AVIATION MAINTENANCE
avm-mag.com
Leading Global MRO Journal since 1983
Get your FREE subscription via www.avm-mag.com/free-sub

GETTING SCHOOLED BY ROBINSON

Robinson Helicopter Maintenance School

CHECK OUT OUR NEW BUYER'S GUIDE SECTION

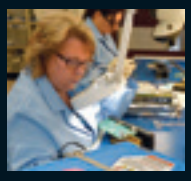
AVIATION MAINTENANCE avm-mag.com BUYER'S GUIDE

Download free iOS app via www.avm-mag.com/iOS

February / March 2016

BATTERY LIFE
TWO STORIES ABOUT THE CURRENT STATE OF BATTERIES AND WHAT'S TO COME IN THE FUTURE

LEGAL SPIN ON DRONES
MARPA'S RYAN AGGERGAARD TALKS LEGALITIES OF DRONE USE IN MAINTENANCE



REPAIR CENTER DIRECTORY 2016
OUR ANNUAL LISTING OF MROS AND RELATED BUSINESSES

AVIATION MAINTENANCE avm-mag.com 2016 REPAIR CENTER DIRECTORY

Getting Schooled on Robinson Helicopter Maintenance

Robinson's factory maintenance school takes any mystery out of maintaining the world's most popular family of light helicopters.

by Dale Smith

"Helicopters are really a bunch of parts flying in relatively close formation; all rotating around a different axis. Things work well until one of the parts breaks formation."

- Anon.

Back in the latter part of the 1950's, U.S.-built light aircraft were being turned out in great numbers and the theme of the day was: "An airplane in every garage." And while that dream was never realized, it never really died.

Even today, like-minded entrepreneurs have their sights set on passenger toting UAVs to flying cars. Why sit in rush hour traffic when you can just fly right over it? The concept sounds even better today than it did 60-years ago.

In fact, while few of us remember it now, the idea of providing simple, affordable, personal airborne transportation was exactly what Frank Robinson had in mind when he founded the Robinson Helicopter Company in 1973.

"The two-place R22 was originally designed as a transport for busy executives," explained Patrick Cox, manager, Technical Support, Robinson Helicopter Company. "The idea was that you could takeoff from your house and fly off to the office. Frank went so far as to use the two-blade rotor configuration to make it easy to fit an R22 in a suburban garage."

"That obviously didn't transpire as Frank had hoped," he said. "But that was the idea of the original helicopter design – easy to fly and easy to maintain."

The Little Helicopter That Did…

While busy executives may have overlooked the time saving opportunities that the early R22 presented, it's capabilities and affordability quickly made it a hit with helicopter-hungry flight schools.

"Up until the R22's introduction, options for helicopter flight training were limited to older Bell 47s, Schweizer 30s, some Hillers and an occasional Brantly," Cox said. "While all fine basic trainers, each required a considerable amount of maintenance, which increased both the downtime and cost of operations."

Current generation, piston-powered R22 and R44, and the new turbine R66s all have a 12-calendar year preventative maintenance schedule on the airframe components. Robinson Image.

As a point of reference, in 1976, when I did my basic rotor training in a Bell 47, the flight school pretty much counted on needing two-hours of maintenance for every hour in the air.

"In the case of the R22/R44 models, we figure it's on the order of 10-hours of flight time to every one hour of maintenance," he said. "That's a good working estimate depending on where you are on the cycle of things on the aircraft. With the piston R22 and R44, the engine requires, by far the majority of the maintenance time."

In fact, Cox said that the current generation, piston-powered R22 and R44, and the new turbine R66s all have a 12-calendar year preventative maintenance schedule on the airframe components.

"Operators today are really looking for value," he said. "And this schedule saves a lot of inspection time. By minimizing maintenance requirements on our helicopters you actually increase the uptime and that, of course, has a direct positive impact on the aircraft's operational value, which the flight schools want," Cox said. "Easier maintenance also greatly reduces the hassle factor from a private owner/operator's perspective."

Robinson Rule #1: K.I.S.S. Complex Maintenance Goodbye

It's not much of a stretch to think that Mr. Robinson had a pretty darn good idea about what were the high maintenance areas on piston helicopters of the day – and that he took great pains to design as many of those issues as possible out of his new generation R22.

