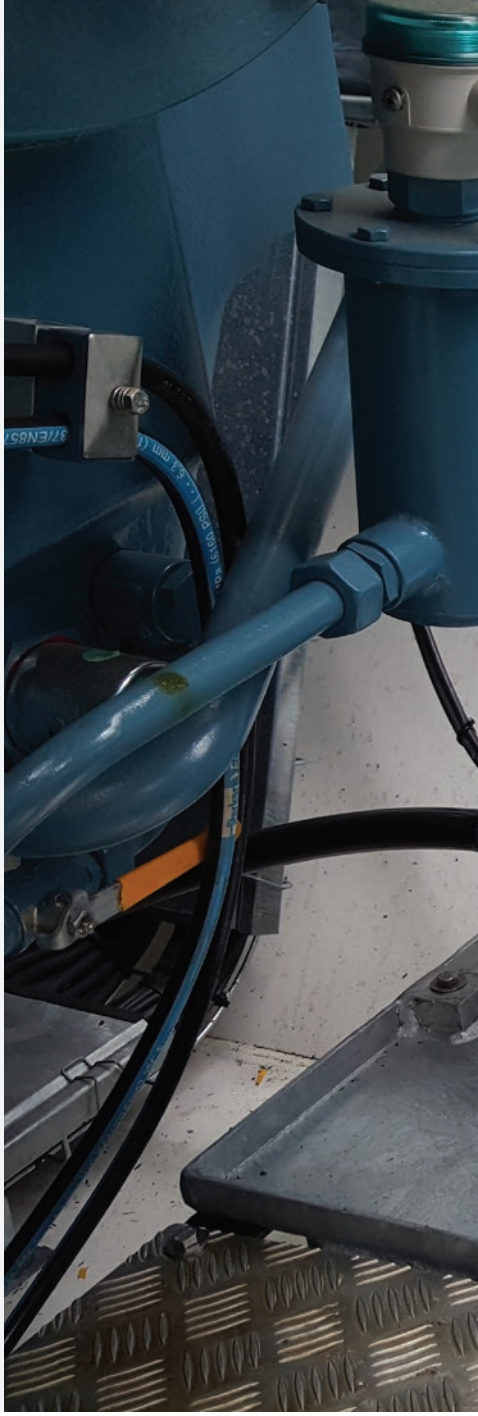
inFOCUS

Profile: C.C. Jensen

Offline filters by C.C. Jensen keep the 'life blood' of wind turbines clean and pumping.

By Justin Stover



The foundation of effective wind-turbine asset management begins with clean oil.

C.C. Jensen is the worldwide leader in providing clean oil for wind turbines through the use of offline filters.

Founded in 1953, C.C. Jensen has provided offline filters for heavy industries, including wind-power, to achieve one singular goal — cleaner oil.

Over the past 20 years, C.C. Jensen's approach has changed how wind-power OEMs, owners and service providers manage and monitor lubricants to achieve great reliability.

THE HISTORY

One day in the late 1930s, an assistant engineer on board the motor vessel Marchen Maersk witnessed a phenomenon that would eventually benefit wind turbines the world over. During his rounds in the engine room, he had kept a watchful eye on oil leaks coming from a pipe connection in the engine's lube oil system.

On this particular day, he observed these leaks closely and happened to see a drop of oil fall on the back of his hand. This was no ordinary drop of grimy oil. What struck him was how clean and bright this amber drop was.

At the same time, he knew the oil flowing through the pipes was pitch black as a result of blow-by and soot contamination. Changing the oil several times, he was accustomed to seeing oil that was dark and contaminated. Carl Jensen had a curious mind, so he looked up to identify the source of this golden drop.

He saw the drop had pressed out through a pipe-flange connection. Looking closer, he took note that this connection had a gasket seal. That was his lightbulb moment — the humble gasket had acted as a filter.

With a keen eye for innovation and reliability, that was his moment of inspiration. Since then, this story has been told many times. Often it is embellished to include a slightly more dramatic version with the oil drop hitting him right on his nose.

Whether it was on the back of the hand or on the bridge of his nose, Jensen invented a product that would eventually save millions of dollars for wind-turbine OEMs and owners. Today, nearly 80,000 wind turbines use C.C. Jensen offline filters to extend gear and bearing life, increase time between costly oil changes, and optimize the power output of wind turbines.

