Izglītības programma: Autotransports

Kvalifikācija: Autoelektriķis, 3.līmenis

Mācību priekšmets: Profesionālā angļu valoda

Mācību materiāls: Sildsvece

Skolotājs: Dace Cine

**A glowplug**

A **glowplug** (alternatively spelled as **glow plug** or **glow-plug -** *sildsvece)* is a heating device used to aid starting [diesel engines](http://en.wikipedia.org/wiki/Diesel_engine)(*dīzeļdzinējs*). In cold weather, high speed diesel engines can be difficult to start because the mass of the cylinder block and cylinder head absorb the heat of compression, preventing ignition due to the higher surface-to-volume ratio. Pre-chambered engines make use of small electric heaters inside the pre-chambers—glowplugs—while the direct-injected engines have these glowplugs in the combustion chamber. The glowplug is a pencil-shaped piece of metal with a [heating element](http://en.wikipedia.org/wiki/Heating_element) at the tip. This heating element, when electrified, heats due to its [electrical resistance](http://en.wikipedia.org/wiki/Electrical_resistance) and begins to emit light in the visible spectrum, hence the term "glow"-plug. The visual effect is very similar to that of a [toaster](http://en.wikipedia.org/wiki/Toaster). The fuel injector spray pattern then impinges directly upon the hot tip of the glow plug during the injection of fuel at top dead center. This enables the fuel to ignite even when the engine is insufficiently hot for[Diesel engines](http://en.wikipedia.org/wiki/Diesel_engine), unlike [gasoline engines](http://en.wikipedia.org/wiki/Gasoline_engine), do not use [spark plugs](http://en.wikipedia.org/wiki/Spark_plug) to induce [combustion](http://en.wikipedia.org/wiki/Combustion). Instead, they rely solely on compression to raise the temperature of the air to a point where the diesel will combust spontaneously when introduced to the hot high pressure air. The high pressure and spray pattern of the diesel ensures a controlled, complete burn. The piston rises, compressing the air in the [cylinder](http://en.wikipedia.org/wiki/Cylinder_%28engine%29); this causes the air's temperature to rise. By the time the piston reaches the top of its travel path, the temperature in the cylinder is very high. The fuel mist is then sprayed into the cylinder; it instantly combusts, forcing the piston downwards, thus generating power. The pressure required to heat the air to that temperature, however, necessitates the use of a large and very strong engine block.

The temperature at the top of the compression stroke is dependent upon many factors, the most influential of which are the compression ratio of the cylinder and the starting temperature of the inducted air. When the engine is cold, the temperature of the inducted air is low and it receives little heat from the engine cylinder walls. In addition, as the air is compressed and becomes heated, some of this heat will be given up to the cold cylinder walls, further reducing the temperature at the top of the compression stroke. This problem is solved by the glow plug. Under these cold conditions, the glowplug is temporarily activated to add a hotspot within the combustion chamber until the residual temperature of the combustion chamber achieves the level required to support self-combustion.

For that reason [indirect injected](http://en.wikipedia.org/wiki/Indirect_injection) diesel engines are manufactured with glow-plugs in each prechamber, and [direct injected](http://en.wikipedia.org/wiki/Fuel_injection#Direct_injection) diesel engines are manufactured with glow-plugs in each combustion chamber.

**Method of operation**

**Pre-heating**

[](http://en.wikipedia.org/wiki/File:Glowplug.jpg)

"Wait-to-Start" light (glowplug indicator light) in a diesel car.

In older generation diesel-engine vehicles, unlike in a gasoline-engine vehicle, the operator did not simply turn the key to the "start" position and have the engine immediately start. Instead, the operator turned the key to the "on" position for a long duration; the glowplug relay switches the glowplugs on, and a light *(see picture at right)* on the instrument cluster illuminates. This process is called "pre-heating" or "glowing". According to [Bosch](http://en.wikipedia.org/wiki/Robert_Bosch_GmbH): "Older engines used a glow period of up to 21 seconds whereas more modern engines use around a 6 to 8 second heat period and provide after glow at a reduced voltage".[[1]](http://en.wikipedia.org/wiki/Glowplug#cite_note-1)

**Starting**

When a pre-set time has elapsed, the glowplug relay switches off the "wait-to-start" light. A pre-heating cycle usually lasts for 2 to 5 seconds. The operator then proceeds to turn the key to the "start" position. The relay switches off the glowplugs after the engine is running (or, in older cars, at the same time the "wait to start" light goes out). In some cars, glow plugs continue to operate for up to 180 seconds after engine start to keep the engine within emissions regulations, as combustion efficiency is greatly reduced when the engine is very cold.

**Warm engine start**

If the car had been running very recently, or if the ambient temperature was hot, the "wait to start" light might not come on. In this case, the operator may proceed to turn the key to the "start" position and start the engine without having to

normal operation. This reduces the cranking time needed to start the diesel engine.