

History

Rootes TS3 - Two-stroke, Opposed piston, Diesel Engine.

Number of cylinders	3
Number of pistons	6
Displacement (Swept Volume)	199 & 215 cu in (3.2 & 3.5 litre)
Performance	70 - 165 hp @ 2,400 rpm
Torque	230 - 345 ft lb.'s @ 1,250 rpm
Manufacturer	Rootes Tillings-Stevens Ltd, UK.
Year of manufacture	1954 to 1974
Total TS3 engines built (all models)	54,000 (approx)
TS3 designation	Two Stroke, 3 cylinder

Introduction

The development of the design for the Rootes TS3 diesel engine began in June 1945 by just three people:

Eric W Coy - Chief Engineer.
Bennett & Mililuski - Draftsmen.

This number grew to a team of 13 which by today's standard is an extremely small team to have achieved such robust and legendary engines that were exported around the world.

This is a particularly remarkable achievement when you consider these engines were designed, developed and manufactured before basic battery calculators and basic computers came into being. (they didn't exist back then).

Below is a 1956 photo of key members of the team from left to right:

- Eric Wilding - Road Test
- Heinz Stransky - Design Manager
- Eric W Coy - Chief Engineer
- Eric Coy's secretary
- Don Kitchen - Senior Design Draftsman
- Roland Golby - Design Draftsman



Starting with Rootes in 1952 in the drawing office, Don Kitchen became design manager after Heinz Stransky retired.

Don was directly involved with the design and development of the Rootes TS3 engines under Chief Engineer, Eric Coy from the pre-production stages in 1952 to the termination of engine production by Chrysler 20 years later. Eric Coy retired in 1963.

Don was also heavily involved with the pre-production design and development of the spectacular Rootes TS4 prototypes (the upgraded 200HP 4-cylinder version of the TS3), commencing in 1965. These exceptional engines were also terminated by Chrysler just as they were to enter production in 1971-72.

He remained with the company as it morphed from Rootes to Chrysler and then to Renault Trucks, rising to the position of Chief Engineer, Technical Administration prior to his retirement in 1993.

This date also marked the end of vehicle production and closure of the huge former Rootes assembly plant at Dunstable.

History has since proven that Eric Coy, Heinz Stransky, Don Kitchen, Bill Seaman and their small team of Designers and Engineers at Rootes Diesel Engineering Division were responsible for designing and developing the highest power density and best high speed diesel engines in the world during that era in the form of the Rootes TS3 and TS4 (prototype).

Don is seen here age 89 at home in Ampthill, Bedfordshire, UK.



These remarkable Opposed Piston, Scavenge blown, 2-stroke diesel engines enjoyed a long pre-production development phase (9 years), with two-stroke consultants, Armstrong Whitworth working closely in the background with Rootes Diesel Engineering Division Chief Engineer, Design and Development managers prior to and after these engines when into production.

Pre-production TS3 engines were being proven in “road rehearsal” testing on roads throughout the UK and in Mexico from 1951 onwards and the earliest production versions of the TS3 engine were launched in 1954 at the Earls Court Motor Show in London, for use in the heavy range of Commer trucks, Commer Avenger bus chassis as well as , Rootes-Lister industrial and marine applications.

These highly advanced and unconventional design engines are characterized not only by their lengthy and highly detailed pre-production development, but also by the unusually high quality material specifications used for their engine components and very precise manufacturing processes and machining tolerances used in their production.

The Opposed Piston 2-stroke design provided much fewer points of failure than in a conventional engine design:

- No cylinder head(s).
- No cylinder head gasket(s).
- No cam box / rocker cover gaskets
- No valves.
- No camshaft.
- No valve gear (cam followers, push-rods, cam timing gears, valve springs, keepers and collets, cam bearings etc).
- Six pistons, but only 3 cylinders and 3 diesel injectors.

The Opposed Piston, twin Rocker Lever architecture also provided less than 5 degree conrod angularity at the pistons, so there was virtually no side thrust generated on each firing stroke.