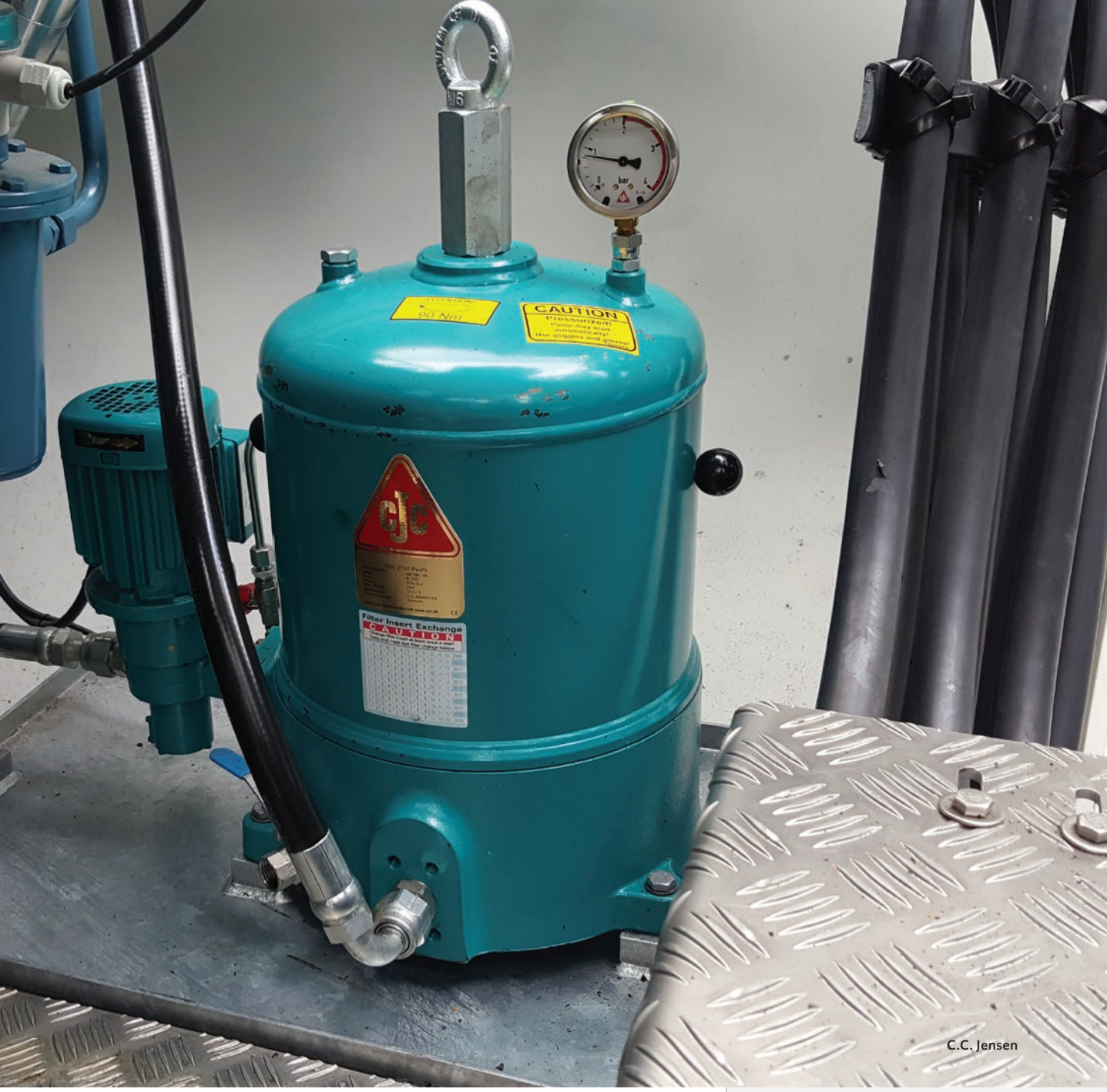
Over the years, the core concept of C.C. Jensen has not changed — low flow through a depth media. This approach has been delivered in the best and most practical way: offline filters.

Most wind turbines now have a so-called inline filter. It is located in series with the oil cooler.

In order to keep oil temperatures down, a higher quantity of oil needs to be pumped every minute. But at higher flow rates, an inline filter needs to be relatively large. In practice, the inline filters are typically coarse and release particles captured during frequently occurring starts and stops.

Offline filters by contrast can filter out much smaller particles because the flow rates are lower. Tiny particles cause the most damage and are in much higher concentrations. No problem for an offline filter.

At the same time, offline filters provide reliable removal of water



C.C. Jensen

A filter unit installed on a Siemens 2.3 MW turbine.

contamination and oil-degradation byproducts.

THE CHALLENGE

Gearboxes that run dirty usually have short lives. Gears, bearings, and the lubricant all suffer greatly from contamination.

In the late '90s, widely publicized news accounts shined a light on gearbox failures. Many manufacturers now acknowledge the gravity of the problem and factory-fit or retrofit offline filters.

It has long been recognized that clean oil will improve the reliability and lifetime of gears and bearings. Therefore, it is ironic that many wind turbines still are sold without filter systems capable of maintaining clean gear oil.

