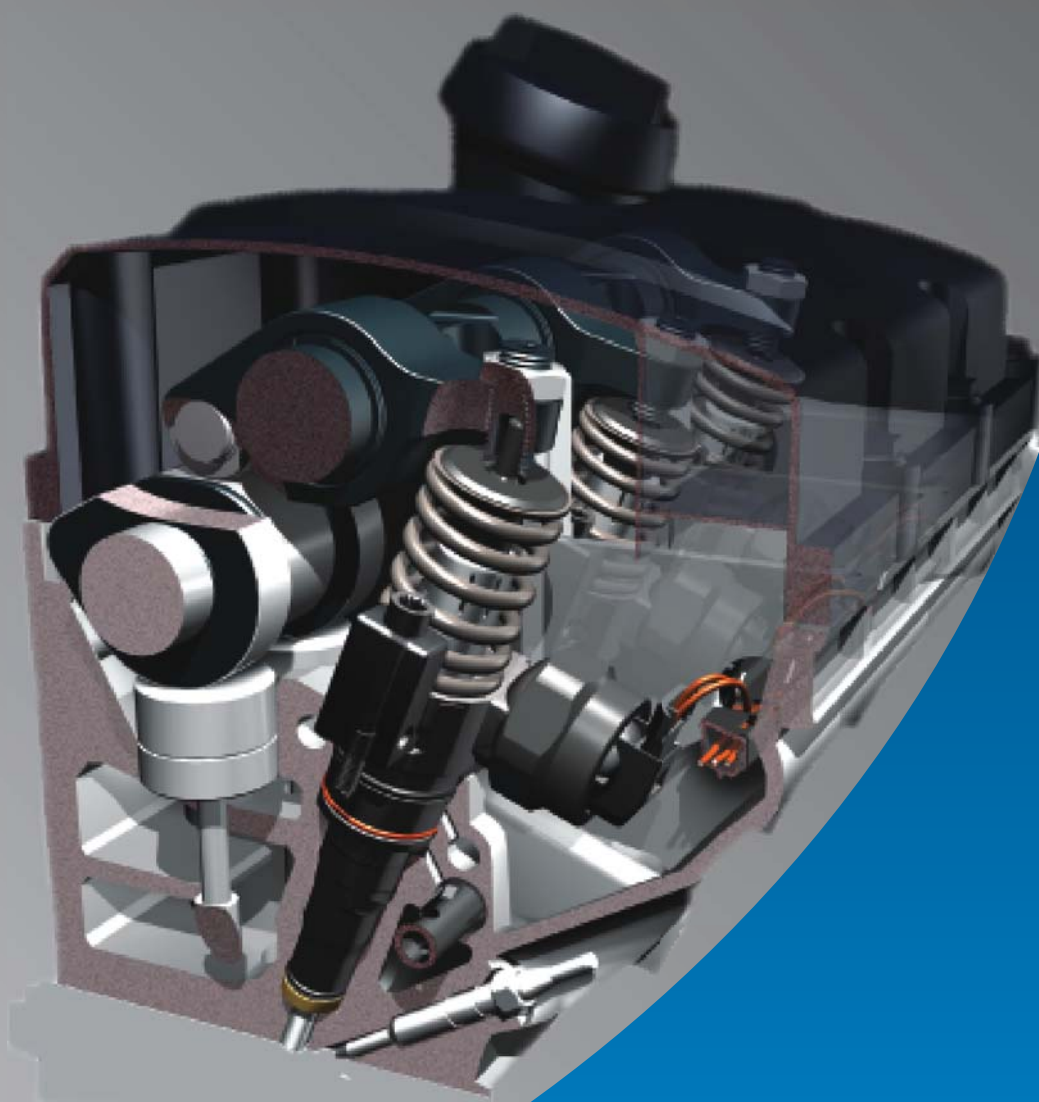




## Self-Study Program 821603

# TDI Diesel



Volkswagen of America, Inc.  
Volkswagen Academy  
Printed in U.S.A.  
Printed 12/2006  
Course Number 821603

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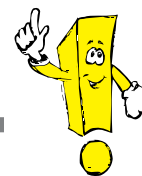
Always check Technical Bulletins and the latest electronic repair information for information that may supersede any information included in this booklet.

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Note



Important!



This Self-Study Program covers information on Volkswagen TDI Technology.  
This Self-Study Program is not a Repair Manual.  
This information will not be updated.

For testing, adjustment and repair procedures, always refer to the latest electronic service information.

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## History and Theory of the Diesel Engine

### History

The diesel engine was developed as an alternative means of power other than steam. Similar to the gasoline engine, the operation is based on the Otto cycle.

