SIMPLE
BUT NOT STUPID

Many people turn their noses up at Zetor, but the Czech manufacturer retains a faithful following who will undoubtedly be interested in the latest flagship addition that's already winning customers in the UK. This month the 95 kW/129 hp Forterra 135 is subjected to our full monthly tractor test treatment – to see if relatively cheap can still be cheerful.

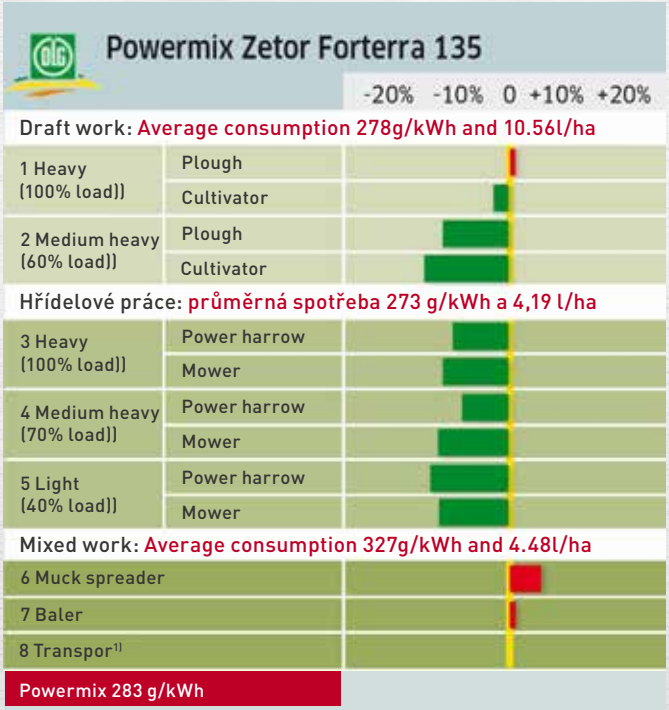
Czech tractor maker Zetor took a step down the horsepower scale when the Stage II six-cyl SAMEpowered Forterra 11741 was given an emission legislation death sentence. Today, though, the company is climbing back up the ladder with its Forterra 135. Launched at the end of last year, the 135 now becomes the figurehead for the fivemodel Forterra line, whose members span 74kW/90hp to 95kW/129hp (ECE R24) and source their power from Zetor's own 4.2- litre Stage IIIA four-cylinder engine. While it continues to be fuelled by the traditional mechanical in-line injection pump, the key Forterra 135 difference is that it has four valves per pot.

We were keen to see just how effective this old/new combination could be, so handed our test subject over to the DLG. Rigged up to the dyno, the Forterra 135 managed to send 85 kW/116 hp to the shaft while the four-potter worked at its rated speed of 2,200 rpm. Then as the engine revs pulled back to 1,800rpm, it mustered a further 5 kW/7 hp. The perky Zetor motor produced a torque rise of 47% and a constant power range of nearly 30% – all very respectable figures. In fact the Forterra proved to be quite a blast, and it was only in the lower speed ranges where the engine started to struggle; culprit here was a 96% start-off torque.

Making up for any low-rev lethargy, the 16-valve motor scores on economy, building on its predecessors' already fuel-frugal reputation. At rated speed the Forterra 135 worked through 279 g/kWh and 244 g/kWh at maximum pto output – both excellent stats. These results are further reinforced by our profi Powermix test, which looks at performance in typical applications (see page 12). Here the Zetor established itself as a leader, sipping 283 g/kWh to make it 5.7% more fuel efficient than the average tractor we've tested so far. So, the 180-litre fuel tank should certainly see most operators through a long working day.

