

This press pack accompanied the UK launch of the Avensis 2.2 D-4D and 2.2 D-CAT, new diesel-powered additions to the second generation Avensis range, in May 2005. The model underwent changes during its time on sale which can be tracked using the Timeline feature on the second generation Avensis archive page. Further assets and information relating to the second generation Avensis can be obtained from the press office.

THE NEW TOYOTA AVENSIS 2.2-litre D-4D

First in a new diesel power generation

KEY POINTS

- New all-aluminium 2.2-litre D-4D engine for the Toyota Avensis
- 148bhp (150 din hp) at 3,600rpm and 310Nm from 2,000 to 3,200rpm
- Lightweight all-aluminium construction
- Maximum speed 130mph, 0-62mph in 9.3 seconds
- 47.9mpg combined cycle fuel economy
- 156g/km carbon dioxide emissions rating – band D for Vehicle Excise Duty
- Low emissions place it in same company car tax band as 2.0 D-4D Avensis
- Low nitrogen oxides and particulate matter (NOx and PM) emissions
- New, compact and lightweight six-speed transmission
- Improved vehicle NVH performance for a calmer, smoother driving experience
- First engine in a new generation of Toyota diesel power units
- On sale in the UK from 1 July
- Available in saloon, hatchback and Tourer body styles in T_{3-S}, T_{3-X}, T₄ and T Spirit grades
- Prices from £18,145 (T₃ saloon/hatchback)
- 175bhp 2.2-litre D-4D engine with D-CAT (Diesel Clean Advanced Technology) system to join UK Avensis range in mid-2006

AIMED AT THE HEART OF THE DIESEL MARKET

The introduction of the new 2.2-litre D-4D engine will make the Toyota Avensis an even stronger prospect. The new 148bhp 2.2-litre D-4D will join the existing 114bhp 2.0-litre D-4D engine from 1 July, while in 2006 the choice will extend to include a

175bhp (177 din hp) 2.2-litre D-4D with D-CAT technology for exceptional emissions performance.

The 148hp engine enters the largest section of the diesel D segment in the UK, accounting for 58 per cent of sales in 2004. It is expected to become the most popular engine in the Avensis range, claiming up to 29 per cent of the sales mix in Europe.

The existing 2.0-litre D-4D and the new 2.2-litre unit will between them cover 95 per cent of the diesel D segment demand in the UK; with the introduction of the 175bhp unit next year, the range will address 99 per cent of the sector in terms of power range.

The 2.2-litre D-4D will be available in Avensis saloon, hatchback and Tourer body styles in T_{3-S}, T_{3-X}, T₄ and T Spirit grades with prices from £18,145 for the T_{3-S} and the T_{3-X} saloon and hatchback.

At the same time as the new engine becomes available, the Avensis is being offered with a new exterior colour, Alsace Granite, and with a new gearlever design, specific to the 2.2-litre D-4D.

THE AVENSIS: TOYOTA'S EUROPEAN FLAGSHIP, BUILT IN BRITAIN

Launched in 2002, the Avensis is the flagship of Toyota's European model range, bringing outstanding safety performance, style and all-embracing superior quality to the D segment.

In 2004 Avensis achieved its highest sales figures yet in the UK, rising by more than 12 per cent on the previous year with a 5.7 per cent segment share. This surge was fuelled by a rise of more than a third in fleet sales.

The model's success in the UK is reflected across Europe as a whole where sales rose above 145,000 units in 2004, an increase of more than 25 per cent on 2003. This raised Avensis to fifth place in the European D segment.

Worldwide production of the Avensis is at Toyota's Burnaston factory near Derby. Last year rising demand, including the first Avensis imports to Japan, prompted an increase in production capacity at the factory to 285,000 units a year from mid-2005.

Toyota invested an extra £50 million at Burnaston, creating an extra 500 jobs. Toyota's total investment in its UK manufacturing operations now stands at more than £1.75 billion.

LIGHTWEIGHT ENGINE CONSTRUCTION

Toyota has adopted an all-aluminium construction for its new 2.2 D-4D engines, following the concept it pioneered with the 1.4-litre D-4D unit used in the Corolla and Yaris models.

As a result, both versions (148 and 175bhp) of the new engine are lighter than competitor units that still use a cast iron block.

Efficiency and low noise, vibration and harshness (NVH) characteristics are helped by a particularly low 16.8:1 compression ratio for the 148bhp engine. The 175bhp version will feature the lowest compression ratio of any diesel engine, 15.8:1.

THE 148bhp D-4D ENGINE

The 148bhp 2.2-litre D-4D engine has been designed to offer a good balance of power and economy.

Key to its performance is its strong torque performance: with a maximum 310Nm from 2,000 to 3,200rpm, it provides great driveability. This is demonstrated in a time of 10.65 seconds for acceleration from 50 to 70mph in fifth gear.

The unit is positioned at the heart of the D segment diesel market, which should ensure it becomes the best-selling engine in the Avensis range. Carbon dioxide emissions are 156g/km, just 1g/km more than Toyota's 2.0-litre D-4D unit, which means models using the new engine are placed in the same company car tax bracket as their 2.0-litre diesel equivalents.

The 2.2-litre D-4D will power the Avensis from rest to 62mph in 9.3 seconds and attain a top speed of 130mph. Combined cycle fuel consumption is 47.9mpg (47.1mpg for Tourer versions).

THE 175bhp 2.2 D-4D ENGINE

A further development of the new 2.2 D-4D engine will be a 175bhp D-CAT unit that will be available in the UK in mid-2006.

