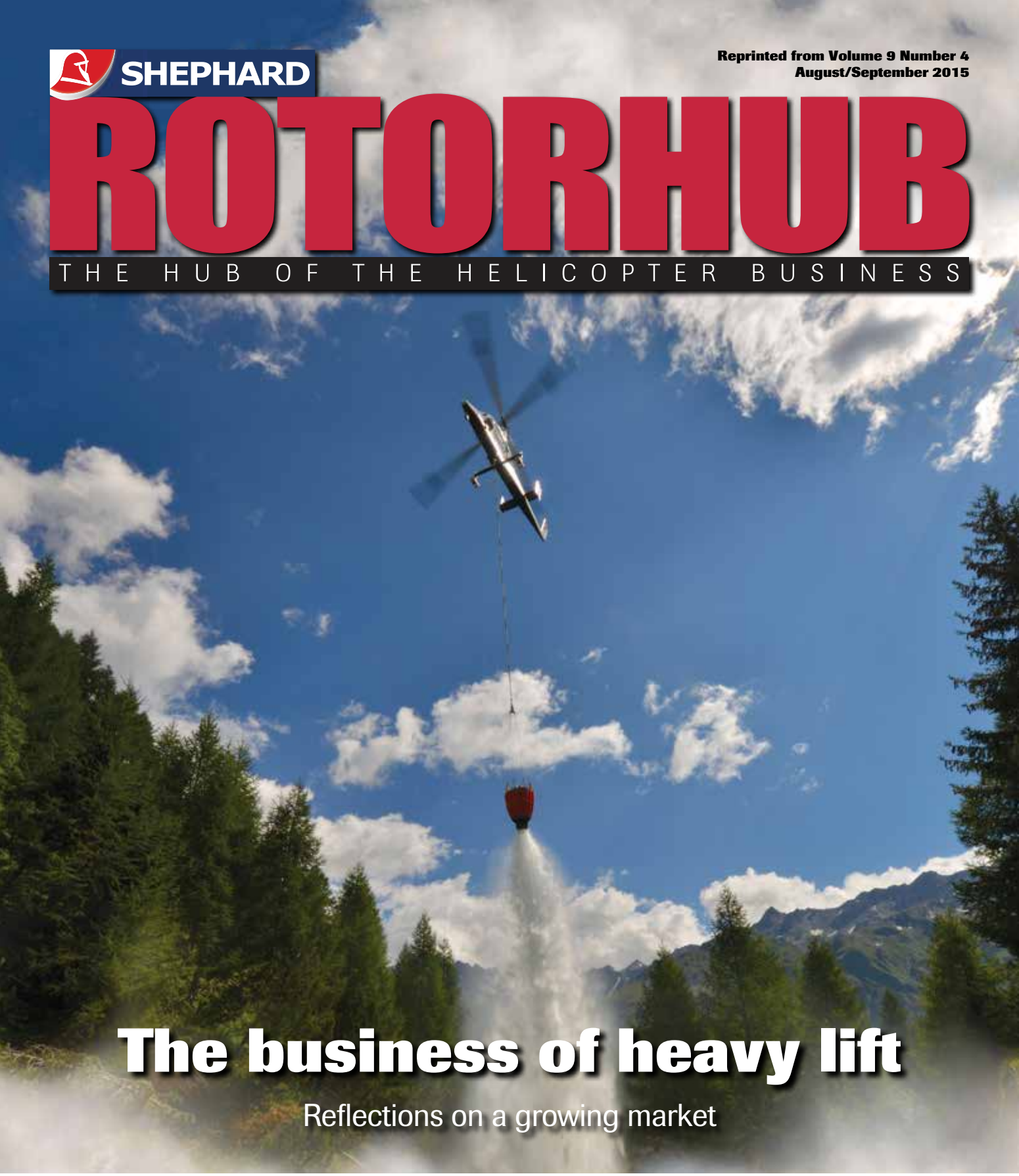
SHEPHARD

Reprinted from Volume 9 Number 4
August/September 2015

ROTORHUB

THE HUB OF THE HELICOPTER BUSINESS



The business of heavy lift

Reflections on a growing market

SPECIAL REPRINT IN ASSOCIATION WITH:

KAMAN Aerospace

US firm Helicopter Express is one of two existing K-Max operators to have signed up for new examples of the type. *(Photo: Helicopter Express)*

A shut and open case

The Kaman Aerospace K-Max production line is set to re-open a decade after the factory doors were shut. **Grant Turnbull** and **Tony Skinner** speak to the OEM about this decision and what the future now holds.