On down the driveline, there's nothing too fancy about the transmission. This mechanical box provides two ranges and four main gears, supplemented by three powershift steps. The lever for the mechanical shuttle resides on the right-hand side, which is not ideal for loader work and would be much better placed on the left as on most other tractors. Only gears one to three can be used in reverse. In total the transmission offers 24 forward and 18 reverse speeds, with top gear pegged at 37.9 km/hr. In the main 4–12 km/hr work travel band the operator has a good choice of ten speeds, although these are spread across the low and high ranges. The slowest speed in high range at 8.5 km/hr is still a bit fast. Moreover, reverse gears are 5% faster in all 18 ratios, so operators could find themselves reaching for the small range lever to the left of the cab more often than they'd ideally like. Two buttons on the side of the main gearstick control the powershift steps, but they aren't clearly marked: tortoise 1, tortoise 2 and no light. The same applies to the digital speed indicator, which is too small and has no decimal place. Going some way to making up for these shortcomings is a form of speed matching: once the operator has activated a button on the dash, the powershift transmission automatically shifts into the middle range each time a new mechanical gear is selected.

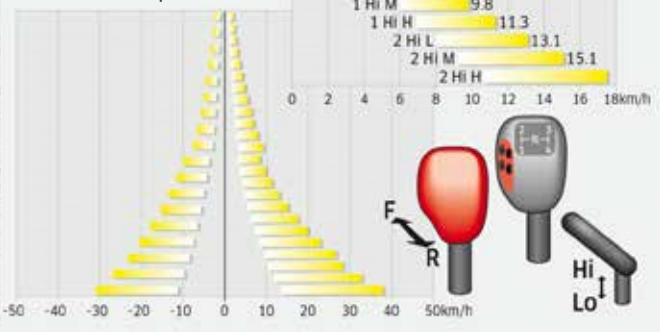
New tractors come with the choice of two pto speeds, either 540/1,000 rpm or 540E/1,000 rpm. Our Dutch test tractor required the operator to manually turn the stub shaft with a supplied spanner to change between the two pto speeds, whereas,



The Powermix figure is shown above to the left and is arrived at by averaging the seven individual tests. The table shows average results for the categories draft work, pto work and mixed work, measuring fuel consumption in grams per kilowatt hour and in litres per hectare. The yellow line marks the average result obtained from all previous Powermix tests, while the length of the individual bars indicates the degree to which performance in this specific type of work was better than (green) or fell short of (red) the average result of all Powermix candidates to present. The average Powermix parameter, obtained from the 61 tractors tested up till now, currently stands at 300 g/kWh.
[1]) Results from the transport cycle tests are not yet published.
Most Powermix results for the Zetor Forterra 135 are below the average results. The overall Powermix result is about 5.7% better than the average result obtained from all previous Powermix tests.

Zetor Forterra 135: Four main gears, two ranges and three powershift steps, plus a synchronised shuttle, deliver 24F/18R speeds. As many as ten of these speeds operate in the 4–12 km/hr bracket, although they're grouped in two different ranges. A maximum travel speed of 37.9 km/hr is not ideal for modern transport work.

24 forward speeds and 18 reverse speeds



The new 16-valve engine proved powerful and economical on the test stand. The Stage IIIA compliant unit mixes new and old technology, incorporating cooled and external exhaust gas recirculation (inset), but still relying on a mechanical injection pump.

thankfully, UK/Irish spec tractors now give their driver the option of selecting the preferred pto speed from within the cab. The Dutch distributor had also added to the test model's standard external linkage control buttons by speccing a button for starting/stopping the pto, yet the main item on our pto control wish list would be to have the pto disengage/ engage automatically when the rear linkage is raised and lowered at the end of a field pass.

As a unique feature, Zetor's ground speed pto remains active when the range lever is in the neutral position, providing the operator with as many as nine to 12 speeds on a stationary tractor in either rotational direction – useful when, say, agitating the farm's slurry store. Unfortunately with this feature the pto speed is not indicated at all, and that clearly isn't ideal.

Further details from our field test

This is not a summary of overall ssessments but a list of positive and less positive details.

Positive

- **High-capacity front linkage (hose routing needs improving)**
- **Toolbox inside the cab, no toolbox outside the cab**

Enclosed cubbyholes, bottle holder and electric sockets – good stuff.

The standard compressor is flanged in place. It's a neat arrangement

Our Dutchsupplied test tractor had mudguardmounted controls for linkage and pto.