Its excellent performance and efficiency will be aided by piezoelectric injection technology, used for the first time in an engine of this capacity. The piezoelectric injectors can inject larger volumes of fuel twice as fast as conventional solenoid injectors.

The engine will give the Avensis a top speed of 137mph and 0-62mph acceleration in 8.6 seconds. Combined cycle fuel economy is 46.3mpg (45.6mpg for the Tourer).

Toyota D-CAT

The 175bhp engine uses Toyota D-CAT technology to bring harmful exhaust emissions down to the lowest levels of any modern diesel engine. Its performance is well below the levels required by Euro IV and its CO₂ emissions rating of 161g/km is just 5g/km higher than for the 148bhp engine.

NEW SIX-SPEED MANUAL TRANSMISSION

Both 2.2 D-4D engines use a new six-speed manual gearbox, designed to provide smooth, quick and precise shifts.

The new unit is both robust and very compact, measuring 384mm long. Using the lowest viscosity oil available, it can deliver a reduction of up to one per cent in fuel consumption.

LOW COST OF OWNERSHIP

As with all its new products, Toyota has designed the 2.2-litre D-4D engine to be simple and cheap to maintain with the engine running on mineral or semi-synthetic lubricant, which is cheaper than the fully synthetic kind used by rival engines.

The 2.2 D-4D matches its 2.0 D-4D stablemate in requiring only 4.2 labour hours for routine maintenance up to 60,000 miles, adding to the low cost of ownership profile.

IMPROVED NVH AND DRIVING DYNAMICS

The new 2.2 D-4D engine has improved NVH performance, aided by a low compression ratio and the adoption of a balancer shaft that significantly reduces engine booming.

Avensis models equipped with the engine will also use a noise-suppressing acoustic windscreen and benefit from improved and additional insulation in key areas.

At the same time, improvements have been made to the suspension system to suit the new engine's performance. This includes stiffer spring and damper rates and adjustment of the power steering pump for quicker responses.

BUILT IN EUROPE

The new 2.2 D-4D engine is produced at a new Toyota factory in Jelcz-Laskowice in Poland – Toyota's eighth manufacturing centre in Europe.

Toyota Motor Industries Poland (TMIP) was announced in 2001 and building work on the site was completed in 2004. Engine production started in March this year and will reach a maximum output of 180,000 units a year in 2007. Toyota has invested £200 million (approximately £140 million) in TMIP.

THE TOYOTA AVENSIS

Toyota's European flagship

- Hatchback, saloon and Tourer body styles
- Top five-star passenger safety rating in Euro NCAP testing
- Record-breaking UK and European sales performance in 2004
- Built exclusively at Burnaston, near Derby, with investment for production increase to 285,000
- New diesel engine family will address the needs of even more customers

A COMPETITIVE PROPOSITION

The Avensis is Toyota's flagship in Europe, available in a full range of high-quality and high-specification versions, including hatchback, saloon and Tourer body styles. Exclusive worldwide production is at Toyota's Burnaston factory, near Derby, where £50 million has been invested in increasing capacity to 285,000 units a year from mid-2005. This takes Toyota's total investment in its UK manufacturing operations to more than £1.75 billion.

Right from the point of the car's launch in 2003, Avensis was engineered around the concept of superior quality and also demonstrated exceptional safety. It was the first

Toyota model to adopt the Minimal Intrusion Cabin System (MICS), a structure concept that effectively reduces the risk of serious injury in a collision. Avensis was also the first model in its class to offer an 18-litre driver's knee airbag as standard.

These elements helped Avensis achieve the top five-star classification for passenger crash protection in Euro NCAP testing.

Sophisticated suspension geometry provides superior handling and a flat ride for excellent comfort. The rear suspension was developed from the double wishbone system created for the Toyota Celica sports coupe, with the addition of a toe-control arm for a more compliant ride suitable for a D segment saloon.

Another key factor in the quality of the Avensis is its strong body structure. Constructed in lightweight, high-tensile steel, it offers excellent torsional rigidity.

In the UK, sales rose by 12.1 per cent to 26,011 units, delivering a 5.7 per cent share of the D segment. This rise was driven by substantial growth in fleet volume: up by 33.3 per cent year-on-year to claim a seven per cent market share, making Avensis the fifth-ranked model in its class.

In Europe sales were up by 25 per cent compared to 2003 to just more than 145,000 units. This has taken the model to fifth place among new registrations in the D segment.

The introduction of the new 148bhp 2.2-litre D-4D engine on 1 July and the arrival in 2006 of the 175bhp unit will add extra impetus to UK sales, in line with the expected continued growth in diesel market penetration.

A NEW DIESEL POWER GENERATION

In 2003 the Toyota Avensis became the first model range in the world to be offered with an engine range fully compliant with Euro IV emission standards.

At the time of launch, two petrol engines and one diesel were available: 1.8-litre VVT-i and 2.0-litre direct injection VVT-i petrol units and the 2.0-litre D-4D diesel. A 2.4-litre direct injection VVT-i followed on in 2004.

Now the strength in depth of this engine range is being increased with the launch of the brand new 2.2-litre D-4D diesel. Initially available in the UK in 148bhp form, with a 175bhp to follow in 2006, the Avensis will offer customers one of the most complete diesel engine ranges in its segment.

Even before the arrival of the 175bhp unit, the 114bhp 2.0 D-4D and the 148bhp 2.2 D-4D will enable Avensis to cover 95 per cent of demand in the UK D segment diesel market.

The 148bhp unit is targeted at the heart of the market sector, offering a balance of performance and economy that is highly competitive with all other units in the 1.9 to 2.2-litre category.

