BorgWarner

Northeastern University

Project Scope Statement
PJM 6015 Project Risk Management

By: Group 5
Akash Venkatraman
Amee Jotangiya
Lavanya Rudrubati
Paksinee Thitiphak
Rashi Vora
Tanvi Rajeevkumar Jain

Date: 04/23/2022

BorgWarner

Table of Contents

BorgWarner

Project Problem Statement

Husky Automobile car company wants to launch a new line up of cars. They realize that the engines have a problem with misfiring. So, the organization wants our firm to produce a solution to reduce engine misfiring as this would help increase the longevity of the car's engine and may also help to increase performance and increase the gas efficiency. Reducing the engine

Project Scope Statement

While running tests on the new line of cars the company noticed that there were engine misfires that could potentially cause engine damage over time. When the gasoline in the chamber fails to burn correctly, it might harm the engine. Consequently, fuel penetrates the catalytic converter, heating it up and potentially damaging it. Furthermore, it can strain the valves and cylinders, causing them to shatter. This will ruin the company's reputation eventually and the company might lose the competitive edge over their competitors and may also lose their global market share. This might also cause the company's share value to plummet.

To solve the above problem Brog Warner are creating a spark plug made from iridium instead of using copper spark plugs. This would increase the lifeline of the cars and would prevent from any kind of misfiring of engines. The design of the spark plug would be optimal such that it works with any kind of car and should not overheat in any kind of environmental condition. The spark plug design should efficiently balance the amount of fuel consumption to start the engine.

Project Objective

- To generate the solution to decrease the engine misfiring by 70% with the introduction of the iridium sparkplug in place of platinum spark plug within the span of 1.5 years (about 18 months).
- To decrease the carbon and hydrocarbon emissions by ensuring a more thorough combustion of the air/fuel combination of the car engine.
- To introduce a sparkplug that is harder and stronger than platinum so that it can last longer, and this would in turn help end-users save on maintenance in the long term. (Owing to the fact that iridium is 6 times stronger and 8 times harder than platinum with a 700-degree higher melting point they tend to last up to 25% longer when compared to platinum spark plugs)
- To build the spark plug within the budget of 5 million dollars.

- Create a cleaner, more controlled burn, producing fewer carbon emissions from the engine (“NGK Spark Plugs - Iridium, Spark Plug Wires & Ignition Parts”)

Project Alternatives

- Changing the car emissions equipment to reduce engine misfire.
- Changing the fuel injector as this would improve the air and fuel delivery problems doing so would hence reduce engine misfires.
- Changing the catalytic converter of the car. To reduce the heating of the gases inside the engine which causes misfiring and damages the engine components.
- Identifying the cars ignition system problems and changing the copper spark plug to an iridium spark. According to us, after intensive research and weighing the pros and cons, this seems like the best solution to address the business needs within the given budget and time while still being able to maintain top notch quality.

Project Stakeholder

Internal Stakeholders

- Board of directors
- Design Team
- Engineering team: Visual design and functionality
- Accounts and Finance team: Revenue generation and budget
- End-users/ Customers: Scope (Research, performance, and functionality)
- Project managers
- Business Analyst
- Employees

External Stakeholders

- Suppliers
- Competitors
- Financial Institutions
- Independent Repair Shops
- Insurance Companies
- Customers
- ISO 9001 and IATF 16949 committee

Project Milestones

Task Name	Start	Finish
1.2.4 Kick-off meeting completed	Mon 5/16/22 5:00 PM	Mon 5/16/22 5:00 PM
1.2.8 Project initiation completed	Wed 5/25/22 5:00 PM	Wed 5/25/22 5:00 PM
1.3.5.1.3 Scope statement approved	Tue 7/5/22 5:00 PM	Tue 7/5/22 5:00 PM
1.3.7.3 Budget plan approved	Wed 9/7/22 5:00 PM	Wed 9/7/22 5:00 PM
1.3.9.3 Project Planning Completed	Wed 10/5/22 5:00 PM	Wed 10/5/22 5:00 PM
1.4.5.6 Vendor selection completed	Fri 2/24/23 5:00 PM	Fri 2/24/23 5:00 PM
1.4.6 Needs assessment completed	Fri 2/24/23 5:00 PM	Fri 2/24/23 5:00 PM
1.5.6 Prototype Design Approved	Mon 4/3/23 5:00 PM	Mon 4/3/23 5:00 PM
1.6.4 Pilot Spark plug built	Wed 8/16/23 5:00 PM	Wed 8/16/23 5:00 PM
1.6.6.10 Pilot spark plug approved	Mon 12/4/23 5:00 PM	Mon 12/4/23 5:00 PM
1.8.5 Post implementation review completed	Tue 12/26/23 5:00 PM	Tue 12/26/23 5:00 PM
1.9 Project Closeout	Tue 12/26/23 5:00 PM	Tue 12/26/23 5:00 PM

Project Trade-offs

- The board might want the project to be ready earlier than the original date. This increases the cost of the project by adding more resources to complete it in time.
- The project quality might be affected if the sponsor delays the timely payments for the project.

- Differences in quality of design may vary in reflection of time and cost if design team or boards expectations might change cause of addition or removal of features, in turns affecting time and cost.

Project Acceptance Criteria

- The temperature range should be kept under control; if it becomes too hot, the engine may detonate, pre-ignite, or lose power. The tip temperature should be kept between 500° C and 850° C, according to most spark plug manufacturers.
- Spark plug should reduce the carbon emissions from the engine by 15%.
- To prevent corrosion, use metal plating for all the parts.
- The electrodes used should be made from iridium material.
- The spark plug should last 25% longer than the platinum spark plug.
- The spark plug should improve gas acceptance and superior antifouling.
- The spark plug should last up to 100000 miles (about 160934.4 km) or longer.

Project Scope Creep

- The stakeholders might want us to change the material of the spark plug after agreeing upon iridium
- Stakeholders might want us to reduce the engine misfiring's by 90 % after agreeing on 70 %
- Stakeholders might want us to last the spark plug up to 120000 miles (about 193121.28 km) after agreeing on 100000 miles (about 160934.4 km).
- The stakeholders might want us to make a sparkplug that lasts 35 percent longer than the traditional platinum sparkplugs though we agreed upon making the new spark plug last 25 percent longer.

\

References:

NGK Spark Plugs - Iridium, Spark Plug Wires & Ignition Parts, https://www.partsgeek.com/brands/ngk.html.

Brown, Hank. “How Long Do Iridium Spark Plugs Last? (Explained!).” 31 Aug. 2021, https://piketransit.com/how-long-do-iridium-spark-plugs-last/

Denso. 8 Apr. 2021 “DENSO | How the Right Spark Plug Can Reduce Vehicle Emissions.”, www.denso-am.eu, https://www.denso-am.eu/news/deneur20_31_spark-plug-emissions

Staff Writers, Underhood Service. 2 June 2011 *“Tech Tip: Understanding Spark Plug Heat Range*, www.underhoodservice.com, https://www.underhoodservice.com/tech-tip-understanding-spark-plug-heat-range/