- **Beefy top link holder**
- **Adjustable steering wheel rake/reach**
- **Battery isolator switch by the steps**

Negative

- **The steps are not protected from dirt**
- **It's necessary to cut into the window seal to route cables into the cab (the seal leaks anyway)**

Hand throttle has no scale and no adjustable stop, and the throttle pedal is too high. The independent brake is prone to inadvertently unlock, a trait that's soon to be addressed.

- **Air conditioning, yes, but there's no cooling box and the fan only has three speeds**
- **Separate pull switch for shutting off the engine**
- **Air couplers are positioned too close together**

It's necessary to first remove the caps before coupling the short connectors. Couplers are marked in a logical fashion, but the decals are unlikely to last.

We had to turn the stub on our Dutch test tractor to alter the pto speed. Zetor UK says that, as an option, this job can now be done from the cab.

UK/Irish spec tractors come with a Dromone push-back hitch, while the ineffective stabilisers (right) can be replaced by Walterscheid options. Mudguards are scheduled for strengthening.

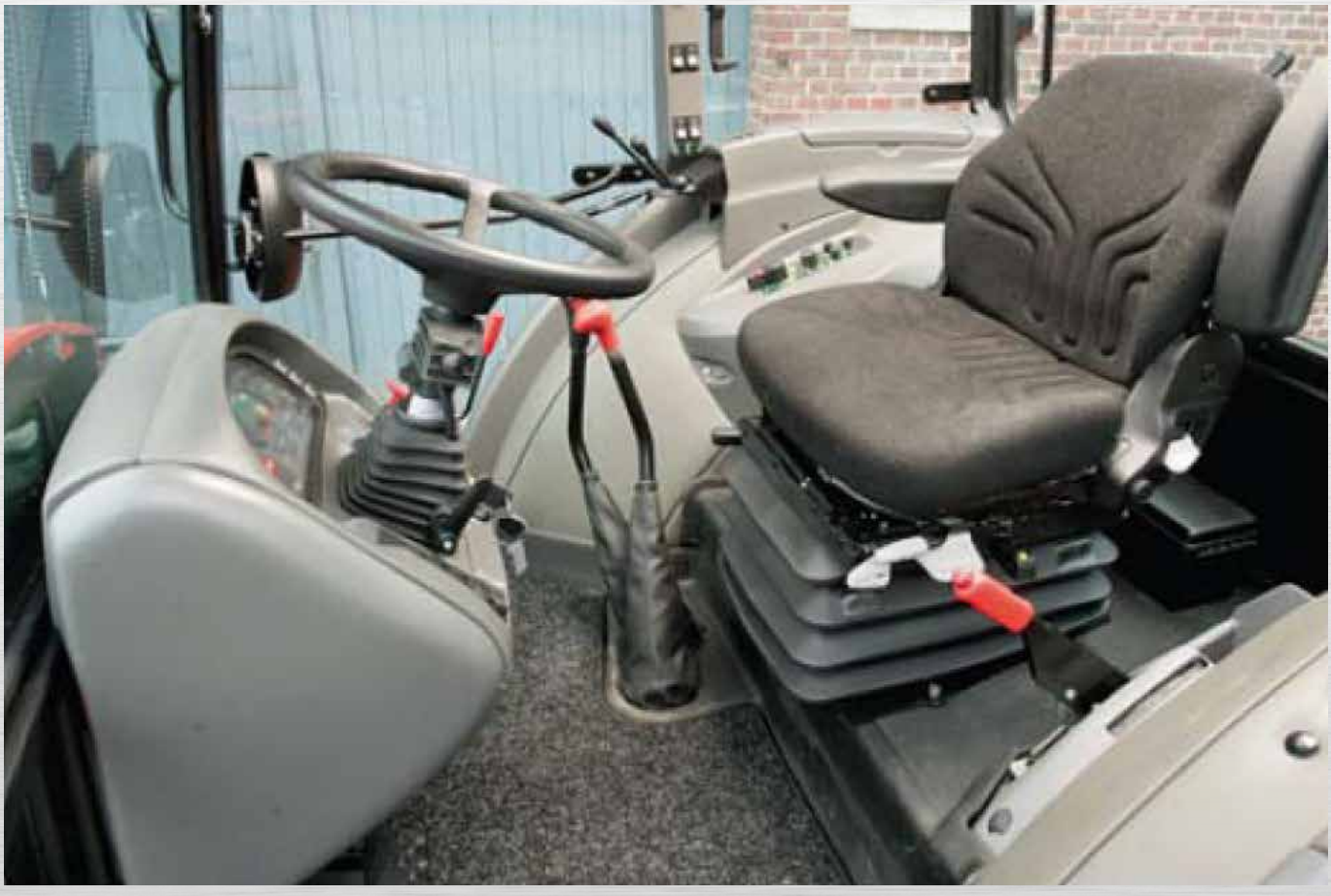
Moving on to the three-point linkage, the tractor's lower link sensing set-up is controlled by the instantly recognisable Bosch ELC system. With its one assister ram, the linkage boasts a lift capacity of 5,000 daN, so it should be up to most hoisting challenges likely to come its way. The turnbuckles for the linkage stabilisers are very basic and have neither pins nor springs, though there is the welcome spec option to upgrade to Walterscheid links.

