The oil and gas industry is increasingly relying on robots like unmanned aerial vehicles for inspection. These drones can get into hard-to-reach or hazardous spots. They do not get bored. They can measure with precision. And they can save significant amounts of time, as Jennifer Pallanich writes.

Low oil price environments tend to prompt operators to seek more efficient ways of carrying out procedures such as inspections. Unmanned aerial vehicle (UAV) specialists such as Sky-Futures and Cyberhawk believe they have the answer. As Sky-Futures co-founder and chief operating officer Chris Blackford puts it, unmanned aerial vehicles, or drones, make it possible for asset owners to detect anomalies and defects so owners can make repairs before they become serious and costly. “There are fewer people, and they’re doing more with less. And you can do more with drones,” Blackford says. Inspecting equipment at height, such as flares and cooling towers, or under the deck typically requires personnel to use ropes for access. Setting that up takes time, and the work itself can be hazardous. Enter the drone, which requires little set-up time. “It takes minutes to set up, compared to a rope access team,” Blackford says. “We reduce risk because we’re using a robot instead of putting a human at risk.”

Sky-Futures carried out a 14-day UAV inspection on a large production platform in the UK North Sea in 2014 that saved the platform from having to shut down, in addition to eliminating an estimated 700 man-days of rope access, Blackford says. The workscope included inspecting the flare structure, communications tower, crane, exhauster, helideck and-under-deck.

In September 2015, the company conducted what it says was the first recognised drone inspection in the Gulf of Mexico for the oil and gas industry. The workscope, conducted over two days, included inspecting the derrick, helideck and four cranes on a drillship.

Growing acceptance

The road to commercial UAV inspections has been a long one. Over the years, drone companies have worked on system reliability along with regulatory rules and public perception. As Fleming puts it, “the connotation of the word ‘drone’ can be negative, as people may associate them with warfare.”

In addition, commercial drones must comply with federal aviation regulations. As such, drones are not allowed to exceed a 400-foot ceiling imposed in the US by the Federal Aviation Administration. Agencies in other countries have also set similar rules.

There was also an initial issue of whether classification societies would accept inspection data generated by UAVs, although drone companies are working closely with the societies to help certify inspection techniques and the data they collect. “The way the offshore industry works is changing,” says James Bond, vice president for marine technology and corporate technology at ABS. “Monitoring is being done at a distance.” “Smart” assets and new technologies are making inspections and condition monitoring more efficient. “Right now it’s primarily visual, via a general visual inspection,” Bond says. Drones can identify anomalies, he says, but “the real question is whether a drone can be used for close-up inspection.”

Safety and efficiency both play into the acceptance of drones. “We see drones as a way to extend our people’s eyes. We’re looking to safely augment the reach of our people and their experience,” Bond says. ABS is working some pilot projects related to UAVs and is in the final stages of internal reviews for the certifications that would permit a third-party independent specialist to handle
“We want things to become less reliant on humans, more automated. UAVs will be one of those tools that you use so you don’t send people into harm’s way.”

Chris Fleming, Cyberhawk

Drone inspections of ABS-classed assets while ABS witnesses the inspection, Bond says. The company is working with Sky-Futures and other specialists to determine what processes and reporting will be sufficient, and then work to enhance them. Blackford says considerations focus on whether the inspection process is safe and whether the data is accurate enough to satisfy survey requirements.

“Inspections are linked to the class societies in terms of what is a standard,” he says. “A class society can say, ‘we approve this as a new technology for replacing the current technique for confined space inspections, for example.”

Close quarters
Fleming, who served as an offshore inspection engineer for Lloyd’s Register for more than two decades before joining Cyberhawk in 2015, says the oil and gas industry would like to see drones capable of carrying out confined space inspections.

“Internal tanks are horrible locations. They’re damp, dark. They’re places you don’t want to die — cavernous, with baffles and walkways and manholes.”

Sky-Futures recently carried out its first client inspection on a floating production, storage and offloading vessel tank in the North Sea. The trial marked the first time a drone was used for a confined space inspection without requiring human entry, the company says.