"To that end, Frank got rid of all the grease nipples on the aircraft straight off," Cox explained. "There were nipples on the ground handling wheels early on, but those are gone now. He also used sealed bearings and self-lubricating rod ends. They are either

There are more than 11,000 Robinson helicopters flying today. Robinson Image.

Teflon or, in cases like in the engine compartment, some are brass. But in any event, none of the rod ends require manual lubrication."

"We also have a semi-rigid rotor systems, which goes back to Frank's original concept of the busy executive as our target buyer," he said. "The main and tail rotor drive systems use maintenance-free flexible couplings; all the hub bearings are self-lubricating; and the spindle bearings are lubricated with automatic transmission fluid (ATF) so you don't have any periodic re-greasing requirements."

Cox said that the ability to use ATF to lubricate the rotor bearings comes from the fact that Robinson used a fully evacuated pitch change bearing housing in his original design. And, by eliminating the use of standard grease, he was able to dramatically reduce the amount of routine maintenance on these critical systems.

"In a standard system you have bearings spinning in grease and that creates a path defined by the walls of the displaced grease and the liquid that separates from the grease to lubricate the balls," he said. "Because there is space created in there you get air and moisture in the system. That increases the risk of wear and corrosion."

"With those designs, you periodically have to go in there and purge the old grease out and replace it with new. That was a major maintenance requirement for older helicopters," Cox said. "By using a sealed system with a low viscosity liquid like ATF, there is no displacement of the lubricant so there's no room for air or moisture. Compared to the automatic transmission in your car, the spindle bearings are a piece-of-cake to lubricate with ATF."

Other areas where the Robinson helicopter family maximizes design and manufacturing efficiency to reduce ongoing maintenance are in the powder coating of the tubular steel and aluminum frame and the use of one-piece components instead of multi-part units.

"We have a huge CNC (Computer Numerical Control) capability here so we can make parts that used to be assembled from multiple components out of a single block of whatever type material," he said. "We have also have sophisticated CNC sheet metal bending capabilities. Instead of riveting or bolting panels together, the machine can fold it from a single sheet. Sort of like aluminum origami. That saves manufacturing and maintenance time."

What all this adds up to is the fact that while they are sophisticated flying machines, the Robinson helicopter line are among the simplest aircraft to assemble, inspect and maintain in the sky.

"From the beginning, Frank's philosophy regarding the simplicity of the R-Series helicopters' design was this: If it's not in there it can't break," Cox said. "And if it is in there it needs to be easy to access and maintain."

Robinson Rule #2: Proactive Maintenance is Key to Reliability

While Mr. Robinson's original target "executive" market didn't quite pan out, he was spot on with everything else about his plan. Today, there are more than 11,000 Robinson helicopters fulfilling a wide array of needs around the world.

And to help ensure that their helicopters will deliver the safe and reliable performance every customer expects Robinson runs its own maintenance school at its Torrance, Cali., headquarters.

The course's primary instructor is Efrain Vargas. Vargas has been with Robinson since 1986 and story goes that he worked closely with Frank Robinson on the development of the four-place R44. Vargas is not only an employee and instructor for Robinson, he also owns a Robinson Helicopter dealership in Mexico.

Robinson runs its own maintenance training class at their Torrance Cali. location. Robinson Image.

Minimizing maintenance requirements increases the uptime which has a direct impact on the aircraft's operational value. Robinson Image.

"Efrain has real world experience and insights into maintaining these helicopters on a daily basis," past attendee and director of maintenance for Helicopter Services, Inc., Mike Crossland said. "What he delivers is not just from a book. He shares the information that you can only get from maintaining helicopters in the field. That sets this school apart from others I've attended."

Crossland stressed that while Robinson helicopters may have been designed to be own and flown by "executives" they're not to be maintained by them. Robinson helicopters are very complex machines and a keen understanding and appreciation of that fact is paramount in safe operations.

While Robinson's in-house maintenance program is described as a "basic hands-on" course for the inspection and maintenance of R22, R44 and R66 airframes, Cox said the course is only available to technicians who already hold a valid A&P certificate or are active duty military with equivalent knowledge.

"We discourage owners from attending unless they have a valid technician's certificate," he said. "It's way too technical if you don't already posses the knowledge and skills. If they do have a certificate, then they're welcome to pay the tuition and attend."