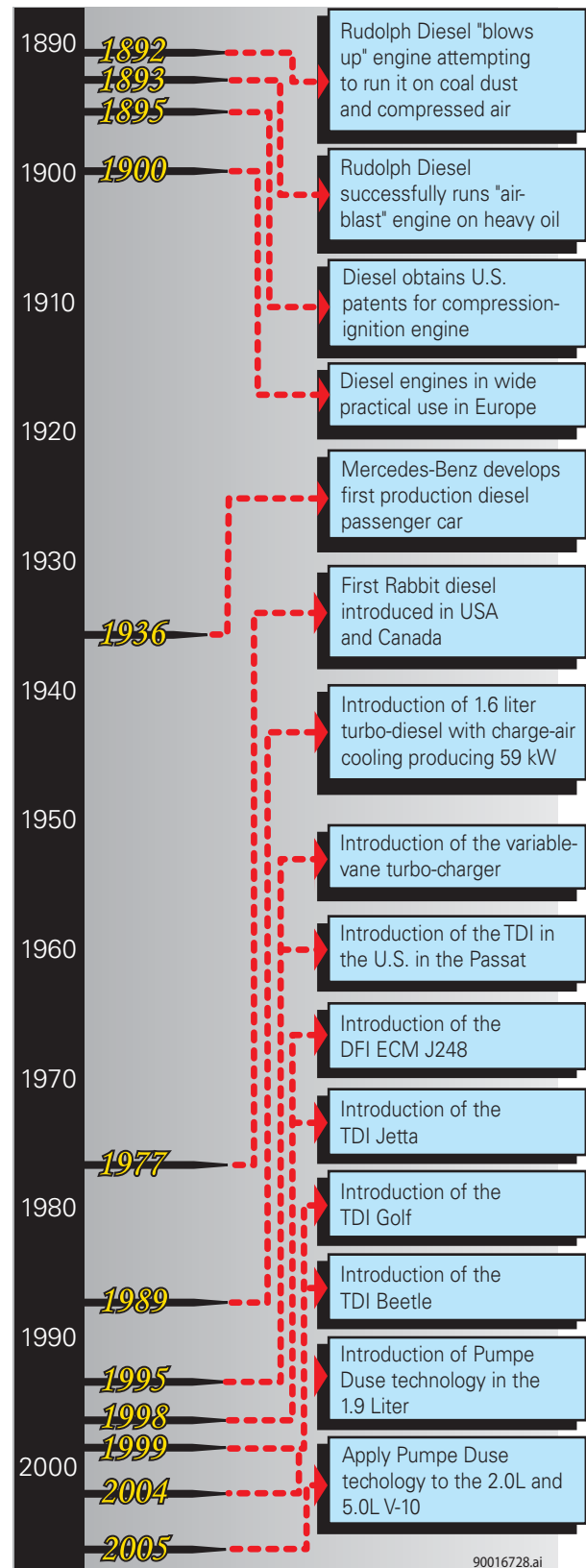
The diesel engine is a compression-ignition engine. This means that tightly compressed air and injected fuel are used to power the engine; no spark plugs are used in this type of engine.

Rudolph Diesel is given the credit for the compression-ignition engine. His first attempts used coal dust as the fuel. These attempts resulted in the engines exploding. After continuous failed attempts, Diesel switched to a liquid fuel. The liquid fuel worked, and in 1895, the compression ignition engine was patented in the U.S. and became known as the diesel engine.

Traditionally, diesels have been considered reliable, but massive and noisy engines. They lacked power and were difficult to start in cold weather. Diesel engines seemed to be best suited for industrial use, where they have succeeded as universal workhorses.

In an effort to explore all possibilities for cleaner, more efficient engines, Volkswagen has developed diesel engines that are practical for passenger car use.

Presently, the diesel is the only alternative engine capable of extraordinary fuel economy with a simple design devoid of complex emission controls.



# Introduction

## Theory

### Diesel vs. Gasoline

The gasoline engine was being developed at the same time as the diesel engine. The gasoline engine quickly became more popular in automobiles because of its major characteristics:

- Wide revolutions per minute (rpm) range
- Ease of starting
- Smooth and quiet operation
- Good acceleration

Even though the gasoline engine is more popular for automobile applications, diesel has some advantages:

- Low fuel consumption
- Less fire hazard
- Lower emission levels

Low fuel consumption is the most noticeable advantage. This is a result of a high air-to-fuel ratio, high compression ratio, and low pumping losses.

### Air-to-Fuel Ratio

The air-to-fuel ratio is the amount of air and fuel needed for combustion. Gasoline engines need more fuel in comparison to air than diesel engines. Diesel engines can have ratios between 20 parts air to one part fuel, up to 100 parts air to one part fuel. This contributes to low fuel consumption.

