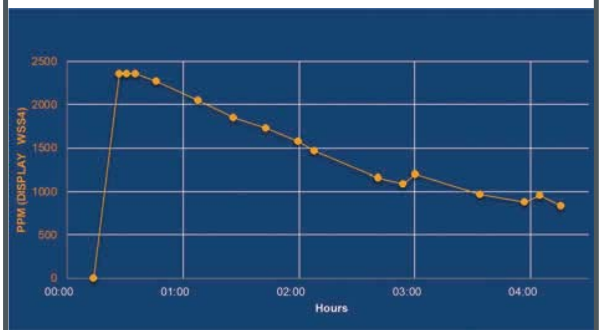
PROVEN QUALITY AND POWERFUL RESULTS

Aircraft hydraulic fluid monitoring is normally conducted during C-checks, at an interval of one year or less. The hygroscopic nature of hydraulic fluids can result in high water concentration within the fluid, which potentially results in hidden corrosion damage to aircraft control systems. This can often be difficult to localize and is expensive to repair. To combat water absorption, Test-Fuchs has developed a small vehicle known as the Water Separator WSS4. Aircraft maintenance teams simply connect the Water Separator WSS4 to the return line between the aircraft and a hydraulic ground power unit. Water is extracted as the fluid circulates during concurrent maintenance activities.

This procedure can potentially prolong the life of the hydraulic medium, thus saving high costs for fluid exchange and also avoids the need for unnecessary hazardous waste fluid disposal. Additional cost savings can also potentially be made by avoiding the replacement of corrosion-damaged components and fluid lines.

When a number of airlines tested the Water Separator WSS4, it was concluded that the quality of the hydraulic medium improved significantly after a purification cycle of only four hours.

The graph illustrates the results of the field tests, illustrating water ppm versus time (hours). After a short starting phase of 20 minutes, the oil circuit was closed and the cleaning process began. Each dot represents a documented ppm value on the display. The peaks around hour 3 and 4 show movement of flight controls to get all oil out of reservoirs. The water content was reduced from 2,351ppm to 831ppm after four hours. \\



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HIGH-SPEED IMAGING TECHNIQUES

High-speed imaging is used in various applications by engineers in the aerospace industry. Three very common imaging techniques utilized are Digital Image Correlation, Particle Image Velocimetry, and Schlieren Imaging. These imaging techniques provide insight into various aspects of the strength and durability of materials, the characteristics of engine combustion processes, the aerodynamics of objects in flight, and much more.

Digital Image Correlation (DIC) is used to determine the extent of deformation, vibration and strain on materials undergoing some type of physical stress. DIC analyzes high-speed video to identify and measure movements, some of which are incredibly small, within a high-contrast speckle pattern that has been applied to the surface of the material being tested. The speckle pattern movements are examined to provide automatic calculations and visualization of the degree of deformation, vibration or strain found on the material.

Particle Image Velocimetry (PIV) plays an important role in understanding the fundamental movement of liquids, gases and plasmas (collectively known as fluids). PIV analyzes high-speed video to identify and measure the movements of tracer particles that have been added to the fluid being tested. The particle movements are examined to provide automatic calculations and visualization of the fluid flow.

Schlieren imaging is used as a means of visualizing changes in pressure and temperature, as well as shock waves, moving through a transparent fluid such as air. This imaging technique relies on differences in refractive index caused by density gradients in the fluid to bend light that is passing through the fluid. The bending of the light creates a spatial variation in the intensity of light, and this can be visualized with the use of a high-speed camera.

There are a number of factors that are important to consider when purchasing a high-speed camera for use with DIC, PIV, and Schlieren imaging techniques. These factors include frame rate, light sensitivity, minimum exposure time, and pixel resolution. All of these factors contribute to the overall image quality. \\

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