Kaman Aerospace's recent announcement that it planned to restart production of its famous aerial crane, the K-Max, serves as a useful barometer not only of the health of the company, but the heavylift industry as a whole.

While production of the K-1200 K-Max ceased in 2003, the single-engine helicopter has remained popular for such load-carrying roles as powerline/utility construction, logging and fire-fighting.

Indeed, being able to lift over 2,700kg externally, the aircraft has become the workhorse of many fleets around the world, with operators attracted by the rugged design and counter-rotating rotor configuration.

June's announcement that the company planned to resume manufacturing the K-Max at its Jacksonville, Florida, and Bloomfield, Connecticut, facilities was therefore a welcomed one.

LAUNCH CUSTOMERS

There will be two launch customers for the new-build aircraft, Swiss operator Rotex Helicopter and US-based Helicopter Express, both of which already operate the K-Max. First deliveries are due in 2017, according to Kaman.

Rolf Spichtig, CEO of Rotex, said the company valued the fact the K-Max made less noise and consumed less fuel.

'With a payload of 2,700kg, the helicopter is very versatile,' he said at the time of the announcement. 'All of this makes the K-Max the preferred helicopter for many of our customers. It is a solid solution, which is why we have placed deposits for two new aircraft.'

Robert Starr, chief financial officer at Kaman, noted that K-Max production would require a 'manageable' near-term investment in working capital and modest capital expenditure.

'With the aircraft already fully developed and certified, the non-recurring costs to restart production are expected to be minimal,' he said. 'The first ten aircraft produced are

expected to generate revenues of between $75 million and $85 million. Restarting the K-Max line is not expected to impact our full-year 2015 outlook.'

The move was a culmination of a two-to-three-year effort by the OEM to assess industry's appetite for the aircraft, according to Terry Fogarty, general manager of the UAS product group in Kaman Aerospace's helicopter division.

'There is really no second-hand market for K-Max – everybody keeps them. So consequently when we got enough interest, plus some deposits, we said "let's open the production line",' he told *RotorHub* at the Paris Air Show in June.

'The bonus for us is that we did not need to re-invigorate the supply base because supporting the helicopter over the years, we've maintained a robust supply chain and now it is asking them for a few more at a time.'

RIGHT DECISIONS

Fogarty said the original decision to close the production line was the right one at the time, given underlying changes to the heavylift sector.

'The economy had changed significantly as far as where the helicopters were being used and it just made sense to close it,' he continued. 'What's fun this time around is just how much interest there is from around the world, not just from specific areas.

'It's that "liftability", it's the altitude capability and the fact that the fire-fighting people in the US really like K-Max. A lot of the time they are the first ones on and the last ones off a fire because they are able to carry so much water at different altitudes and they are truly an asset to the fire-fighting.

'And then the forestry industry and infrastructure building is a big part of it, such as building power lines across very austere places. There was a power line project in Southern California that lasted over four years that involved up to four K-Max at any one time – from four different companies.'

For Rotex Helicopter, ordering the new production K-Max allowed it to expand capacity and begin the process of renewing its fleet. The first aircraft is due to be delivered by July 2017 and the company holds an option for a second example.

'We will decide [to exercise this option] after the successful introduction of the first new helicopter,' Spichtig told *RH*.

Today, Rotex operates two K-Max helicopters across Austria, Germany, Liechtenstein and Switzerland, and feels it needs a minimum of three new machines over the next six to eight years as an initial step to renew its fleet.

EXTERNAL LOADS

More than 70% of the company's work is in the forestry sector, while installation mounting (power lines, antennas, ski lifts, etc) and supply to construction sites comprise the rest.

'We are specialised in pure external load operations,' Spichtig explained. 'The maximum payload [of the K-Max] with 2,700kg is an optimal performance for our customers. The K-Max is the ideal helicopter for our concept.

'The performance profile of the K-Max is very linear, even in the high altitudes. We have the possibility to adjust the flaps on the rotor blades to reach an even better performance at high altitudes.'

Helicopter Express, meanwhile, is a relatively new operator of the K-Max, with its first example, acquired from New Zealand operator Skywork Helicopters, coming online in March this year.