This meant the levels of cylinder bore and piston skirt wear, plus the related motoring losses (friction losses generated when the engine is running) were substantially less than all conventional design diesel engines.

These combined qualities produced:

- High power density.
- High levels of mechanical reliability under adverse / overload operating conditions.
- Impressive engine life.
- Very low fuel consumption (.37 lbs per HP per hour)..
- Low overall operating costs.

Known variously as:

- **Rootes TS3.**
- **TS3**
- **Commer TS3**
- **Knocker.**
- **Commer Knocker**
- **Double Knocker**
- **Tillings-Stevens 3**

.... Rootes TS3 powered Commers were readily accepted by transport operators around the world and quickly became legendary for their ability for hard work and low operating costs.

With steadily increasing requirements for more power from Rootes Product Planning Dept, development continued uninterrupted throughout the 20 year engine production era.

They were manufactured and assembled at the Rootes owned Tillings-Stevens engineering facility in Maidstone, Kent with various engine components being manufactured by motor industry suppliers of the day such as:

- Sheffield Forge (crankshafts and flywheels).
- Dartmouth Auto Castings (early crankcases).
- Wade Engineering (scavenge blowers).
- CAV (fuel Injection equipment, starter motors)
- Hepworth and Grandage (pistons and piston rings).
- Usine Metalurgique (later crankcases).
- Glacier - Vandervell (crankshaft bearings, rocker lever and piston rod bushes).
- Coventry Radiators (oil coolers and coolant radiators).
- Teddington (bellows thermostats).

..... And so on.

The various 3 cylinder / 6 piston models produced over the 20 year production era were:

- 3D-199 (199 cu in 70HP to 105HP).
- 3DA-199 (199 cu in 117HP).
- 3D-215 (215 cu in 135HP).
- 3DB-215 (215 cu in 135HP to 145HP).
- 3DTC-215 (experimental 215 cu in 160HP).
- 3DD-215 (re-manufactured "seconds" by Chrysler - 215 cu in 125HP).

Rootes also produced and tested to production ready status the upgraded 200HP, 4 cylinder / 8 piston version of the TS3, called the Rootes TS4 prototype, model 4D-287 Stage 1 and Stage II.

Built on the shoulders of everything learnt from the TS3 development and production era, the TS4 prototypes were head and shoulders above any other commercial vehicle diesel engine in the world at that time.

However, Rootes financial troubles on the car side of their business resulted in Chrysler USA assuming full control of Rootes Group in 1967, which unfortunately also included Rootes Diesel Engineering Division.

Chrysler terminated TS3 production and the planned introduction of the production ready TS4, to safeguard their new joint venture Cummins 4-stroke engines (V6 and V8) and supplier agreements with Perkins.

By 1974, all TS3 engine production had ceased (the last engines made were "re-manufactured" 3DD-215 model).

We can only guess at what the TS3 and TS4 would have evolved into over the last 40 years, had Chrysler not taken control and closed down Rootes Diesel Engineering Division.

And who at Chrysler would have guessed (back then) that TS3 engines of various models would still be operating efficiently in restored Commer trucks, buses, boats and industrial applications around the world and were also being reconditioned back to brand new on the other side of the planet in New Zealand in 2015.

An enduring testament to the outstanding design and build quality of the Rootes TS3 is represented in the famous orange fishing boats at Mar Del Plata harbour, Argentina.

The 11 to 13 metre commercial fishing boats in this fleet were made in timber by Mar Del Plata Shipbuilders to an old Italian design in the mid to late 1950's and were powered by the very earliest Rootes TS3 production engines (1954 3D-199 model).

These early engines were developed as marine engines in a joint venture between Rootes Diesel Engine Division and R A Lister Ltd.

Over 60 years later - in 2015, about 20 of these old commercial fishing boats still go fishing each day, powered by their original Rootes-Lister TS3 marine engines.

Subpages (1): [TS3 emissions comparison 2001](#)

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