Developing an innovative next generation anti-wear

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New regulatory standards, growing environmental concerns, and the impending shift toward alternative transportation solutions are factors rapidly transforming the lubricant industry. As a consequence, formulation options around using traditional lubricant additives and compositions are shrinking.
In this context, Solvay has chosen a new technology path to develop sustainable anti-wears with enhanced performances and milder classifications.
The objective of this talk is to present an update on the development of a next generation of anti-wear technology based on a polymeric platform demonstrating high potential performances.

Keywords: Low SAPS, Friction Modifiers, Regulation, Sustainability, Polymers

1. Introduction

Today, the industry is looking for more sustainable solutions to follow new regulations as well as more efficient formulations to pass tighter specifications.
More specifically, low SAPS or even SAPS-free products with improved wear prevention and better fuel economy are needed to be developed.
This paper is going to present a technology under development to meet these requirements. This technology is innovative and it is based on a polymeric technology.

2. Purpose of this project

The objective of this project is to develop a next generation of anti-wear additive presenting the following features vs. current technologies available on the market:

- Ashless, Sulfur-free, and low phosphorus: a very low SAPS technology
- Providing equivalent or better wear prevention
- Improving fuel economy.

3. An Innovative anti-wear solution under development

3.1 Technology platform description

The technology of a polymeric anti-wear we propose here is a copolymer technology. In order to meet the developmental objectives, this family provides developmental flexibility by selecting and evaluating different parameters a polymerization can provide (monomer types, polymerization process…). This technology has been patented [1] and can be depicted as the following:

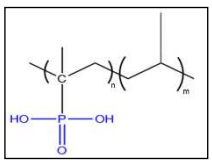

Figure 1: Polymeric Anti-Wear

Different candidates are under development and evaluation. The next paragraph will give an example of first performances evaluated on one of our lead technology.

3.2 Performance evaluation

Anti-wear performance was evaluated on one of our lead candidates using the 4 ball wear test: ASTM D4172. This evaluation shows that the polymeric anti-wear candidate is equivalent to ZDDP (Zinc Dithiophosphate), by being Ashless and Sulfur-free and by providing 18 times less Phosphorus than ZDDP when tested at 1wt% in a lubricant:

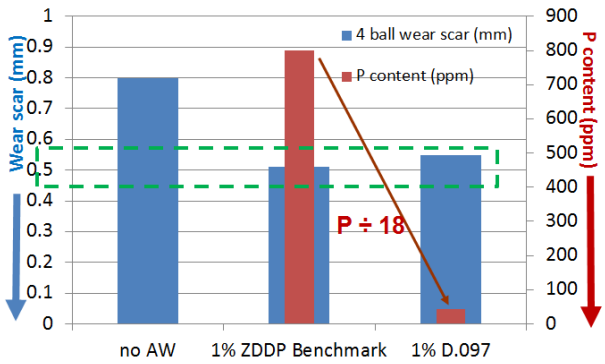

Figure 2: 4 ball wear evaluation

4. Conclusion

- The polymeric anti-wear candidate evaluated here brings equivalent anti-wear performance as ZDDP even by being Ashless, Sulfur-free and providing very low Phosphorus level.
- Further evaluations have been conducted on this candidate to determine its other performances, for example on friction and corrosion protection
- Other candidates have been developed and are currently under evaluation in order to meet requirements needed by the industry.

5. References

[1] WO2016/177839