



## Influence of Hydraulic Fluid on the Wear of Mechanical Systems in Heavy Machinery

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### Resumo

“This study comprehensively analyses the degradation and service life of the Valvoline ATF Dexron II lubricant used in a Caterpillar 420E Backhoe, using vis-cosity and particle count tests as key quantitative methods. The main objective is to detect potential failures in the hydraulic system before they become apparent, to optimize preventive maintenance strategies and reduce associated operating costs. The research was carried out in the context of the public sector in Ecuador, where high maintenance costs of heavy machinery pose a significant challenge. The methodological approach included the collection of lubricant samples at three time intervals (100, 500 and 1000 hours of use), to assess their quality in terms of crit-ical parameters. The analyses were performed according to the international standards ISO 11171 and ISO 4406 for particle counting, and ASTM D445, ASTM D2270, ASTM D97 and ASTM D92 for the evaluation of viscosity, flu-id cleanliness, pour point and flash point, respectively. The sample extraction process used the ‘vampire’ method, which employs a vacuum pump to avoid flu-id contamination during sampling. Laboratory tests were carried out using high-precision equipment such as the PAMAS S40 particle counter and the VST-2000 viscometer. The results obtained showed that the lubricant showed adequate sta-bility in its first 500 hours of use. However, at 1000 hours, considerable degrada-tion was recorded, characterised by a decrease in viscosity and an increase in the concentration of particulate contaminants. This trend suggests that Valvoline ATF Dexron II is not suitable for extended-use applications in this type of machinery, in contravention of the manufacturer’s technical specifications and current interna-tional regulations. This analysis highlights the need to adjust maintenance inter-vals and reconsider the selection of lubricants for applications in hydraulic sys-tems subjected to intensive working conditions, to improve operational efficiency and prolong equipment life.”.

### Palavras chaves:

*Informe de 4 a 8 palavras chaves, por exemplo:*

Lubricant analysis, Lubricant degradation, Particle count test, Viscosity test, Per-sonal Protective Equipment (PPE), Hydraulics, Hydraulic lubricant, Pascal's principle.

### Área temática:

*Escolher uma das áreas temática descritas:*

*Exemplo: A1.1 Desenvolvimento tecnológico e inovação agroindustrial*

### Preferência de apresentação:

Oral  Pôster