ALSO IN THIS SECTION

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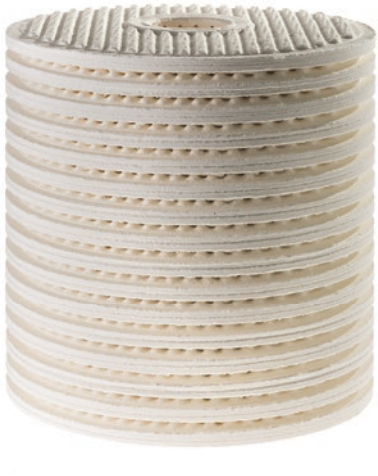

A gear-filter insert.

C.C. Jensen is a family-owned international company established in 1953 and based in Denmark.

Not all gearboxes suffer from severe contamination, but all gearboxes should have contamination control systems in place that will give the gears, bearings, and oil a fighting chance to survive. C.C. Jensen is the world leader for such systems.

THE IMPORTANCE OF CLEAN OIL

About 80 percent of all breakdowns in lubricated machines are related to contamination in the oil. Research going back nearly four decades dependably established gear and bearing life can be increased up to seven times simply by upgrading the filtration system of a gearbox.

For instance, in 1979, a groundbreaking study at London's Imperial College proved that rolling element bearings in gearboxes can have a life-extension factor of six by upgrading the filter system from a 40-micron to a 3-micron filter.

One of the conclusions from their research was: "Replacing 40-25 micron filters by units rated at 3 microns absolute is to be recommended for gearboxes. Such action should lead to improved reliability, longer periods between overhaul, cheaper overhauls, and consequent reductions in ownership costs. Times between oil changes, where relevant, should be substantially increased." C.C. Jensen fills that need with offline filters rated at 3 microns absolute that are affordable, compact, and easy to install.

WHY CUSTOMERS USE C.C. JENSEN

Clean oil saves money. Average ROI is less than three months. Extending oil life by a factor of three saves $95,000 over the life of the turbine. Improving gear and bearing life by a factor of three will save $250,000. Clean oil is also good for the environment. Oil is a resource that needs to be cared for and managed responsibly. Less oil waste reduces the carbon footprint for wind farms, making wind energy even greener.

C.C. Jensen

Before and after oil results.

Working with customers worldwide, C.C. Jensen delivers products and consulting services in multiple languages in most countries using wind power. For organizations with a global reach, it can support a customer's efforts basically anywhere.

Being a clean-oil expert, C.C. Jensen has an experienced global team focused on getting results. It sees all types of oils and all types of turbines first hand. It provides training and consultative services for wind-turbine OEMs and owners, big and small.

C.C. Jensen's offline filters deliver — as testified by more than 80,000 wind turbines running with clean oil worldwide

TODAY AND MOVING FORWARD

C.C. Jensen's offline filters and superior filter inserts are available through a global network of sales offices and dedicated support teams.

In day-to-day dealings with C.C. Jensen, customers experience a commitment to service. C.C. Jensen's employees do their utmost to provide the right solution — every time.

With the number of wind turbines expected to double by 2020, C.C. Jensen is ready and poised to support OEMs and owners to efficiently manage wind-turbine assets. The company maintains a stock of offline filters and associated spare parts to ensure smooth operations and maintenance for years to come.

For more information on C.C. Jensen, go to www.ccjensen.com.

WHAT IS AN OFFLINE FILTER?

A system of filtration in which a portion of the total oil volume passes through a filter having its own circulating pump operating in parallel to the main system.

The word "offline" can mean different things in the power-generation business. Offline to a power-plant operator generally does not create a warm and fuzzy feeling. As it relates to filtration, offline is an important distinction because it identifies where and how a filter operates. The term offline simply refers to the fact the filter operates completely independent of the machine on which it is installed. While critical to the overall function and health of the machine, the offline filter is designed to run on its own. In a wind-turbine gearbox application, the offline filter will operate continuously, pulling oil from the gearbox, purifying it and returning it to the gearbox through an available port. This takes place whether the wind turbine is spinning or idle. This ensures clean and dry oil is available at critical starts and stops when the gearbox is most vulnerable to damage.

A common phrase to describe an offline filter is a so-called "kidney loop" filter. As the name implies, the filter operates similar to a dialysis machine that filters the blood of a patient with failing kidneys. This "kidney loop" process involves drawing oil out of the dirty system and passing it through highly efficient filters to remove contaminants. Offline filtration units are simple. Typically they include a robust electric motor and a highly dirt-tolerant gear pump that pushes oil through a fine filter element.

Since oil is often referred to as the lifeblood of a gearbox, it is fitting that "kidney loop" or offline filters are employed to keep lubricant health in optimum condition.