A gear pump supplies oil to the three standard double-acting spools at the rear at a rate of nearly 71 litres/min. All three spools have a float position, which is good. Nonetheless, at least one of the spool valves should have some form of flow control plus a notch for the lever, so the operator can leave the system pumping continuously when working a hydraulic motor. At the moment this isn't possible due to the kick-out function, and, on top of that, the spool lever position by the right-hand B-post is awkward.

Zetors have never been short on cab space, and thankfully the Forterra does nothing to break this mould. Build quality is decent, too, with a snug-fitting carpet floor mat in our test tractor. In-cab noise level, sadly, remains at an ear thumping 80dB(A), and the reason for this soon becomes clear. As you look through the front window you can spot the poor insulation between engine and cab, which results in the ultimate double whammy – high noise levels and, in addition, extra heat for the air-con system to ward off to keep the operator cool.

The standard seat from Grammer merits a thumbs-up as do the cab storage facilities and toolbox behind the driver's chair. Fourwheel drive and the diff lock are engaged pneumatically, indicated by a tiny LED in each rocker switch, but there are no automatic functions. As mentioned, the speedometer is too small and the pto display and hour meter are also used to show other info. If the reason for this restricted size is a lack of space on the dash, then we'd rather go without the large analogue speedometer. Zetor, please take note.

Machine manoeuvrability isn't a problem for the Forterra 135, which managed to turn through an 11.0m circle; this stat increased to 11.6 m after we engaged the four-wheel drive



The large, air-suspended cab is workmanlike. Though the DLG recorded a noise level as high as 80.0 dB(A), operators were pleased with the cab in practice. There are no fan vents in the roof.

Dash controls are neatly grouped. Downers include the digital read-out being too small and the tractor having just the one display for ground speed, pto speed, hours etc.

Red-handled lever operates the mechanical shuttle forward/reverser; the other tall lever shifts through the four main gears. Buttons control the three powershift steps.

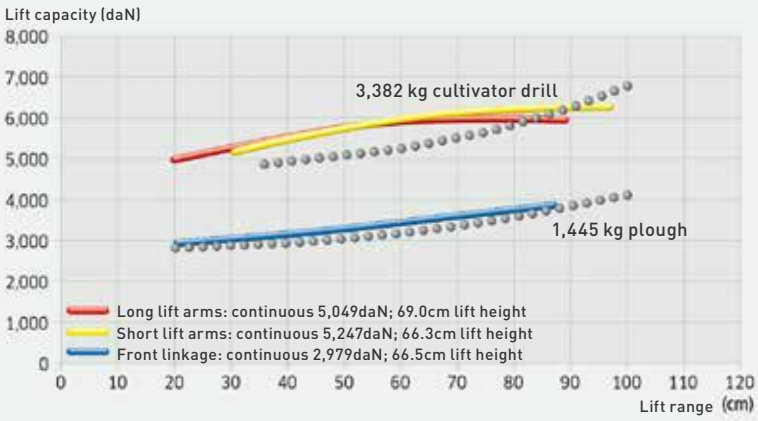
and when turning left – still an excellent result that's achieved without pivoting front mudguards.