As well as its 47.9mpg combined fuel consumption and 156g/km CO₂ emissions, the engine offers strong mid-range torque to enable efficient overtaking power at motorway speeds: acceleration from 50 to 75mph in fifth gear takes 10.6 seconds. A maximum 310Nm is available all the way from 2,000 to 3,200rpm for comfortable cruising and confident overtaking performance.

The low CO₂ figure of 156g/km means that the new 2.2-litre D-4D is in the same tax band as the current 2.0-litre D-4D which is very positive news for company car users paying company car tax.

The 175bhp engine will allow Avensis to compete with the most powerful engines in the top five per cent of its sector, using a raft of advanced technologies and components to deliver powerful and refined performance.

TOYOTA AVENSIS 148bhp 2.2 D-4D PRICES

Details of the full Toyota Avensis 148bhp 2.2 D-4D range and pricing are given in the table below.

MODEL	PRICE
T _{3-S} saloon/hatchback	£18,145
T _{3-S} Tourer	£19,145
T _{3-X} saloon/hatchback	£18,145
T _{3-X} Tourer	£19,145
T ₄ saloon/hatchback	£19,645
T ₄ Tourer	£20,645

T Spirit saloon/hatchback	£20,895
T Spirit Tourer	£21,895

The new Toyota Avensis 2.2 D-4D enters one of the hardest-fought sectors of the UK diesel new car market. Taking into account its quality, safety performance and pricing, it stands as one of the most attractive prospects in terms of on-the-road pricing, even before its strong cost of ownership profile is added into the equation.

Taking as an example the 2.2 D-4D T_{3-x} model, its price, adjusted for specification details, proves greater value than the Volkswagen Passat 1.9 TDI 130 SE, the new-look Renault Laguna 2.2 dCi 150 Dynamique and the Vauxhall Vectra 1.9 CDTi (150PS) Life. These rivals work out between 1.70 (Passat) and 7.85 per cent (Vauxhall) more expensive than the Toyota.

The Avensis trumps the Passat in terms of engine power and the standard provision of front fog lights, a six-speed transmission, 16-inch alloy wheels and driver's knee airbag. The Laguna lacks a tachometer, split-folding rear bench seat and the knee airbag. The Vectra lacks rain-sensing wipers, the split-folding rear bench seat, trip computer, 16-inch wheels and leather steering wheel trim. None of these rivals are equipped with the auto-dipping rear-view mirror provided as standard on the Toyota, and only the Laguna matches the provision of electric folding door mirrors.

Some of these rival cars have features that are not standard on the Avensis, but the taking these into account in the value-adjusted price demonstrates how, based on the T_{3-x} specification, the Avensis emerges as the best deal, as shown in the table below.

TOYOTA AVENSIS T_{3-x} COMPETITOR COMPARISON

MODEL	TOYOTA AVENSIS 2.2 D-4D T _{3-x}	VOLKSWAGEN PASSAT 1.9 TDI 130 SE	RENAULT LAGUNA 2.2 dCi 150 DYNAMIQUE	VAUXHALL VECTRA 1.9 CDTi LIFE
On-the-road price	£18,145	£17,710	£18,930	£17,850
Price advantage	-	-2.40%	+4.33%	-1.63%
Sound system – No of speakers	8	8	6	6
Remote audio controls	✓	✗	✓	✓
CD autochanger	✗	✓	✗	✗
Trip computer	✓	✓	✓	✗
Climate control air conditioning	✓	✓	✓	✗
Cruise control	✗	✗	✓	✓

Automatic headlights	x	x	✓	x
Automatic wipers	✓	x	✓	x
Front fog lamps	✓	x	✓	✓
Electric folding door mirrors	✓	x	✓	x
Auto-dimming rear-view mirror	✓	x	x	x
Alloy wheel size	16in	15in	16in	16in
Specification adjustment	-	+£760	+£630	+£1,720
Adjusted price	£18,145	£18,470	£19,560	£19,570
Price advantage	-	+1.79%	+7.80%	+7.85%

Note: selected equipment features listed; pricing calculations based on complete specification comparison.

ENGINE CONSTRUCTION

Lightweight and efficient

- Lightweight all-aluminium construction with block developed from Toyota's AZ petrol engine family
- Full integration of components such as water and oil pumps to reduce size and weight
- Low compression ratio for improved engine efficiency and low NVH

WEIGHT-SAVING MEASURES

The new 148bhp 2.2-litre D-4D engine was designed from the start to be light and compact in order to reduce fuel consumption and harmful exhaust emissions and also to lessen the impact on driving dynamics by delivering a better front-to-rear weight distribution.

To achieve these goals, Toyota opted for an all-aluminium construction. It has considerable experience in this technology, having already developed the world's first diesel engine built entirely in aluminium in place of cast iron: in 2001 it used the aluminium block of the 1.5-litre petrol engine in the Yaris T Sport as the basis for a new 1.4-litre D-4D diesel unit.

For the new 2.2-litre D-4D Toyota has adopted the aluminium block from the AZ petrol engine family, which includes the 2.0 direct injection petrol unit featured in the Avensis range. Cast iron liners are used in the cylinder bores, for greater resistance to wear.

Further weight-saving has been achieved by constructing the oil cooler entirely in aluminium as well.

The development team has also worked to integrate different components into a single structure. Traditionally separate items, the water and oil pumps form part of the chain cover. This has made the oil pump 20 per cent smaller and five per cent lighter. New, lower tension 2mm piston rings have been used to reduce friction losses.

