

“We need to move fast to seize new growth opportunities and make sure our customers benefit from our innovations at the earliest opportunity. Goldfire helps us quickly carry out research and development projects by giving us a development platform with rapid and intelligent access to our internal systems, databases, and worldwide patent literature.”

- Hugh Blaxill
Chief Engineer
MAHLE Powertrain, Ltd.

Invention Machine Goldfire

Driving Sustainable Innovation for the Automotive Industry

You're in one of the most competitive markets there is. To navigate around tight curves in the automotive industry, innovation today means shifting into high gear to quickly respond to government regulations, globally distributed operations, and complementary technologies to ensure vehicle performance and top line growth.

With Invention Machine Goldfire, a unique innovation software solution, you can quickly transform ideas into products and make innovation a repeatable and sustainable process, allowing you to quickly respond to the changing landscape.

Designed with engineers, scientists and researchers in mind, Goldfire automates more than a dozen critical innovation tasks spanning a product's lifecycle—from identifying a new market to developing a new product to improving existing products.

Fusing proven innovation tools and methods with precise access to corporate and external knowledge, Goldfire systematically guides users through every day innovation tasks to bring structure and uniformity to inventive problem-solving, concept discovery, and idea generation and validation.

Leading automotive manufacturers and suppliers—including Bentley, Cummins, Delphi, Eaton and MAHLE Powertrain—are using Goldfire to:

- Identify strategies to reduce costs and introduce competitive differentiation
- Reduce liability through predictive failure analysis
- Gain deeper understanding of functional models and opportunities
- Generate and validate ideas to improve design and processes
- Find technical innovation solutions to reduce environmental impact
 - Engine systems, i.e. hybrids, fuel cells
 - Weight reduction, i.e. light steels, aluminum, magnesium, plastics
 - Emission filters
- Identify and leverage enabling and complementary technologies
 - Power, materials, security, nanotechnology, software and computers, wireless.





INNOVATION TASKS with Invention Machine Goldfire

>> ANALYZE A MARKET

Quickly Understand a Technology Space
Technology Driven Evolution of Product
Technology Landscaping
What do I know about X?

>> DEVELOP A NEW PRODUCT

Design a New System
Design a Hybrid System

>> IMPROVE A SYSTEM

Capture Design Intent of a System
Diagnose a Product Failure
Fix a Product Defect
Improve Product to Achieve a Specific Goal
Resolving a Contradiction or a Trade-Off

>> RISK MANAGEMENT

Predictive Failure Analysis

>> LEVERAGE IP

Finding a New Market for an
Existing Technology
Patent Busting

SNAPSHOT OF PAST AUTOMOTIVE PROJECTS with Invention Machine Goldfire

- Improvement of the insulation for battery pack cell seals.
- Explore methods to convert nitrous oxide in a lean tailpipe exhaust and simultaneously control HC/CO/NOx levels to meet emission standards.
- Discover new ways to effectively cool the shape memory alloy of a port fuel injector.
- Identify potential gaps in the market and support rapid development of a new valvetrain and deactivation system leading to two patents.
- Navigate around a blocking patent related to turbocharging capability for downsized engines - a key technology for the sustainable reduction of fuel consumption and carbon emissions.
- Research possible ways to increase effectiveness of a lead acid battery.
- Refine the rotor design of a synchronous reluctance machine to increase rotor speed but avoid deformation from centrifugal force.
- Reconfigure and improve the design of a smart battery to optimize its reset logic.
- Fix an urgent engineering problem – saving \$800K while reducing unnecessary analysis by 75 percent.
- Resolve a previously unsolvable problem in a failing automotive component – eliminating the failure, reducing annual production costs by \$350K and resulting in a new patent. Previous company ideas required increased cost and radical changes.
- Discover alternative design strategy to overcome scuffing of gasoline engine cylinder bores due to failure of spray bore during cold start testing conditions below -20 degrees F.

A major global automotive parts supplier used Invention Machine's software to simplify and improve its fuel supply system – the resulting system was lighter, smaller, vastly simplified, and represented a cost savings of greater than 50 percent.

A leading provider of innovation software, Invention Machine drives sustainable innovation by empowering global organizations to translate ideas into market-leading products, consistently and rapidly.

Global 2000 manufacturers in more than 25 countries rely on Invention Machine Goldfire for product innovation, process improvement and market expansion. Its unique software fuels sustainable innovation across numerous industries, including aerospace and defense, automotive, consumer, technology, energy and environment and life sciences. For additional information, please visit invention-machine.com.