ROTARY VERSUS RECIPROCATING ENGINES
Ships, Planes and Cars

Yes, I know it should be “Trains boats and planes” but hear me out. In 1906, the British battleship “Dreadnought” was launched. Apart from being the first of a class of “all big gun” battleships, she also used New Parsons steam turbines. That is, the engines did not feature the usual piston and connecting rod to crankshaft reciprocating engines of all previous steam powered ships, she used rotary steam turbine engines. Since that time, most of the World’s shipping has been powered by steam turbines.
Incidentally, as an aside, from the early days of aircraft up to 1918/19, most aircraft were powered by what was referred to as a “Rotary” engine, that is, one with it’s cylinders arranged in a star wheel type layout, but whilst the crankshaft was bolted to the front bulkhead of the aircraft it powered, the cylinders spun around the crankshaft and the airscrew was bolted to the crankcase. Whilst this aided cooling the air cooled engine, once power had crept up to the 200 HP mark, the gyroscopic forces upon the aircraft became too great with a willingness of the aircraft to turn very well one way but not so well the other! In fact, Sopwith Camel pilots of 1917/18 were reputed to not bother to try and turn the “wrong” way but just to turn right as far and fast as they could!
In 1944, the twin engined German fighter-bomber, the Messerschmitt 262 went into service. She too featured turbines, although these were gas powered, instead of the steam type used in “Dreadnought”. Since 1944, most aircraft have been developed using the gas turbine as a power unit. So on that basis, surely the cars that we drive today should be turbine powered? Or at least be of Rotary construction (as in the Wankel engine, which has no pistons, conrods nor valves)? Er….no. We are still running around in cars with engines that have pistons and connecting rods connected to crankshafts, not to mention a valve train as well. The pistons go up and down and sometimes, in some special racing engines, the crankshaft can be made to revolve at up to 22,000 rpm. Compare that to a gas turbine, which revolves at some 60,000 rpm at cruising speed.
So why don’t car engine manufacturers design and use rotary engines? That’s a good question. In 1967, NSU brought out their rotary Wankel engines and fitted them to their new NSU RO 80 and it was, in the beginning, a sales success. But then came disturbing news; the tip seals on the rotor itself were wearing out within 30,000 miles. NSU ceased production of their revolutionary Wankel engine and that was the end of that. Surely some bright engineer(s) could have developed some better seals? Well, they did and the problem was cured but by then the damage was done and a reputation for unreliability, combined with high fuel consumption and difficulties with emissions saw the car cease production ten years later. A case of more development being needed, perhaps?
Mazda of Japan has for years used the Wankel rotary engine but they have gradually let it go, their last RX-8 being built in 2012. In passing, it should be pointed out that a four-rotor version powered a Group C car that actually won the Le Mans 24 Hour race in 1991. The three drivers of that car said afterwards that they had driven it flat out the entire 24 hours as they thought it wouldn’t finish anyway and they wanted an early night!

I can only believe that the problem is entrenched bureaucracy amongst the people charged with designing engines for cars and a complete resistance to change on a wide front. I posit that today’s engineers (and most that have gone before too!) have become so used to using the reciprocating engine, and so much development money has been poured into it’s use, that engine designers no longer even consider changing this well over one hundred year old design.
Today, we are living in a time when hybrid power plants are being developed but they are still using, as their base, reciprocating engines. What’s happened to the ideas of innovation and experimentation in the engineering World?