Kerb weight is also low at 4,550 kg but, with the gross weight set at 8,000 kg, the payload of 3,450 kg still isn't really sufficient for this size of tractor. Proving the point, the brakes (the front axle brakes on the propshaft) would comfortably be able to cope with more mass, as the DLG measured a healthy deceleration rate of 5.8 m/s². One word of warning, though: operators need to watch for the locked independent brake pedals releasing accidentally.

Finally, maintenance. The 4.2-litre engine requires just 11 litres of oil every 500 hours, while 52 litres are shared between transmission and hydraulics and need dropping every 1,500 hours. To access the oil filler neck, the bonnet lifts up in an inviting arc. Summary: While the stock farmer-/loaderfriendly Proxima remains as the main bread winner over here for Zetor, the higher spec Forterra still accounts for a fair number of UK sales (210 Zetor tractors sold in 2010). There is no doubt that the four-valve engine in the Forterra 135 is a top performer, yet there is still room for improvement in other areas such as lowering cab noise, adding a clutchless powershuttle and stretching the top speed to 40 km/hr.

ELC operation is excellent. Only tester complaint was that the spool levers reside all the way over on the cab's B-post.

Zetor Forterra 135: Lift power and lift requirement



Zetor Forterra 135: The red curve illustrates the recorded lift capacity (90% of maximum lift) as continuous lift power on the link ends, whereas the yellow curve shows lift capacity with lift arms shortened – more than 200 daN of extra lift capacity, nearly 3 cm smaller lift range. The front linkage is powerful. In contrast, the rear unit might start to struggle at the top of its arc.

ZETOR FORTERRA 135	
Width	222 cm
Length	501 cm (incl. front linkage)
Height	279 cm (exhaust stack)

TECHNICAL DATA

Engine | 95kW/129 HP to ECE R24 at 2,200 rpm; watercooled four-cyl Zetor 1605 engine (Stage IIIA) with turbocharger, intercooler and four valves per cylinder; 4,156 cm³ displacement; 180-litre fuel tank.

Transmission | 24F/18R speeds, four main gears, two ranges, three powershift steps, synchronised shuttle, 40 km/hr.

Brakes | Wet disc brakes at rear, hydraulic engagement, front disc brake on propshaft; mechanical hand brake; air brake system is supplied as standard.

Electrics | 12 V, 165 amps battery, 100 amps alternator, 3.2 kW/4.4 hp starter power.

Linkage | Category II, ELC with draft link control and shock absorption, standard slip control option. Optional front linkage and front pto package.

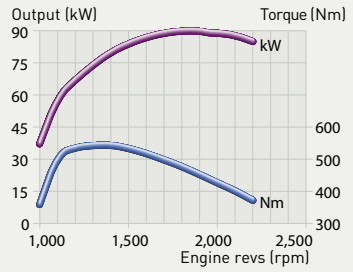
Hydraulics | Gear pumps with 70-litre/min capacity + 30-litre/min flow for steering system, 190 bar; three double-acting spools with float position are standard; available oil for external use by trailed and mounted implements is 22 litres.

PTO | 540/1,000 or 540E/1,000 and ground speed pto with 24/18 speeds; 1 3/8in, six splines.

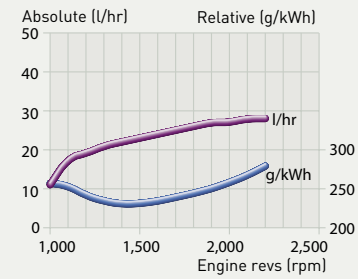
Axles and running gear | Planetary axle with multi-plate differential lock, pneumatic 4WD and differential lock engagement; RD-70 Mitas test tyres 420/70 R24 at the front and Mitas RD-02 520/70 R38 at the rear.

Service and maintenance | 11.0 litres of engine oil (500-hour intervals), 52 litres of gearbox/hydraulic oil (1,500 hours), 22.5-litre cooling system.

