

AROUND 11 LITERS

A PERFORMING NEW ENTRY



We know the Super, it is the 13-litre that competes with Weichai for the road efficiency record. A dualism that cannot be found in industrial scenarios since Scania has churned out the only monoblock capable of breaking through the 50% efficiency sound wall. *“Thanks to the new exhaust gas treatment system, a reduced internal friction and an increased turbocharger efficiency, the new generation of Scania’s engines sets a new standard for efficiency in industrial and power applications. Our leadership now also extends to power solutions,”* said **Joel Granath**, Senior Vice President and Head of Power Solutions at Scania. What perhaps not everyone remembers is that Scania

BRAND MODEL	AGCO POWER 98 CTA SCR	LIEBHERR D936 A7
I. D.		
B x S mm - S/B	111 x 145 - 1,31	122 x 150 - 1,23
N. cil. - dm ³	7 - 9,82	6 - 10,
Maximum power kW - rpm	365 - 2.100	320 - 1.900
Mep at max power bar	21,7	19,6
Piston speed m/s	10,2	9,5
Maximum torque Nm - rpm	1.901 - 1.500	1970 - 1.000
Mep at max torque bar	24,8	24
% power at max torque (kW)	42,1	51,6
Torque at max power Nm	1.656	1.607
% power at max torque (kW)	81,9 (299)	64,50 (206)
Work range rpm	600	900
DETAILS		
Specific power kW/dm ³	37,1	30,4
Specific torque Nm/dm ³	193,5	187,2
Areal spec. power kW/dm ²	53,91	45,65
RULES AND BALANCE		
Dry weight kg	850	1.150
L x W x H mm	1.200x850x1.100	1.592x918x1.151
Volume m ³	1,12	1,68
Weight/power kg/kW	2,3	3,6
Weight/displacement kg/dm ³	86,5	109,3
Power density kW/m ³	325,9	190,5
Total density t/m ³	0,76	0,68
Displacement/volume dm ³ /m ³	8,77	6,26



Pär Olof Åhlin, Product Manager, Power Generation, Scania:
"This is our most fuel-efficient engine platform ever, with more torque, more power and up to 50 percent longer base engine lifespan."

MAN D20	MTU 6R1100	SCANIA DC11 542A	VOLVO PENTA TAD1183V3
120 x 155 - 1,29	125 x 145 - 1,16	130 x 160 - 1,23	123 x 152 - 1,24
6 - 10,51	6 - 10,67	5 - 10,61	6 - 10,83
324 - 1.800	320 - 1.900	368 - 1.900	315 - 1.700
20,9	19,3	22,3	20,9
9,3	9,2	10,1	8,6
2097 - 1.000	2100 - 1.000	2.523 - 1.200	1938 - 1.400
25,6	25,2	30,5	22,9
54,7	55,6	58,6	51,6
1.715	1.607	1.842	1.764
67,80 (220)	68,80 (220)	86,20 (317)	90,30 (284)
800	900	700	300
30,8	29,9	34,6	29
199,3	196,6	237,5	178,8
47,72	43,48	55,42	44,18
975	990	970	1.127
1.630x893x1.046	1.325x955x1.230	1.235x1.171x931	1.398x921x1.153
1,52	1,56	1,35	1,48
3	3,1	2,6	3,6
92,7	92,7	91,3	104
213,2	205,1	272,6	212,8
0,64	0,63	0,72	0,76
6,92	6,84	7,87	7,32

has broken the spell of the trilogy: between the 9-litre and the 13-litre, without disturbing His Majesty the V8, it has introduced an 11-litre. After the season of the 11.7-litre hex cylinder, an oversized successor to an 11-litre ancestor (see box), the time has come to expand the Swedish family. The starting point is the "old" DC13, of which the 130-millimetre bore remains intact, with a solid addition of vertical thrust. In fact, the stroke increases from 140 to 160 millimetres. The result is a 10.6 litre, spread over five cylinders, like the 9-litre. Ours, in fact, is also an odd one, like its smaller brother, and is the expression of a modular platform shared with the 13-litre Super. At the time of its launch, the Gryphon promised 8%

COMPARISONS

savings compared to the previous 13-litre version.

During the usual end-of-year press conference, however, Scania adjusted that figure up to 10%. *“Renewable fuels and electrified vehicles will increase their share dramatically in the coming years, but we still depend on combustion engines for our daily lives. That is why Scania’s new engine is so important, as it will contribute to a substantial decarbonisation for the rest of this decade.”* This was the premise and promise of **Alexander Vlaskamp**, Executive Vice President and Head of Sales and Marketing. As is standard practice, we put the highest-performing calibration, 368 kilowatts, in the comparison form. The available power scale starts at 202 kilowatts. The vital section of the Super family confirms the ingredients of Scania’s recent success, namely

Stage IIIB, and Euro 4 onwards. The engine management system is the tested Ems, which oversees the Xoi nozzles delivery, and communicates with the variable geometry turbo. The distribution is ensured by the double overhead camshaft. Attention to flow management is one of the keys to efficiency implementation, also including the cooling development, together with the benefits of the engine block and cylinder head, and a gear transmission. The fuel filter is mounted on the engine, the additional prefilter features a water separator.

The oil cooler is integrated in the cylinder block. Integrated auxiliary braking is provided by the compression release brake (Crb), which is integrated in the engine and weighs 7 kilos.