These measures contribute to making the 2.2-litre D-4D engine lighter than rival diesel engines that continue to use a cast-iron block.

LOW COMPRESSION RATIO FOR GREATER EFFICIENCY

One of the key factors in the high efficiency and low noise, vibration and harshness (NVH) characteristics of the new 148bhp 2.2 D-4D engine is its low compression ratio of 16.8:1. The forthcoming 175bhp version will reduce this figure further, to 15.8:1 – the lowest in the world for a diesel engine.

A low compression ratio means the engine requires less effort to compress the air-fuel mixture. This makes the engine more efficient, delivering higher performance with lower fuel consumption.

Leaner engines (those that adopt a high air-fuel mixture, such as diesels) tend to produce high levels of nitrogen oxides (NOx), as they are unable to use a larger amount of fuel to reduce the build-up of heat in the piston bowl. This also leads to higher combustion temperatures. By reducing the compression ratio, it is possible to bring down the combustion temperature and so help cut the generation of NOx.

By reducing the compression build-up inside the cylinder and combustion chamber, it is possible to reduce the noise and vibration caused by each ignition cycle.

The lower compression ratio also gave the engineers freedom to develop lighter moving parts and the lightweight aluminium engine block, without compromising durability and reliability.

INJECTION AND INDUCTION SYSTEMS

Power with efficiency

- State-of-the-art piezoelectric injectors
- Operation twice as fast as solenoid injectors
- Up to five injections per cycle
- Electrically-activated turbocharger allows more precise control and improved torque at low engine speeds
- New intercooler with heat exchange area eight times larger than on previous D-4D engines

SOPHISTICATED COMMON RAIL INJECTION SYSTEM

The 175bhp 2.2 D-4D engine uses piezoelectric technology in its common rail system, a first for an engine of this capacity.

Each injector contains a stack of piezoelectric ceramic elements. When an electric charge is applied to the stack, these elements instantly expand, lifting the injector's nozzle needle and allowing fuel at high pressure in the common rail to be injected into the cylinder.

This system allows larger volumes of fuel to be injected twice as quickly as is possible with the solenoid injectors used by most other common rail diesel engines.

Each injector has 10 nozzles, four more than on the solenoid system used in Toyota's 2.0 D-4D engine. Injection pressure is the highest for a system of its type, 1,800bar

This, combined with a nozzle diameter of 0.13mm, gives better dispersion and atomisation of the fuel, which in turn permits combustion at lower pressure. Hence the engine's record low 15.8:1 compression ratio.

The piezoelectric system can perform up to five injections per cycle, with a single pilot injection at hot idle and full load and multiple injections at light and mid-load. Pilot injection can be optimised, leading to a significant reduction in combustion noise.

The quality of this system is a key element in achieving excellent power and torque performance, with high fuel efficiency and low NVH.

ELECTRICALLY-ACTIVATED TURBOCHARGER

The 175bhp 2.2 D-4D uses an electrically activated variable nozzle turbocharger (VNT). This is equipped with vanes in the turbine housing the change angle according to the speed of the exhaust gas flow. Although normally activated by a step motor, in this engine they are triggered by a direct-current electric motor. This lets the engine's ECU control the vanes more precisely and progressively, increasing turbocharger efficiency. The vanes can be activated at lower speeds as well, if required.

Compared with the 2.0-litre D-4D engine, the turbine wheel inertia has been reduced by 30 per cent, with fewer and less thick blades. This contributes to quicker response at low speeds.

EFFICIENT INTERCOOLER

A new intercooler has been developed for both the 2.2 D-4D engines, with a heat exchange area increased by eight times. This raises heat exchange efficiency from 68 to 88 per cent.

This plays an important part in improving volumetric efficiency and thereby engine performance.

TOYOTA D-CAT

The World's cleanest diesel technology

- 175bhp 2.2 D-4D engine equipped with Toyota D-CAT for substantial reduction of harmful exhaust emissions
- Emissions levels for nitrogen oxides and particulate matter better than Euro IV standards
- Acceleration from 0-62mph in 8.6 seconds
- Top speed 137mph
- Combined cycle fuel consumption 46.3mpg
- Available in the UK in mid-2006

TOYOTA D-CAT

The 175bhp version of Toyota's 2.2 D-4D engine family uses D-CAT (Diesel Clean Advanced Technology) to reduce exhaust emissions to a level lower than any other modern diesel engine, well within the forthcoming Euro IV standards for hydrocarbons (HC), carbon monoxide (CO), nitrogen oxides (NOx) and particulate matter (PM).

At the heart of Toyota D-CAT is the DPNR (Diesel Particulate NOx Reduction) four-way catalyst that is able to reduce PM, NOx, HC and CO content in the exhaust gases simultaneously.

The DPNR catalyst uses a highly porous ceramic filter, mounted close to the exhaust manifold. Further down the exhaust system there is also a conventional oxidation catalyst.

The DPNR is able to oxidise particulate matter in lean-burn combustion, using active oxygen from the NOx temporarily stored in the catalyst, created by means of a rich "spike" injected into the exhaust port (EPI).

Unlike particulate filters used on rival diesel engines, the DPNR catalyst is maintenance free.

EXHAUST PORT INJECTION

The effective operation of the DPNR catalyst is reliant on the engine management system being able to vary the air/fuel ratio in the exhaust gases. To achieve this, a fifth injection nozzle is located in the exhaust port. This enables fuel to be injected into the exhaust manifold at a critical point as a rich "spike", allowing the catalyst to reduce the amount of stored NOx.