Output and torque



Fuel consumption



RESULTS FROM THE TEST STATION

Pto output

Max (1800 rpm)	89,8 kW
At rated speed	85,2 kW

Fuel consumption

Specific at max draft output	244 g/kWh
Specific at rated speed	279 g/kWh
Absolute max/rated speed	26,2/28,4 l/h

Torque

Max	544 Nm (1,400 rpm)
Torque rise	47,1 %
Engine speed drop	36,4 %
Start-off torque	96 %

Transmission

No. of gears in 4–12 km/hr range	10

Rear lift capacities (90% max oil pressure, cor.)

Bottom/middle/top	5,049/5,931/6,039 daN
Lift height under load	69,0 cm (20–89,0 cm)

Front lift capacities (90% max oil pressure, cor.)

Bottom/middle/top	2,979/3,393/3,924 daN
Lift height under load	66,5 cm (20,5–87,0 cm)

Hydraulic output

Operating pressure	192,9 bar
Max flow	70,7 l/min
Max output	18,4 kW (62,1 l/min, 178 bar)

Drawbar power

Max (1,800 rpm)	
At rated speed	78,9 kW (298 g/kWh)

Noise level (Under load at driver's ear)

Cab closed/open	80,0/84,0 dB(A)

Braking

Max mean deceleration	5,8 m/s2
Pedal force	27 daN

Turning circle

4WD disengaged/engaged	10,70/11,40 m

Test weight

Front axle	2,045 kg
Rear axle	2,505 kg
Unladen weight	4,500 kg
GVWR	8,000 kg
Payload	3,450 kg
Power-weight ratio	48 kg/kW
Wheelbase	233 cm
Track width front/rear	172/174 cm
Ground clearance	38 cm

FUEL ECONOMY AT TYPICAL PERFORMANCE

Working areas	Output	Speed	g/kWh	l/h
Standard speed PTO 540	100 %	1,911	251	26,9
Economy PTO 540E	100 %	1,563	232	23,7
Standard speed PTO 1,000	100 %	1,950	254	27,1
Economy PTO 1,000E	100 %	•	•	•
Engine in top speed range	80 %	max.	305	24,9
High output	80 %	90 %	264	21,6
Transport work	40 %	90 %	313	12,7
Low output, ½ speed	40 %	60 %	247	10,1
High output, ½ speed	60 %	60 %	231	14,1

THE TEST RESULTS

Engine +

Performance characteristics	2,1
Fuel economy	1,5
Pto output/drawbar power	1,7

Good performance characteristics and high drive power, but a low start-off torque. Fuel economy is nearly 6% better than the average for the Forterra 135's power class.

Transmission ○/−

Gearbox ratios/functions	3,5
Shifting	2,8
Clutch, throttle	3,5
Pto	4,0

Basic gearbox with a large number of speeds. No forward/reverse powershuttle and only three powershift steps. Pto has two speeds, which are selected by turning the stub.

Axles and running gear ○

Steering	1,5
Four-wheel drive and diff lock	3,5
Hand/foot brake	2,0
Suspension	n.a.
Weight and payload	3,5

Manoeuvrable with a direct steering system, but no auto engagement of four-wheel drive and diff lock; powerful brakes; no front-axle suspension available; inadequate payload.

Linkage/hydraulics +/−

Lift power and lift height	2,0
Operation	1,5
Hydraulic output	3,7
Spool valves	4,0
Hydraulic couplers	4,0

Excellent lift capacities and operation; hydraulic output too low for this hp bracket; operation and labelling of rear spools need improving.

Cab ○

Space and comfort	3,2
Visibility	2,5
Heating/ventilation	3,0
Noise level	4,0
Electric system	2,0
Build quality	2,0
Maintenance	2,0

Space and visibility are OK for a tractor in this power sector; 80dB(A) noise level under load is high and needs further designer attention.

ABILITY	−−	−	○	+	++
Basic standards					•
Average standards			•		
High standards	•				
Field work			•		
Grassland work			•		
Transport work		•			
Loader work			•		

Grading system
++ very good; + good; ○ average;
− below average; −− poor

The individual marks are extracts from our assessments and do not necessarily result in a mathematically conclusive overall mark.