Let’s go through the other main contestants of the competition. We

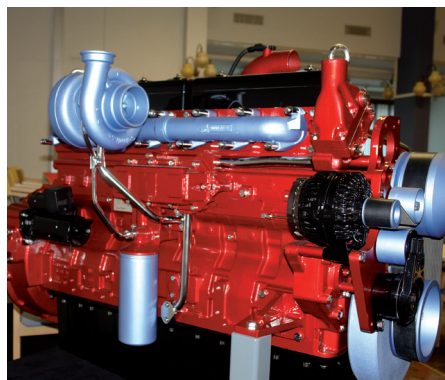
have selected only the most similar displacements, i.e. in the narrow range of cubic centimetres between 9.8 and 10.8 litres. In the past, we had widened such range to 9 litres, thus including two giants of the dual stage, here interpreted as competence in both road and industrial, such as Caterpillar, Cummins, Fpt Industrial and Perkins. Moreover, the “twins” Cat and Perkins had won the Diesel Index of the comparison exactly two years before. In Turin, it is possible to find the 11-litre, namely the Cursor 11, currently destined for Iveco’s S-Way. Let’s start with the good news, even if that means starting from the end: the Diesel Index is a prerogative of the DC11, as well as the Performance Index and Compactness Index. Scania shares with the other Scandinavian company, Agco Power, the singular “odd”attitude.

BRAND MODEL	AGCO POWER 98 CTA SCR	LIEBHERR D936 A7	MAN D20	MTU 6R1100
INDEX				
Torque	9,2	12,0	11,1	12,1
Performance	7,3	6,9	7,2	7,0
Stress	11,7	11,2	11,6	11,5
Lightness	11,2	14,1	11,5	11,9
Density	11	7,2	8,3	8,0
DIESEL INDEX	7,9	7,4	7,7	7,7

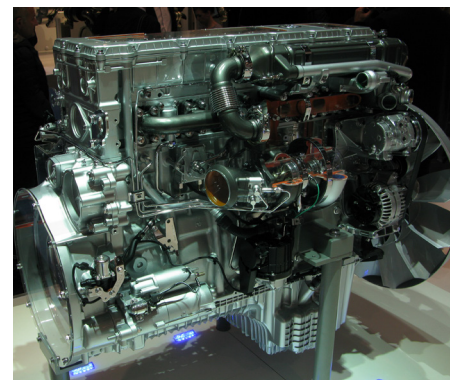
1 | SCANIA



2 | AGCO POWER



3 | ROLLS-ROYCE



This is in turn a *sui generis* analogy, since odd for Scania means 5 cylinders, while Agco splits the cubic capacity over 7 cylinders. The result is the comparison of a 2.12-litre and a 1.4-litre barrel which in terms of stress are very similar, giving curves that are not so different and with the same piston speed. Their respective average effective pressures also get in the top rungs of the podium, demonstrating a precise engineering will. Leaving this “ugrofinnic” dualism, what are Scania’s winning cards on the table for this comparison? Certainly, those that answer the ear worm of any engine comparison: specific torque and compactness. To translate this concept into numbers, just think of the gap with the second-placed contestant in the partial ranking of torque to displacement ratio: almost 20 percent, sim-

SCANIA DSC11 - DSC12

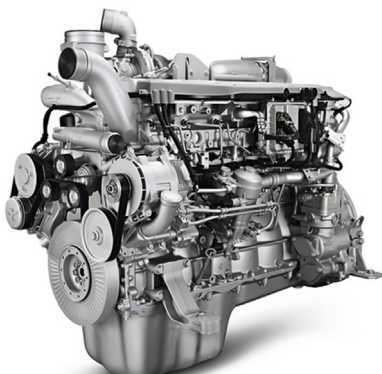
The genesis of Scania’s 11-litre (BxS 127x145 mm) finds its roots in the Sixties. Its restyling started in 1983 and was fully enhanced with its “release” in 1989: specific consumption of 195 g/kWh, thermodynamic performance of 44.1%. The marine-like version is equipped with a Bosch P7100 pump and gains 11% power, 285 kilowatts at 2,100 rpm. In 1998 the 11-litre engine made way for the 12-litre, consequently to a generous lengthening of the stroke (DSC12: BxS 127x154 mm), which doesn’t compromise its compactness. Here the truck influence is even more evident. There are four valves, an electronic injection control by DEC 2, a two-stage oil filtration, single heads, midstop wet barrels to minimise corrosion and cavitation, a high-positioned camshaft with roller plungers providing a precise distribution, a Poly-V belt, which is destined to auxiliary driving, and a flat oil exchanger integrated into the monoblock. The injection is ensured by Bosch pumps, either 3000 or 8000 depending on the model. At the time, the regulator, which controls injection according to the requested load and power, was already prearranged for a potential integration of other control systems, via CAN. The last shot in the arm was in 2001, with the switch to Hpi injection, conceived together with Cummins.

SCANIA
DC11 542A

VOLVO PENTA
TAD1183V3

10,9	6,1
8,2	6,6
13,5	10,5
12,0	13,6
11,5	7,8
8,1	6,6

4 | MAN



ilarly to the gap with Rolls-Royce Power Systems’ equal displacement (10.6 litres, even if fractioned over 6 cylinders), in this case in absolute torque values (423 Nm difference). It is instead AGCO that catches all the attention in terms of specific power, due to its 365 kilowatts spread over 7 cylinders and just 9.8 litres. With 37.1 kilowatts/litre, it leaves behind all the other competitors that, all in all, are fairly aligned, with the exception of Volvo Penta, which is weaker than in other situations. It is needless to say that we are only talking about supercharged engines, and the VGT blows loudly. There is no room for jokes here

when it comes to electronic control and common rail. What we report in our conclusion is just an impression. While waiting for the drafting of the final text of the Euro 7 standard, we don’t know how ingenious the automotive manufacturers will be and what they will be adding to the industrial price lists. What is certain is that Scania has accelerated on the enhancement of endothermic engines, as far as it will be allowed by European legislators, and not only there. The impression concerns the possible massive adhesion of engines between 9 and 13 litres to hydrogen power supply. Only time will tell...