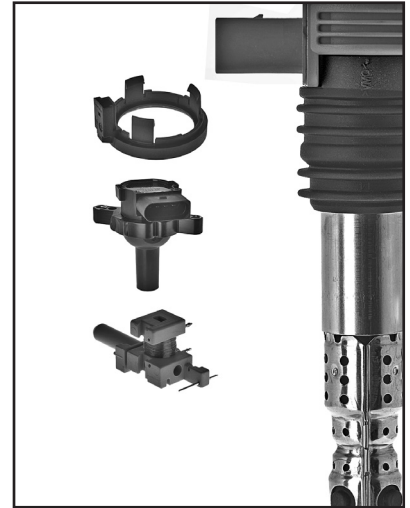


AUTOMOTIVE PRODUCTS

Pulse's Automotive Division has designed, developed, and manufactured coils and ignition transformers for the automotive industry for more than ten years. Pulse meets or beats the challenges of the stringent requirements of the international automotive industry with mature quality procedures, savvy research and development, the latest in production technology, and competitive pricing. This results in products that are "intelligent solutions" at competitive market prices.

Worldwide automotive teams manage customer projects with detailed attention to defined standards and procedures. Engineering teams work together to resolve customer problems, develop concepts, and manage research and development. Once developed and ready for manufacturing, products are manufactured in some of the most technologically advanced production facilities in the world.



OVERVIEW: PULSE AUTOMOTIVE PRODUCTS

Ignition Coils

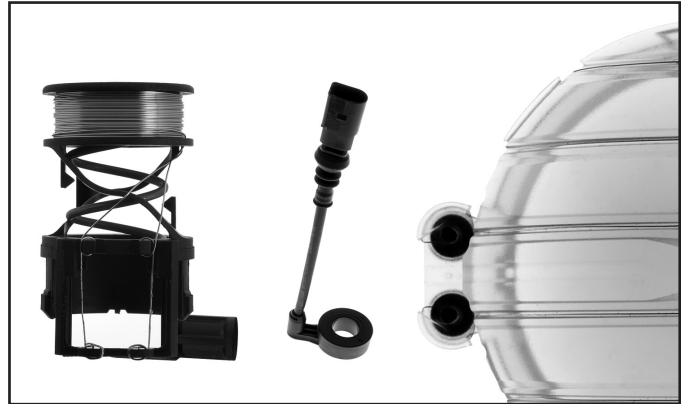


Ignition coils from Pulse are designed, developed, and sold to several automotive OEMs (original equipment manufacturers) and the IAM (international after-market).

Benefits:

- Experienced product development
- Technologically advanced development centers
- Customer-specified designs
- Superior process capability
- State-of-the-art production facilities

Coils



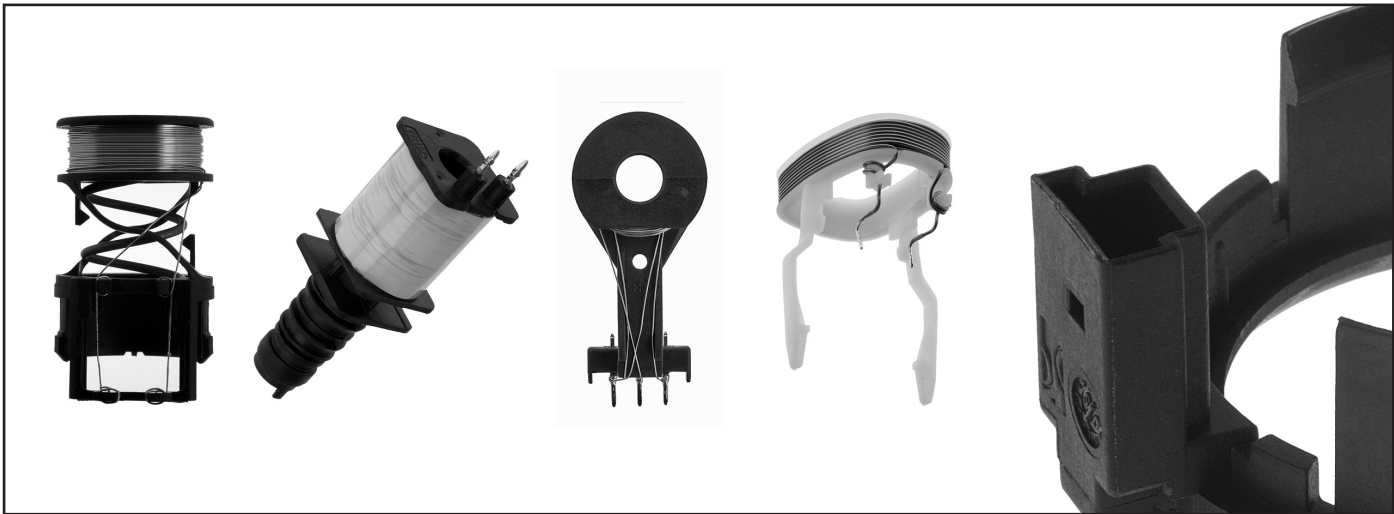
Fine-wire coils are found in automotive parts and coil assemblies. They are used in various applications that increasingly include safety and comfort devices for the automobile.