Cox explained that when a qualified owner does attend the course they are treated like any other attendee. Passing requires they do all the same tasks and pass the same tests everyone else.

"This is not a school for 'students' – everyone in the room is a qualified technician already," Cox said.

While Robinson helicopters are found in pretty much every corner of the world, Cox explained that the Torrance facility doesn't get many European-based technicians.

"It's mainly due to the EASA training requirements. They have

The maintenance course is available to technicians who already hold a valid A&P certificate or are active duty military with equivalent knowledge. Robinson Image.

To earn their factory authorization, each of the 450 Robinson Service Centers are required to have their technicians attend and pass the course.. Robinson Image.

become quite onerous now," he said. "EASA requires much more practical experience than we can provide here. It's not just hands-on training. They require line-type training if you will. We're not set up to do that."

"If they require EASA certification, then we refer them to the EASA approved school held at Heli Air in the UK," Cox said. "They're an authorized Robinson dealer and service center."

Cox stressed another thing for international students to be aware of: All of the Robison Helicopter classes are given in English. However, attendees who are not fluent in reading and writing English are welcome to bring an interpreter if they need to.

Robinson Rule #3: You Snooze, You Loose

As for how the program is run, Cox explained that the eight-day (Monday thru Friday then Monday thru Wednesday) course is structured more like a college program with lecture-type classes starting at 8:00 in the morning followed by a daily written test. Hands-on labs are held each day after lunch. There is also about an hour and a half's worth of homework each evening.

Robinson helicopters are complex machines. They were designed to be owned and flown by executives but not to be maintained by them. Robinson Image.

"It's not a difficult program by any stretch if you're at all familiar with helicopters," he said. "You just have to do your homework each evening and pay attention in class."

To earn their "factory authorization," each of the more than 450 (at last count) Robinson Service Centers are required to have their technicians attend and pass the course.

"We don't routinely fail any students. When that does happen it's usually a lack of preparation on their part or it has been an issue with language," he said. "Students are also failed if they do not pass each daily exam or in the opinion of the instructor, they cannot safely inspect and maintain a Robinson helicopter. That rarely happens. But just showing up does not ensure a pass."

Cox explained that the hands-on part of the program is based on the company's written task checklist. Students get to cover the typical inspection and maintenance items on the piston powered Robinson R22 and R44 and the turbine-powered R66. All the airframes are basically the same.

Since this is a Robinson course, the program doesn't get too deep into the Lycoming piston engine on the R22/R44 or the Rolls-Royce turbine on the R66. Both companies offer schools for their engines.

"Students are put in teams to do most of the tasks," he said. "But, each student has to demonstrate individual knowledge and skill to the instructor to pass that section."

"I know first hand that in many instances helicopter MROs will hire new A&Ps and put them on maintaining Robinson helicopters," Crossland said. "This course program gives everyone great insight into what to look for during routine inspections and maintenance. It's valuable training for anyone working on Robinson helicopters."

Robinson Rule #4: Change is Good

Cox said that, like the Robinson helicopters themselves, the maintenance, training course continues to improve from when it was first held in the early '80s.

"There's much more emphasis on the why behind the procedure now," he said. "If the technicians know and understand the 'why' it is done that way, the more likely they are to remember it and do it correctly."

One point that Cox said is stressed throughout the course is to always read the manual before beginning any task. And when in doubt, call the factory support team and ask.

He said that one related comment he hears a lot from attendees is, "This makes more sense now that I have read the instructions."

"When I attended the course it was one-week," Crossland said. "Now they've added three more days and I think that's a huge benefit to the attendees. There's so much to learn and Efrain has so much knowledge to share."

While the course has evolved, Cox doesn't see the need for a formal "recurrent" training program.

"One that's worked out pretty well with our R66 (turbine) model is we require all the maintenance shops to be Part 145 compliant," he said. "That regulation requires the operator to provide their own approved recurrent training program. That saves them from having to send technicians back. Travel is expensive."

"Our airframes have pretty much stayed the same since Frank designed them, so unless you are away from helicopters for a while, there's just not much to forget," Cox said. "We feel that our maintenance training course is right at where it needs to be to provide technicians with the product knowledge they need to keep our aircraft operating safely and efficiently." AM


ROBINSON®
HELICOPTER COMPANY