**ELECTRIC MOTOR EDUCATION**

**Split Phase** Induction Motorand **Shaded pole** Induction Motor

Both of these motors are NOW OBSOLETE

Starting with the “1973 OIL CRISIS (SHOCK)”, and culminating with 21st Century steady shift towards the reduction of CO2 gases (green revolution), the major industrialised countries have become highly focused on the both reducing the consumption of energy and the efficient use of energy.

Part of the process has involved moving away from the production of inefficient energy consuming products, by either redesign or replacement with new and innovative products

The **split phase** and **shaded pole** ac induction motors are the two electric ac single phase induction motors which came under close scrutiny.

Both of these motors inefficiently convert electrical energy into torque (mechanical energy).

The split phase motor’s inherent and inefficient high starting current to moderate starting torque ratio, and

The shaded pole’s inherent inefficient high running input power to mechanical output power ratio

The “1973 OIL CRISIS (SHOCK)” was the catalyst to cause the USA authorities to look at reducing their electric demand. This investigation suddenly highlighted, what had previously, generally, been regarded as insignificant, the use of single phase electric motors in domestic (consumer) white goods and heating consumer appliances. The numbers of which, post WW2, had increase to the point there were literally billions in service on the grid. The two dominate types being the ‘split phase’ and ‘shaded pole’ induction motors. The advantage of both these motors being they were cheap to manufacture, mechanically robust and reliable in operation. However, when their efficiency was considered it became horrifyingly obvious (due to the sheer volume of them in service) they were a substantial cause of inefficient energy use within nation’s electricity grid (oil consumption). As a consequence the use these two types of single phase induction motors have been progressively phased out of production and replaced by more efficient types of motors

Aided by over 100 years of advanced material technology, both the physical size and production costs, of capacitors have been dramatically reduced.

The first major advancement in single phase motor technology occurred roughly around circa 1940 where the reduction in physical size and production cost of capacitors saw the manufacturing costs of the more robust, and mechanically reliable, single phase **“capacitor start”** induction motor ***fall below*** that of the then common used , high maintenance prone, **“repulsion start”** induction motor.

Both these motors produced the very high starting torque characteristic required by the refrigeration industry.

The result being the **“repulsion start”** motor became obsolete and has been consigned to history.

A similar fate has befallen the single phase **“split phase”** and **“shaded pole”** induction motors.

In the change to more energy efficient motors, often aided by government regulation, and more recently to what are called “high efficiency” (HE) and/or “high performance”(HP) motor technology, the single phase **“split phase”** start induction motor has been superseded by the **“capacitor start”** induction motor. Whereby the **“spilt phase”** induction motor is ***no longer manufactured*** and is now also consigned to history.

Similarly, the ***‘highly’*** inefficient **“shaded pole”** induction has come under pressure.

Although not having been completely superseded its *manufacture is now* ***strictly limited*** *to the ‘****single coil****’ configuration used in domestic whitegoods (i.e. ‘frost free’* refrigerators, *‘fan forced’* ovens and washing machine pumps). Here again, more recent developments, are seeing these motors superseded and replaced by synchronous motors and 12V brushless dc motors (i.e. stationary armature) using solid state commutation.

For all other applications the **“shaded pole”** induction motor is ***no longer manufactured*** and has also been consigned to history and superseded by the much more efficient **“capacitor run”** induction motor which produces, more efficiently, a similar low starting torque and a greatly improved running efficiency. This type of motor is commonly called a **“Permanent Split Capacitor (P.S.C.)**

Commonly, although slightly more expensive, most ‘General Purpose’ single phase induction motors now sold, especially the higher kW output types, are ‘**two capacitor’ (or dual capacitor) Cap start Cap run** motors. This type of single phase induction motor has both highly efficient start and run characteristics.

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