EPI is also used for sulphur discharge control, raising the bed temperature to a level at which excess sulphur can start to be reduced.

EXHAUST GAS RECIRCULATION

Toyota D-Cat uses a high-response exhaust gas recirculation (EGR) valve that has twice the discharge rate of the one used on the 2.0 D-4D engine. It also opens more quickly, so can react faster to changing conditions and reduce the amount of smoke created during acceleration.

A large capacity, high-efficiency EGR cooler reduces the temperature of the exhaust gases recirculated in the combustion chamber. The cooler the gases, the greater their density, allowing a larger mass to be fed into the chamber each time.

The EGR circuit has a by-pass valve, enabling it to divert the gases, avoiding the cooler. This allows EGR to operate and reduce emissions even in cold conditions.

NEW SIX-SPEED TRANSMISSION

Precision, performance and fuel economy

- Extremely compact design – 384mm long but with 400Nm torque capacity
- Three-axis configuration enables 20 percent reduction in length
- Use of low-viscosity oil can improve fuel consumption by up to one per cent
- High sixth gear ratio improves fuel consumption

SMOOTH AND PRECISE GEARCHANGE

The new 2.2-litre D-4D engine is matched to a new six-speed manual transmission that delivers smooth, quick and precise gear changes. These qualities are the result of using a multi-cone synchromesh in first to fourth gears so that less effort is required when changing gears.

The gearbox uses a slide ball-bearing in the select lever and fork shafts, giving high shift efficiency. There is also a shift guide plate that decreases the amount of “play” in the linkage once a gear has been selected. A re-shaped mass damper also helps improve shift smoothness.

The 175bhp 2.2-litre D-4D engine will use the same gearbox, but with a lower ratio for sixth gear.

COMPACT CONSTRUCTION

The new gearbox not only has a robust construction, it is also very compact. Measuring 384mm long, it is shorter than other six-speed units with the same or lower torque capacity.

A three-axis construction, with one input and two output shafts, enables the gearbox to be 20 per cent shorter than one with a two-axis design.

In some cases, the same drive cog is used for two different gears, such as for fourth and fifth or first and reverse. This strategy helped Toyota's engineers keep the gearbox dimensions compact and also kept its overall weight down. More weight saving is gained from the all-aluminium transmission casing.

REDUCING FUEL CONSUMPTION

The new six-speed unit uses the lowest viscosity oil available for manual transmissions. This factor alone can yield a reduction in fuel consumption of up to one per cent.

Turbulence is reduced by an aluminium oil separator inside the gearbox which prevents the oil in the sump being directly stirred by the output shaft. The shaft bearings have a lower friction coefficient than those in the five-speed transmission used with the 2.0-litre D-4D engine, giving smoother performance.

The transmission was developed to provide a wide range of gear ratios, which gives smoother and more flexible driving performance, particularly notable when motorway cruising.

CLUTCH PERFORMANCE

The quality of the clutch design contributes to the overall refinement of the 2.2-litre D-4D powertrain.

It uses a dual-mass flywheel comprising two parts – input side and output side – articulated through four arc-type springs. They provide efficient damping against the engine's acceleration and torque fluctuation. As a result, transmission rattle and low speed booming are substantially reduced.

COST OF OWNERSHIP

The best investment in the segment

- Insurance groups 9E (T_{3-S} and T_{3-X}) and 10E (T₄ and T Spirit)
- Insurance ratings just one group higher than the Avensis 2.0 D-4D

- Lowest-in-class cumulative scheduled maintenance time up to 60,000 miles – 4.2 hours
- Superior quality and reliability record in D segment

LOW REPAIR COSTS

The new Toyota Avensis 2.2 D-4D capitalises on the model's established, excellent record for low repair costs. Items such as headlamp mounting brackets designed to break on impact before the lamp itself is damaged, a large front bumper which helps protect the bonnet from damage in a collision, and aluminium rear bumper reinforcements have all been developed specifically to reduce the cost of repairs.

In addition, a bolt-on crushable box structure within the front bumper mountings means this section can be replaced simply, with no need for cutting or welding.

The 2.2 D-4D Avensis has been given UK insurance group ratings of 9E for T_{3-S} and T_{3-X} models and 10E for the T₄ and T Spirit versions. These are just one group higher than for the Avensis 2.0 D-4D models.

IMPROVED MAINTENANCE

The 2.2-litre D-4D engine requires major servicing every 20,000 miles with an annual health check with an oil change every 10,000 miles. The oil change process is made cleaner on the new engine thanks to a new sump draining system.

The 2.2-litre D-4D engine matches the Toyota's 2.0-litre D-4D unit in terms of the cumulative maintenance time up to 60,000 miles: at 4.2 hours, it's the lowest in the diesel D segment. Both engines also run on mineral or semi-synthetic oils, which are cheaper than the fully synthetic type demanded by other rival engines.

An automatic tensioner means there is no need for the auxiliary drive belt tension to be checked, as is the case for valve clearances, thanks to the use of hydraulic valve compensators. Engine coolant will last for 100,000 miles before changing.

These factors and the adoption of a metal chain drive in place of a timing belt contribute to a reduction in both the labour hours and the overall cost of standard servicing up to 60,000 miles, compared to the Avensis 2.0 D-4D models. The price advantage of the 2.2 D-4D range on service parts and labour costs is £102 (£511.88 versus £614.18). Taking standard tyre and brake repair and maintenance into

account as well, the 2.2 D-4D's cost advantage remains: £264 against the equivalent 2.0 D-4D Avensis.