According to Gary Dalton, Helicopter Express's VP of acquisitions, sales and business development, the Georgia-based company expects to take delivery of its new machine by summer 2017, with the second arriving six or seven months later.

He explained to *RH* that one of the main reasons for purchasing a new K-Max directly from Kaman was the company's fire-fighting work.

'Ninety per cent of our work at the moment is fighting fires for the federal government, and we feel it's without doubt one of the best machines to fight fire with,' he remarked. 'Fires are just getting worse by the minute, all the time here in the US. So we feel that's the market we need to be going into, the medium to heavy market.'

The introduction of new aircraft will also allow the company to address the growing demand for infrastructure construction work, particularly power line assembly, according to Dalton.

Helicopter Express has a fleet of around 30 aircraft and has ordered two new Airbus Helicopters H125s (AS350 B3e), bringing the total fleet of the type to eight. The company is also looking at other options suited to hot-and-high operations such as the Bell 407HP from Eagle Copters.

However, it's not just work in the US that Helicopter Express is aiming for. 'We are very interested in taking the K-Max and [Bell] 205s into South America,' Dalton said. 'We are really looking at that hard at the moment because their fire seasons are the opposite to us. Obviously there is a lot of red tape we have to go through, but we think it will be worth it in the end.'

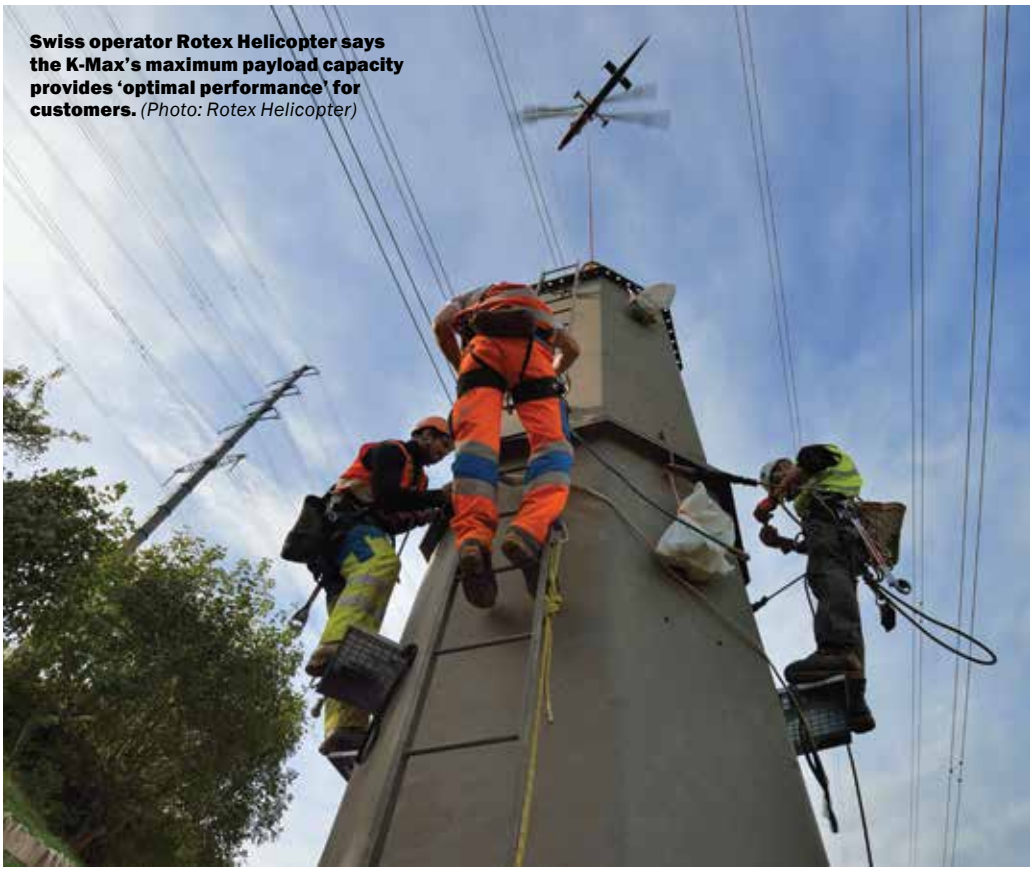
LEAD TIMES

Back at Kaman, the team is getting everything in place for an initial ten-aircraft production run, although it expects this number to grow significantly.

