

# Heavy handed

When it comes to abnormal loads, truck engineering and logistics move up to a different level. Brian Tinham talks to the specialists

**H**ave you ever considered what it might take to transport, say, a gas turbine weighing 220 tonnes and measuring six metres high by four metres across? Not exactly a standard freight job, but relatively par for the course for heavy haulage contractors, such as JB Rawcliffe & Sons. And what engineering manager Stuart Rawcliffe has to say about this and other similar projects brings a whole new meaning to the term 'big boys' toys'.

This is a tale of specialist, heavy haulage tractor units and equally specialist

modular trailers – for the above-mentioned generator, involving no fewer than 20 axles – at prices way in excess of industry standard vehicles. However, it's also about project engineering, from fabricating trailers and axles man enough for the job, to constructing jigs and skids for manoeuvring loads efficiently to the transporter. And, just as important, it also involves meticulous project planning, seeking permissions for suitable routes, as well as managing the logistics for obstructions, escorts, manning etc during the move itself – to the extent of checking lamp post separations, bridge widths and roundabouts for the most extreme jobs.

"Often, we have to build the trailers around the piece of equipment to be shifted. But the team is also responsible for getting the job ready for loading, with all the jacking up and skidding out etc. And our role includes liaising with transport authorities, bridge authorities, waterways, county councils, the police etc, to obtain permissions and engineering acceptances," explains Rawcliffe – although he adds that this has been eased, following improvements to the Highways Agency's EDSAL website.

"For example, on the gas turbine job, which involved moving a very large plant unit from a power



station site near Liverpool docks to the docks themselves, we used an assigned high load route," he continues. "We wouldn't have been allowed to take that scale of plant anywhere else. But, for other jobs, we've been able to get the load height below five metres by building special decks and that enables us to use the motorway network, which massively reduces the cost. If you have to use high load routes, you're on A roads, which probably means passing through villages – and that inevitably entails removing and then making good road furniture, mini roundabouts, traffic lights, crash barriers, even high voltage wires."

So let's look at the engineering behind this kind of work. Rawcliffe & Sons, which is based in Skelmersdale, Lancashire, constructs its modular trailer systems from Nicolas' axle units. "We buy either two-axle chassis or fours, fives or six-row chassis. They have four or up to eight tyres across, and come with modular necks for attaching to each other and straight onto beefed-up trailers or our low loader decks, which are mostly also Nicolas or Greiner," says Rawcliffe.

### Tough beasts

He makes the point that trailers for heavy haulage are highly engineered, designed to be lightweight to maximise payload potential, but also robust enough to withstand very heavy loads, likely also to present uneven weight distributions. So they are tough.

"Some of our decks are up to 30 years old, just reconditioned in our own workshops and good as new," comments our engineer. "Others we build ourselves, based on Nicolas axles. We're fully geared up for stripping them down, blasting, painting, re-piping and modifying them to click together with the rest of our equipment."

In fact, these trailers are constructed from specialist spring steels and run on box-section chassis. As for the suspensions, Rawcliffe points out that each leg has independent



axles with drum brakes and runs on hydraulic cylinders that can be raised or lowered to distribute and level the load. "Our primary concern is the load's centre of gravity," says Rawcliffe. "If the load is heavy one end and light at the other, we need to know, so we can make sure it is distributed correctly through the axles and hydraulic cylinders onto the road.

"For example, the 220-tonne gas turbine generator was heavy on one corner, so we had to offset the load, with one side having a greater overhang than the other. And we had to set up the suspensions accordingly along the low loader length. All the trailer axles have hydraulic gauges, so we can see the suspension pressures and where the load is through each of the legs. It's then a matter of equalising those from side to side."

What about the tractor units? Rawcliffe runs a substantial fleet, starting with MAN and Volvo 6x2s, all with mid lifts and plated for 44-tonne gvw, then running up through 65-, 80-, and 90-tonne double-drive trucks (again Volvo and MAN, all 6x4s). Then, at the top end, this operator also runs two 150-tonne Volvo 6x4 tractors, one 180-tonne Scania and three more MAN trucks plated for 250-tonne gross train weight, designed for pulling and pushing.

Looking at the specification for the biggest beasts, all Rawcliffe's 250-tonners are MAN 41.680 BBS 8x4 tractors, with the front steering and two rear drive axles on steel springs and the second steer axle (steer by wire) on air. Axle ratings are nine tonnes on the front, eight on the second steer and 16.5 tonnes on each of the drive axles – with twin wheels on the rear axles and 385/65 22.5 super singles on the front steers. There are also rear differential locks and cross locks, and air can be dumped from the second steer, for traction.