ADDED APPEAL FOR BUSINESS CUSTOMERS

The low emissions performance of the 2.2 D-4D engine gives an official CO₂ rating of 156g/km, which places the Avensis in band D for Vehicle Excise Duty. It presents a particularly strong proposition for UK company car drivers as it falls into the same tax band as the 2.0 D-4D Avensis, its CO₂ emissions being just 1g/km greater.

The quality and reliability of the Toyota Avensis has been reflected in a series of awards and accolades. In the UK *Fleet Management* and *Fleet Week* named it New Fleet Car of the Year in 2003.

More recently the Avensis came out on top in the latest *Fleet News's* FN50 survey, which analyses the reliability of more than 700,000 lease vehicles in the UK.

Strong residual values

The new Avensis 2.2 D-4D has been analysed for its expected residual values by data experts Eurotaxglass's and emerged among the strongest performers in its class.

The forecasted trade value for the T_{3-x} five-door model after three years shows the vehicle retaining 40 per cent of its cost new. That's substantially better than the market performance of the Renault Laguna 2.2 dCi Dynamique and the Vauxhall Vectra 1.9CDTi Life and only marginally less than Eurotaxglass's prediction for the all-new Volkswagen Passat 2.0TDI SE. The 2.2 D-4D's strong position serves to consolidate the excellent residual value the Avensis range has achieved since launch in 2003.

Residual value forecast

MODEL	COST NEW	RV AFTER 3 YEARS	RV %
Toyota Avensis 2.2 D-4D T _{3-x} 5dr (148bhp)	£17,432	£6,900	40
Volkswagen Passat 2.0TDI SE 4dr (138bhp)	£17,742	£7,200	41
Renault Laguna 2.2 dCi Dynamique 5dr (148bhp)	£18,732	£5,400	29
Vauxhall Vectra 1.9 CDTi Life 5dr	£17,152	£5,000	29

(148bhp)			
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Data provided by Eurotaxglass's

Kevin Ledger, Toyota (GB) PLC Fleet Marketing Manager, said: "The Toyota Avensis has enjoyed huge success in the fleet market since launch and its current diesel engine line-up has helped us penetrate areas of business where we have had no previous representation.

"The introduction of the new 2.2 D-4D diesel engine will give us valuable, fresh impetus in this market with Euro IV compliance and more dynamic and powerful performance. Even with an increase of more than 30bhp over the 2.0 D-4D unit, it remains an economical proposition for fleet managers."

THE 148bhp 2.2 D-4D ENGINE IN DETAIL

- Expected to be Avensis's best-selling engine
- Maximum torque available across a wide rev range for effortless performance
- All-aluminium construction makes unit 13 per cent lighter than Toyota 2.0 D-4D
- Low compression ratio help achieve high efficiency and low noise and vibration
- New turbocharger allows 20 per cent higher boost

MARKET POSITIONING

The 148bhp 2.2 D-4D engine is designed to provide customers with a strong balance of power and economy, positioned with the well-established 114bhp 2.0 D-4D unit and the 175bhp 2.2 D-4d which will join the UK range next year. Toyota expects it to claim a 22 per cent share of UK Avensis sales in 2006.

PERFORMANCE

Emissions and fuel economy are similar to those of the 2.0 D-4D, but the engine is 29 per cent more powerful and raises maximum torque from 280 to 310Nm. In combined cycle driving, the engine produces 156g/km of carbon dioxide (just 1g/km more than the Avensis 2.0 D-4D) and achieves 47.9mpg (47.1 Tourer)..

The wide torque range is one of the main strengths of the new engine, its maximum 310Nm being available all the way from 2,000 to 3,200rpm. This delivers strong

overtaking performance, comfortable cruising and contributes to the engine's excellent efficiency.

Powered by the 148bhp engine, the Avensis will move from rest to 62mph in 9.3 seconds and achieve a top speed of 130mph.

THE NUTS AND BOLTS

The 2.2 D-4D uses an all-aluminium construction that makes it 13 per cent lighter than the 2.0 D-4D unit. Its low compression ratio, 16.8:1, helps achieve greater efficiency and lower levels of noise and vibration.

The common rail injection system has a maximum injection pressure of approximately 1700bar. The solenoid injectors have more holes than those on the 2.0 D-4D (nine instead of six) and they are smaller, too, giving an increase in injection volume and better fuel atomisation.

The engine has an all-new, higher capacity turbocharger, which means boost has been increased by 20 per cent compared to the 2.0 D-4D.

Another benefit comes from the metallic glow plugs, which can reach a 12 per cent higher temperature than before, improving cold start performance.

Improvements have been made to other components, for example the exhaust gas recirculation (EGR) cooler which has been made more efficient.

NVH AND DRIVING DYNAMICS

Greater refinement

- Balancer shaft reduces engine booming
- Improved NVH package with acoustic windscreen
- Increased damping force on front shock absorbers
- Improved power steering pump capacity
- Stiffer front axle

NOISE, VIBRATION AND HARSHNESS

The introduction of the new 2.2 D-4D engine reinforces the Avensis's reputation for refinement and low levels of noise, vibration and harshness (NVH).

The 148bhp engine's low compression ratio reduces the compression build-up inside the cylinder and combustion chamber and so reduces the noise from each ignition cycle.

A balancer shaft also produces a significant reduction in booming noise, particularly between 2,000 and 3,000rpm.

All Avensis models equipped with the new engine benefit from an improved NVH package. This includes:-

- Higher-density bonnet insulation material
- Additional felt added to the engine cover
- Floor insulation now three times thicker
- Extended tunnel insulation, using 38 per cent thicker material
- Acoustic windscreen

The acoustic windscreen features an intermediate layer of acoustic film, sandwiched between the two layers of glass. This improves noise absorption by up to 75 per cent at low frequencies.