'It's about an 18-month lead time for us to get everything set up, all the parts ordered, get them assembled and fly the first one out of here,' Fogarty explained. 'We have established the rate as one every six to eight weeks, starting in January 2017.

While a lot may have changed since production ceased in terms of some of the more advanced helicopter technologies now available, the only components that will initially be changed are those that are simply no longer produced.

'Now as we go forward with a second lot or third lot, whatever the case may be, there will be the opportunity to make some modifications. But right now we really want to get back into the rhythm of building helicopters again, and then in the future we can look at potential changes.'



Swiss operator Rotex Helicopter says the K-Max's maximum payload capacity provides 'optimal performance' for customers. *(Photo: Rotex Helicopter)*

> In two to three years' time I will sell you a kit to install so you can do unmanned operations.

Chief among any future wish list would be a composite main rotor blade, but this will likely have to wait until additional production lots are finalised.

A modern advance any prospective customer can take advantage of, however, is the fact that Kaman can credibly claim the K-Max is a true optionally piloted aircraft.

Developed in conjunction with Lockheed Martin, the unmanned K-Max supported the US Marine Corps (USMC) in Afghanistan for 33 months in 2011-2014, carrying more than two million kilogrammes of cargo.

UNMANNED OPERATIONS

Additional unmanned fire-fighting and humanitarian missions for K-Max are now also being developed and trialled.

'This time around I can say to people, you can buy a K-Max and in two to three years' time I will sell you a kit to install so you can do unmanned operations like unmanned fire-fighting,' added Fogarty. 'That gives people an option so that they can say: "You know that might be something that we might want to do in the future, that's good information to have."'

The two companies carried out a demonstration of the unmanned K-Max in the fire-fighting role in New York last November for the Department of the Interior and is planning further tests in undulating terrain in October.

'The goal [in Afghanistan] was to get trucks off the road, to save lives,' he continued. 'Well, we removed over 900 trucks and if you count a contact hour as the time a soldier or marine could be in possible contact with the bad guys, we eliminated 46,000 contact hours.

'It got to the point where they had complete faith in the aircraft, and it happened early on. They started having their marines hooking up loads under a hovering unmanned K-Max. That's a level of confidence that was gained rapidly.'

The resumption of production will certainly help dispel any arguments that the aircraft was 'old technology' as the USMC looks to transition the unmanned cargo aircraft experiment into a funded programme of record.

Fogarty said the company was already getting queries from civil organisations about the maturity and utility of the K-Max for optionally piloted missions.

'There have been enquiries from humanitarian aid folks who would like an unmanned K-Max as part of an aid package that could be deployed anywhere in the world in 30 days or less, to deliver supplies and medicines, whatever the case may be, to places that have a lack of infrastructure.'

With only 35 production aircraft ever delivered (the first three built were prototypes, with one of those still used today for Kaman's unmanned testing), it is little wonder the K-Max has been highly prized by those plying their trade in the heavylift sector.

REPETITIVE TASKS

Designed specifically for repetitive lifting missions, the aircraft has fewer complex systems than most other helicopters and is based on a single engine, single transmission and servo-flap controlled, counter-rotating rotors with no high-pressure hydraulic system.

The lack of a tail rotor and its attendant driveshaft optimises power output, increases safety and lowers the overall noise signature.

For romantics, the resumption of K-Max production also continues the story of one of the pioneers of the helicopter industry, with the young Charles Kaman founding Kaman Aircraft Company in the garage of his mother's home in 1945 with $2,000 invested by two friends.

His innovations, including intermeshing rotors to increase lift while eliminating the tail rotor and a new concept of rotor control based on 'servo-flaps', have become hallmarks of most Kaman helicopters since.

'It's a fun story,' Fogarty said. 'To have the K-Max in production again and to have people say "I want what you make" – what could be better than that?

'The intermeshing rotor is very simple – it's one transmission and two output shafts. The theory behind it has been alive since 1920 when it was first flown by Anton Flettner in Germany and Mr Kaman made his first intermesher in 1945, well before computers – it's all slide rules.

'These were smart guys and they had visions. They knew where they wanted to get to. All these guys – Charles Kaman, Larry Bell, Frank Piasecki, Igor Sikorsky – were brilliant people, but they had a vision.' **RH**