Unladen weight is about 13 tonnes – about double that of a standard truck – and at 45 tonnes gvw, there's plenty of facility for adding a ballast box when running in locomotive form [ballasted tractor, towing modular trailers]. Indeed, Rawcliffe took its new tractors straight into the workshop to mount its own twist lock bracketry on the rear of the tractor

**Big lifts require more than just serious truck muscle; these combinations are bespoke for each haulage project**





unit, to enable swift conversion to locomotive.

As for the power plant, it's a 16-litre V8 MAN D28 68 LF06 Euro 5 engine, using SCR (selective catalytic reduction) emission-reducing technology and delivering 680hp with up to 2,700Nm torque, slightly limited by the gearbox. That is a ZF 12AS 2740 overdrive Tipmatic, with a WSK 440 torque converter and retarder – both engine and transmission being equipped with hydraulically-driven cooling to provide enough heat rejection. This puts MAN at the pinnacle of the capability table when it comes to extreme heavy haulage, where one of the key challenges is always handling shock loads from rest and gear changing on gradients.

### Torque converter

John Donnelly, MAN UK's heavy haulage specialist, explains that there are two main components here. First is the automatic transmission, which reads rolling resistance to select gearing for the road conditions, cambers and gradients. Second is a large torque converter on the front of the gearbox, which absorbs shock loads when the vehicle train pulls off and feeds in power gradually. That alone is a £28,000 piece of kit – which goes some way to explaining why the big MAN runs out at around three times the price of a standard tractor unit.

Rawcliffe is an unequivocal advocate of this transmission. "The torque converter acts as one big fluid flywheel and makes all the difference at the heavy end. We're also using automated manuals on our 44-tonners. The drivers much prefer them, because they take out so much stress. But our experience is that there's also much less clutch wear and much less driver abuse. So I'm now specifying all our trucks with automatic transmissions."

What about the rest of the truck? "Very little, other than the cab, is the same as a standard tractor," states Donnelly. "The suspension is different. The

**MAN's three-stage hydraulics, on the rack behind the cab, facilitate modular trailer steering and suspension adjustment, delivering variable pressure and flow**



chassis is different, with a heavy-duty, double-flitched frame and cast iron mounting brackets, instead of pressed steel. At the rear, the truck has a 120-tonne, heavy duty cross-member, with a fully oscillating VBG draw bar coupling. Also, the front end has a register coupling that also houses a 120-tonne VBG coupling so that, if it's in push mode, the truck can shunt at a wide range of angles. Then there's a Jost JSK 38 G1 double oscillating, heavy duty fifth wheel, capable of taking a trailer neck up to 35 tonnes."

Down a level in detail, and Donnelly points out, by way of example, that all of these couplings also have automatic lubrication built in. Why? Because rubber bushings aren't up to the job here, so bronze bearings are the order of the day.

You get the picture. And for the ultimate in refinement, Rawcliffe also takes MAN's factory-fitted three-stage hydraulics, mounted on a rack behind the cab and with plug-in connections at the front and rear. "That unit facilitates modular trailer steering and suspension adjustment, with a simple in-cab control that delivers variable pressure and flow rates to the combination," explains Donnelly. "So, when the tractor is running in locomotive form, up to 20 axles can be steered, raised and lowered by the 'banks man' to keep the load level as it approaches gradients or adverse cambers.

Rawcliffe concedes that using this scale of equipment is the exception, not the norm. "The choice of tractor and trailer or deck combination we build depends on the size and weight of the load and where it's going," he explains. "The best way to move abnormal loads is on a trailer neck off the fifth wheel, because it's an easier, more efficient pull. It's always a bigger job when you move up to ballasted tractors and trailers on drawbars. On the other hand, the trailer becomes more manoeuvrable on a drawbar, so, if the route warrants it, that's what has to be done. And if the load is too great to get the weight through the neck, you have no choice." **TE**

## EDSAL abnormal loads site moves up

Within the first two months of the Highways Agency upgrading its online ESDAL service (electronic service delivery for abnormal loads) last year, haulier numbers using the facility grew by more than 80%.

Paul Furlong, from the Highways Agency, reports that the most popular functions now include: A-to-B mapping, online collaboration, and fast vehicle data entry. A-to-B mapping does what it says on the tin, with ESDAL automatically planning the abnormal load route and return route, using a drag-and-drop interface.

Online collaboration is where the road authorities, structure owners and police provide online feedback to the haulier. Simplified vehicle entry provides a single page to enter details of vehicles used in abnormal load movements.

"ESDAL reduces the administrative burden and modernises the procedures for managing abnormal loads," explains Furlong. "It significantly improves the planning, management and notification of abnormal load movements," he adds.