Benefits:

- Custom designs
- Superior process capability
- High-quality materials
- A mature "quality" system
- State-of-the-art production facilities

AUTOMOTIVE PRODUCTS

COILS



Custom coils, developed by Pulse, are wound on state-of-the-art, semi- and fully-automatic machines. A selection of fine wires, from 0.028mm to 0.095mm and standard wires, up to 0.75mm, are used. A variety of plastics, such as thermoplastics, duroplastics, and specialty plastics, designed for use in high-temperature applications in an engine compartment, can be selected for use as the coil body, depending on electrical, temperature and mechanical specifications.

AUTOMOTIVE COILS

Target Applications	Operating Principles	Product Benefits
Sensor Coils for:		
Shock Absorber	Measures the stroke so the data can be used to regulate the characteristics of the shock absorber	Highly-integrated assembly consisting of an over-molded coil combined with the cable and connector
Positioning Sensor	A magneto-strictive displacement sensor used in various applications	Highly-robust, wear-and-tear resistant
Actuator Coils for:		
Climate Control Systems	Steers the hatches within the system	A very robust coil, sheathed in a metal frame
Automatic Gearbox	Controls hydraulic valves in an automatic transmission	Highly integrated assembly, heat-resistant coil with metal housing
Antenna Coils for:		
Body and Security System (immobilizer)	Active communication between key and vehicle	Flexible cabling approach a variety of options: over-molded assembly for robustness, tight tolerances on inductance, and DC resistance

COIL ASSEMBLIES

Target Applications	Operating Principles	Product Benefits
Toothbrush Charging Unit	An inductive charging unit for electric toothbrushes	Heat-resistant plastic, highly-integrated coil
Manufacturing Technology	Directional control valve within a pneumatic application	Highly robust, wear-and-tear resistant

AUTOMOTIVE PRODUCTS

IGNITION COILS



Pulse is a leading manufacturer of ignition transformers for use in passenger cars and motor sports. The ignition is the heart of the engine. For over 70 years, Pulse's developers (formerly part of BREMI) have been involved in producing products that address every aspect of ignition technology. The invention of the pencil-ignition transformer is a technology breakthrough in modern ignition concepts.

AUTOMOTIVE/MOTORCYCLE

Pencil Coils

Pulse's ignition coils, for both automobiles and motorcycles, are well known for reliability, as well as being a perfect fit for each customer's engine application. Custom coils are designed and manufactured by Pulse's rigorous design processes and production lines that are scalable to any required volume, high or low. Pulse uses accumulated knowledge and long-term practical experience with design and material selection to address specifications for thermal, mechanical, electrical and chemical ambient conditions.

Essential Features

- Lock-in-place for spark plugs with SAE-adaptor
- Plug-in assembly spark plug shaft
- Integrated semiconductor power switch (IGBT)
- Soft shut-down
- TTL - Level control input
- Integrated EMC
- High-ignition energy and voltage capability
- Over-voltage protection
- Coil over-current limiting
- Active ECU-interface

THE FUTURE OF IGNITION

The **OBD Spark** is a new development in the field of ignition. It's a diagnostic-capable, inductive, high-energy, rod-ignition transformer with wideband sensing.

Product Highlights

- Diagnostic capability through ion sensing
- Spark and combustion diagnostics
- Knock detection
- Active spark control
- Misfire detection

The **Transformer Plug Unit** is a combination of an ignition transformer and a spark plug. The unit is a smaller part. Thus, it reduces the component count.

Product Highlights

- Fewer components
- Adjustable abrasion resistance
- Water-resistant
- Age-resistant bobbin