Thanks to these measures, the new Avensis 2.2 D-4D delivers a quieter ride and less vibration than the 2.0 D-4D, with a significant reduction in booming noise.

ENHANCED DRIVING DYNAMICS

The Avensis has improved driving dynamics, tailored to suit the new 2.2 D-4D engine.

The front anti-roll bar has been stiffened by 20 per cent to reduce body roll. The damping force of the front shock absorbers has been increased, which allows for a flatter ride. And the capacity of the power steering pump has been increased to give a quicker steering response.

Furthermore, the front axle has greater stiffness and has been equipped with bigger hubs and bearings, all of which helps deliver greater stability at high speeds.

MANUFACTURING

A new plant for a new engine

- 2.2 D-4D engine built at Toyota's eighth European production centre – its second in Poland
- Investment of €200 million (approx. £140 million), creating 950 new jobs
- Young workforce – average age 27
- Production started in March 2005 with full capacity of 180,000 annually to be achieved by 2007

TOYOTA'S EIGHTH EUROPEAN PRODUCTION BASE

The new Clean Power engine family is produced at a new Toyota plant, located in Jelcz-Laskowice in Poland. Toyota Motor Industries Poland (TMIP) is Toyota's eighth production centre in Europe; details of its manufacturing operations are given in the table below.

PLANT	PRODUCTION
Toyota Motor Manufacturing UK, Burnaston	Avensis, Corolla hatchback
Toyota Motor Manufacturing UK, Deeside	Engines, machined engine parts
Toyota Motor Manufacturing France	Yaris, engines
Toyota Motor Manufacturing Turkey	Corolla saloon, estate and Verso
Salvador Caetano, Ovar Plant, Portugal	Dyna, Hiace
Toyota Motor Manufacturing Poland, Walbrzych	Engines, transmissions
Toyota Motor Industries Poland, Jelcz-Laskowice	Engines
Toyota Peugeot Citroën Automobile, Czech Republic	Aygo

The commissioning of the new factory for the 2.2 D-4D engines demonstrates Toyota's commitment to manufacturing products within or close to the markets where they will be sold. TMIP represents a total investment of €200 million (approx. £140 million), bringing 330 jobs to the region and providing potential for a further 620 in the future. The workforce is young, with an average age of 27, and highly-qualified, helping to ensure consistently high product quality and productivity levels.

TOYOTA'S FIVE-YEAR SCHEDULE

The official announcement of TMIP was made in October 2002 in Jelcz-Laskowice, the location for Toyota's eighth European production centre.

Construction work began in April 2003 and was completed in a record eight months. Equipment installation was finished in August 2004, ready for employee training and production trials through to March this year.

Engine production began on 21 March, with the usual ramp-up cycle. TMIP is now undertaking the machining of two main components alongside the engine assembly operations.

Further growth will happen in early 2006 with the introduction of more in-house machining operations. By that date, TMIP will also be casting three of the principle engine parts.

Full capacity of 180,000 units a year will be reached in 2007, when a second production shift will be initiated at the factory.

TOYOTA AVENSIS EQUIPMENT LIST

SAFETY	T_{3-S}	T_{3-X}	T₄	T SPIRIT
Driver and passenger airbag	✓	✓	✓	✓
Front side airbags	✓	✓	✓	✓
Driver and front passenger knee airbags	✓	✓	✓	✓
Full-length curtain shield airbags	✓	✓	✓	✓
ISO-FIX child seat preparation	✓	✓	✓	✓
Five three-point seat belts with Emergency Locking Retractor	✓	✓	✓	✓
Two stage seat belt warning system	✓	✓	✓	✓
ABS and Electronic Brakeforce Distribution (EBD)	✓	✓	✓	✓
Vehicle Stability Control, Traction Control (TRC) and Brake Assist (BA) – 1.8, 2.0 VVT-i petrol models and 2.2-litre D-4D models	✓	✓	✓	✓
Vehicle Stability Control, Traction Control (TRC) and Brake Assist (BA) – 2.0-litre D-4D models	x	x	x	✓
Reinforced rear seat back with seat lock warning	✓	✓	✓	✓
Head impact protection structure (roof, side and pillar)	✓	✓	✓	✓
Anti-submarining seats	✓	✓	✓	✓
De-coupling brake pedal system	✓	✓	✓	✓
INSTRUMENTS & CONTROLS				
Trip computer with fuel consumption and average speed display	✓	✓	✓	✓
Sequential transmission mode indicator (automatic)	✓	✓	✓	✓
Engine temperature warning	✓	✓	✓	✓
Door ajar warning	✓	✓	✓	✓
Optitron instrumentation	✓	✓	✓	✓
Digital odometer with two trip meters	✓	✓	✓	✓
Outside temperature display	✓	✓	✓	✓
COMFORT & CONVENIENCE				
Turn-by-turn satellite navigation with ETA (Electronic Traffic Avoidance)	✓	x	✓	✓
Full colour satellite navigation with European DVD	x	x	x	Opt
Cruise control (n/a on 1.8-litre)	x	x	x	✓
Remote boot release (key fob)	✓	✓	✓	✓
Remote fuel flap release	✓	✓	✓	✓
Illuminated vanity mirrors for driver and front passenger	✓	✓	✓	✓
Electric front windows with “one touch” & anti-trap mechanism	✓	x	x	x
Electric front and rear windows with “one touch” & anti-trap mechanism	x	✓	✓	✓
Twin speed wipers & variable intermittent with mist function	✓	x	x	x
Twin speed wipers, variable intermittent with mist and rain sensing function	x	✓	✓	✓
COMFORT & CONVENIENCE				
	T_{3-S}	T_{3-X}	T₄	T Spirit
Colour keyed and electrically adjustable exterior mirrors	✓	x	x	x
Colour keyed, electrically adjustable mirrors - heated and retractable	x	✓	✓	✓
Light sensing and anti-glare rear view mirror	x	✓	✓	✓
AUDIO				
AM/FM radio with preset settings – integrated	✓	✓	✓	✓

