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## Confidentiel

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**Titre:**

Tribological properties of Micro Tech Lubes and BestLine's synthetic oil additive

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# 1.

## Introduction

The goal of this project is to verify whether and to which extent the BestLine International Research Inc. synthetic lubricant additive as provide by Micro Tech Lubes AS and further described in the addendum, for testing, affects the wear mechanisms of the steel and in particular its mechanical response to friction. For this, first wear tests were carried out in high performance engine oil with and without additive by rubbing a steel ball against a steel disc. The obtained worn surface (with and without additive) was investigated using SEM (Scanning Electron Microscopy) to characterize differences in wear morphology between additive free and additive containing oil. Surface chemistry was analyzed using different surface analysis methods (currently just EDS (Energy Dispersive Spectrometer)) depending on sample characteristics.

### 3.2.2 Oil with BestLine Additive

From Fig 7, it can be found that, in oil with additive, the wear track on the disk is much thinner than those in oil. The width is just about 0.1 mm. The surface inside the wear track is also smoother than that in oil.

### 3.5.2 Oil with BestLine Additive

Two points were analyzed inside the wear track, as shown in Fig 22, and the spectra of each point are shown in Fig 23. The atomic concentrations of the detected elements are shown in Table 4. Fewer elements were found on the surface comparing to that in oil without additive and elements like P, S, Mn, Zn, which can be from the ZDDP in the oil, were not detected. **This suggests that the BestLine synthetic additive inhibits the reaction of ZDDP and renders it unnecessary for reducing wear.**

## 4. Conclusions

This tribological study has led to the following conclusions concerning the wear and friction effect of the investigated synthetic oil additive (from BestLine) in motor oil Mobil 1 OW-40:

- (1) The additive significantly reduces wear of the carbon steel disk to 6% of the wear

observed in pure oil without additive.

- (2) There is no obvious effect of the additive on friction except a slightly better stability with time of the coefficient of friction.
- (3) The additive was found to modify the plastic response of the investigated steel and to influence the chemical reactivity of the worn surfaces.

A handwritten signature in black ink, appearing to read 'Shoufan' followed by a stylized monogram or initials.