“The whole idea of using a drone is to carry out low-risk operations like aerial photography and survey in an open environment, or over fields or construction sites. This environment is typically not tense for the pilot. The second tier requires flying close to structures, such as wind turbine blades or electrical towers. Such activity helps the pilot become adept at flying, nose first, to within a metre of a structure, rather than observing from farther away.

“The third tier is more intense, allowing the pilot to operate in a refinery or other industrial setting where there may be hazards such as fumes, flares and fumes, along with noise and other potential distractions. The top level at Cyberhawk, usually reached after about 18 months of training, is the offshore environment. The initial offshore experience of simply getting on board can be overwhelming, Fleming says, so for the first few trips offshore, the pilot goes as a second to a more experienced pilot.

“We’re trying to stage the training in such a way that skills are developed incrementally,” Fleming says. Blackford gained familiarity with drones during a seven-year stint in the British Army. “We were using drones to go into areas that were dangerous to go to, to get data,” he says. “It made operations more efficient and safer.”

UK-based Sky-Futures was founded in 2010 with an ambitious agenda for the oil and gas market.

“We are trying to entirely disrupt the inspection sector of the market,” says Blackford, who foresees a future in which inspections have evolved from once a year to daily.

“We’re talking to clients about putting a drone on every single platform,” he says. “I see a future of underwater robots, crawling robots, flying robots gathering data. Humans would only go out for severe interventions.”

Inspections can build up “very solid layers of data that we can use to start forecasting trends”, he says, adding the information — which may be high-definition video or stills, thermal imagery and 360-degree visuals — can be shared on Sky-Futures Cloud. “We get information that can’t typically be achieved unless the platform is shut down. We
CLEARED FOR TAKE OFF: A two-person team prepares to launch a drone during an offshore inspection.

see areas that are not typically accessed on a regular basis.” Additionally, Sky-Futures is trying to move away from a system in which they carry out all the inspections. The company has set up a joint system with Bristow Group to train UAV pilots, allowing Sky-Futures to focus on delivering technology solutions to inspection problems. “Why not train the remotely-operated vehicle (ROV) guy to fly as well, and he can do an inspection every day,” he says. “It’s the same thing, just topside.”

Growth potential Blackford puts the drone inspection market potential at $10 billion-plus globally. And possibilities for drones continue to expand — eventually, he believes, drones will be able to deliver some cargo to offshore platforms.

Sky-Futures has carried out thousands of drone flights in 16 countries and opened an office in Houston in August 2015. “The US is one of the biggest markets for us,” Blackford says.

Scotland-based Cyberhawk boasts more than 13,000 commercial flights carried out in more than 20 countries. The company, founded in 2008, carries out inspections in multiple industries, and also has a new Houston office.

Each inspection can result in thousands of images. Not only can the data and images be used to create 3D models, Fleming says, but also to generate inspection reports that provide clients with ways to act on the data. All of this can be made available through the company’s iHawk asset management software.

Blackford believes the future for drone inspection reporting is in the ability to present 3D visualisations of the structures at engineering grade tolerances. “It won’t be just a pretty 3D model, it will be a model that can be used from an engineering point of view.” Blackford also believes laser measurement, fingerprinting and data filtering, corrosion measurement and drone-based ultrasonic non-destructive testing are on the horizon. “Intrinsically safe” drones are also a potential goal.

“Would the oil and gas companies love intrinsically safe drones? Of course they would. But you can’t retrofit that. You have to build it from the ground up.” Such drones would be encased to prevent giving off heat and sparks, which would make them heavy.

As for pilots with “skilled thumbs,” there may soon be a day when humans are no longer needed to fly the drones, Fleming says. A UAV at a normally unmanned facility could be able to carry out its inspections, analyse the data and sift through it for a change in condition, and transmit to a remote location, without human intervention, just as is done in the military for seeking out improvised explosive devices.

“We want things to become less reliant on humans, more automated. UAVs will be one of those tools that you use so you don’t send people into harm’s way,” Fleming says. “At the moment, they’re expensive, and they rely on good operators, skilled individuals, to fly them. As the technology improves and the sense-and-avoid systems come in, then you’ll see the use of them increase exponentially.”

“We get information that can’t typically be achieved unless the platform is shut down. We see areas that are not typically accessed on a regular basis.”

Chris Blackford, Sky-Futures

Photo: Sky-Futures