unique fit with LCD				
RDS radio operation with PTY and EON settings	✓	✓	✓	✓
Cassette and single disc CD player	✓	✓	✓	✓
Eight speakers, glass integrated aerial and steering wheel mounted audio controls	✓	✓	✓	✓
VENTILATION				
Air conditioning	✓	x	x	x
Front dual zone air conditioning with digital climate control	x	✓	✓	✓
Electronic air recirculation	✓	✓	✓	✓
Electric tilt/slide glass sunroof with shade and anti-trap facility	x	x	x	Opt
Clean air filter	✓	✓	✓	✓
SECURITY				
Remote control central locking with double locking facility	✓	✓	✓	✓
Transponder immobiliser and remote alarm with perimeter and microwave protection	✓	✓	✓	✓
Security window etching - linked to 24hr helpline	✓	✓	✓	✓
Vehicle parts marking – major parts traceable to VIN	✓	✓	✓	✓
STORAGE				
Illuminated and lockable glove box	✓	✓	✓	✓
Centre console storage box	✓	✓	✓	✓
Driver and passenger seatback pockets	✓	✓	✓	✓
SEATING, UPHOLSTERY & TRIM				
Manual multi-adjustable front seats	✓	✓	✓	x
Electric multi-adjustable front seats	x	x	x	✓
Electric lumbar support for driver's seat	x	x	x	✓
Foldable rear seat back (saloon)	✓	x	x	x
60/40 split/fold rear seat back (saloon)	x	✓	✓	✓
60/40 split/fold rear seat back and cushion (Hatchback and Tourer)	✓	✓	✓	✓
SEATING, UPHOLSTERY & TRIM (contd.)	T_{3-S}	T_{3-X}	T₄	T Spirit
Cloth upholstery with cloth door inserts	✓	✓	✓	x
Leather upholstery with leather effect door inserts	x	x	x	✓
Leather and metallic-effect gear knob	✓	✓	✓	✓
Black centre console, door switch surround trim and Instrument panel surround	✓	x	x	x
Metallic-effect centre console, door switch surround trim and Instrument panel surround	x	✓	✓	✓
Metallic-effect door scuff plates	x	✓	✓	✓
Chrome-effect interior door handles	x	✓	✓	✓
Four-spoke steering wheel with integrated audio controls	✓	x	x	x
Leather trimmed four-spoke steering wheel with integrated audio controls	x	✓	✓	✓
Front foglamps	x	✓	✓	✓
Red tone rear light cluster	✓	✓	✓	✓
Colour keyed door handles and mirrors	✓	✓	✓	✓
Body coloured front grille with chrome surround	✓	✓	✓	✓
16-inch steel wheels with full wheelcaps	x	x	x	x
16-inch 8-spoke alloy wheels with locking wheelnuts	✓	x	x	x
16-inch 5-spoke alloy wheels with locking wheelnuts	x	✓	x	x
17-inch 7-spoke alloy wheels with locking wheelnuts	x	x	✓	x

17-inch 10-spoke alloy wheels with locking wheelnuts	x	x	x	✓
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TOYOTA 148 and 175bhp 2.2-litre D-4D TECHNICAL SPECIFICATIONS

ENGINE		2.2 D-4D 148bhp	2.2 D-4D 175bhp
Type		In-line 4-cylinder with Variable Nozzle Turbocharger and intercooler	
Cylinder head material		Aluminium	
Engine block material		Aluminium	
Fuel type		48 Cetane diesel (or higher)	
Injection type		Direct, common rail, multiple fuel injection	
Injection pressure (bar)		1,670	1,800
Emission control system		Oxidation catalyst	Toyota D-CAT + oxidation catalyst
Valve mechanism		DOHC 16-valve	
Displacement (cc)		2,231	
Bore x stroke (mm)		86.0 x 96.0	
Compression ratio (:1)		16.8	15.8
Max. power (bhp/rpm)		148/3,600	175/3,600
Max. torque (Nm/rpm)		310/2,000-3,200	400/2,000-2,600
TRANSMISSION			
Drive type		Front-wheel drive	
Gearbox type		Six-speed manual	
Gear ratios	1 st	3.538	3.538
	2 nd	1.913	1.913
	3 rd	1.218	1.218
	4 th	0.860	0.860
	5 th	0.790	0.790
	6 th	0.673	0.638
	Reverse	3.831	3.831
PERFORMANCE			
Max. speed (mph)		130	137
0-62mph (sec)		9.3	8.6
FUEL CONSUMPTION (mpg)			
Combined (Tourer)		47.9 (47.1)	46.3 (45.6)
Urban (Tourer)		37.2 (36.7)	37.2 (37.2)
Extra-urban		57.6 (57.6)	54.3 (53.3)
EMISSIONS			
Combined CO ₂ (g/km)	Saloon/hatch	156	161
	Tourer	158	163
NOx (g/km)		0.24	0.11
PM (g/km)		0.020	0.002