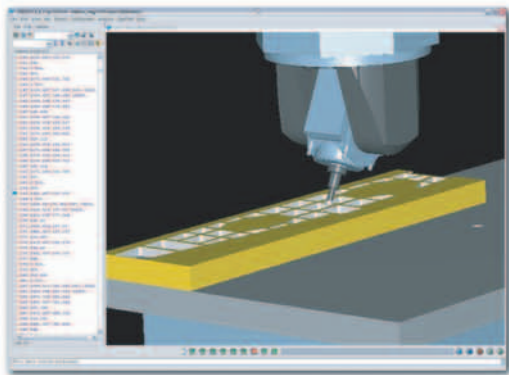
"We're on the edge of a new low carbon industrial revolution," stated

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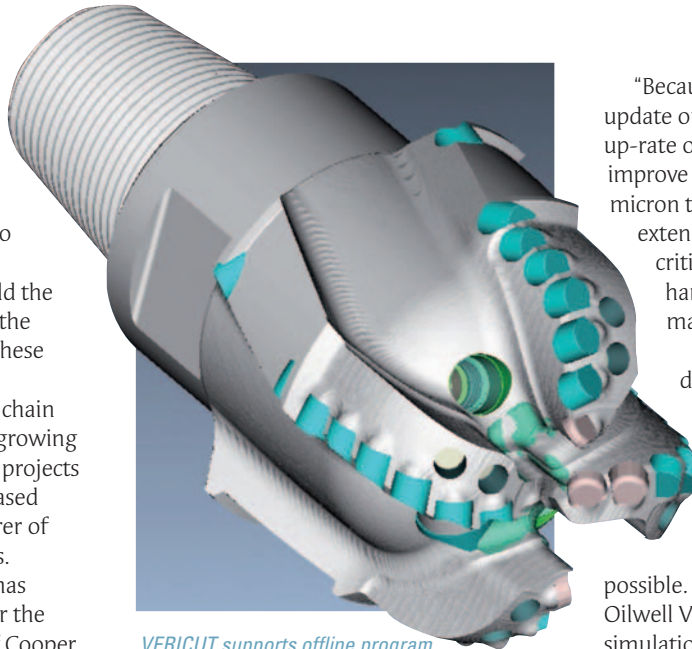
Business Secretary Lord Mandelson at the recent Cumbria Economic Forum. "As the UK shifts over to civil nuclear power, carbon capture and renewable energy, we need to ask what more we can do to strengthen the UK's ability to build the companies that will compete for the supply chain work in support of these industries."

Of course, some in the supply chain are already benefitting from the growing penetration of renewable energy projects and a case in point is Sheffield-based Cooper and Turner, a manufacturer of industrial bolts, nuts and washers.

In recent years, the company has secured a number of contracts for the wind energy sector. A majority of Cooper & Turner's products are forged from lengths of cut bar, or pins, that are accurate to ± 5 mm, whereas wind energy fasteners generally have to be cut to a five-fold tighter tolerance. Before recent investment in new equipment, this was difficult to achieve using the company's three cropping machines because the shearing action left a rag on the underside of the pin that made subsequent turning problematic.

Production director David Brown decided that circular sawing was the way to go and reviewed a number of suppliers, eventually selecting a German-built, automatic KASTOSpeed C9, due to its robust construction, speed and accuracy. Additionally, Kasto was one of the few suppliers able to supply a practical handling device for transferring automatically each cut pin directly into an Akea lathe of 48 mm diameter capacity, where the OD for the thread is turned. On the input side of the saw is a 5 tonne capacity bundle loader for feeding the raw stock automatically.

The success of the first production cell prompted the installation of a second,



VERICUT supports offline program prove-out at National Oilwell ReedHycalog

identical Kasto saw and linked Akea lathe, while most recently Cooper and Turner's expertise in the wind energy sector resulted in the award of another contract, this time for the supply of blade-to-hub studs in large volumes, with effect from early this year. Two more KASTOSpeed C9s were consequently ordered, one for stand-alone use and another for linking to an Akea lathe of larger, 80 mm diameter capacity.

OIL WILL DOMINATE

But estimates suggest that oil and gas will inevitably continue to dominate energy markets for at least the next 20 years. As a result, investment by supply chain sub-contract manufacturers is crucial, in order to secure potential contracts.

This policy is certainly paying dividends at Montrose-based Mountwest Services, which has just installed machines that include a Hankook Protec 9NC from Ward CNC to help it provide tools, products and components for the global oil drilling market.

"Because the new machines will both update our manufacturing processes and up-rate our productivity, as well as improve quality levels by machining to micron tolerances, we will be able to extend significantly the number of critical oil industry components we handle," says workshop production manager John Tulloch.

Today's complex oil and gas drilling programmes demand innovative down-hole solutions. The precision machining of manufacturing equipment for this sector requires that the cutting process be as efficient as possible. To help achieve this, National Oilwell Varco ReedHycalog uses simulation software from CGTech that eliminates the need for physical prove-outs on multi-axis CNC machine tools.

NOV ReedHycalog designs and manufactures fixed cutter and roller cone drill bits at its Stonehouse, Gloucestershire, facility, where the company currently has four 'floating' VERICUT licences.

Matthew Tolner, senior production engineer, explains how the company chose VERICUT: "When VERICUT was selected, 5 per cent of the production of steel drill bits was new prove-outs," he says. "Typically, prove-out times were around 30 hours."

CGTech's VERICUT software allows NOV ReedHycalog to do all of its prove-outs offline on a PC, most programs being of the complex 5-axis persuasion.

"All new 5-axis and 3-axis G code programs are run through VERICUT to check for machine and tooling collisions, dimensional tolerances and cycle times, prior to being made available to the shopfloor," continues Mr Tolner. "This equates to approximately 150 programs per year, each with an average cycle time of just five hours." □



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