MARINE CORPS AIR STATION CHERRY POINT, N.C. — The process of removing paint from blades in for repair at Fleet Readiness Center East will be about 75 percent faster for technicians with the approval of a laborsaving paint removal process. According to Electrical Engineering Team Lead Ben Thompson, the Automated Rotor Blade Stripping System, or ARBSS, is now complete and approved for use in Naval Aviation depots, and will reduce the 22-hour process of removing paint from H-53 blades to four hours or less.

“It's been a lengthy process to ensure the technology is viable, sustainable and consistent,” said Thompson. The goal to automate the process got underway in (fiscal) 2006. At the start of the project, the depot was refurbishing more than 900 blades annually for CH-53, CH-46 and H-60 aircraft. The requirement to depaint blades opened the door to other issues that threatened throughput quality. Those issues included damage to blades from use of orbital sanders, intensive labor methods, inconsistencies from manual blasting and cost. Also, paint removal work orders ranged from spot repair to full-blade sanding.

The primary objective was to choose and implement a cost-effective, alternative paint
removal technology. The system’s design goals were set to eliminate substrate damage, increase throughput, and reduce the cost of the paint removal process, reduce health and safety risks to workers and lessen environmental impact.

The process has spanned more than a decade, as it had to undergo testing as defined by the original equipment manufacturers and Naval Air Systems Command before use. Various entities donated parts in order to prove the laser stripping concept. A prototype system was installed in 2009 to prove the technology concept. The system, however, was somewhat obsolete once it was installed, as the lasers were already 10 years old.

“This project joined a lot of entities together — academia, original equipment manufacturers, government, private industry,” said Robert Mehring, materials engineer who worked with the project.

Engineers performed preliminary test to establish the proper recipe, ascertaining things such as thermal, mechanical and environmental effects on blades. During the first phase of testing engineers tested the mechanical properties of the blade; thoroughly examining its physical and mechanical structure.

According to Mehring, there were concerns about using the thermal process on critical items such as rotor blades, and if the process was safe for use on composite materials. He said they were concerned about the composite skin being made of a thin fiber glass and what heat would do to the structural adhesive bonding agent. He said they focused on protecting the structural properties of the materials in the rotor blade, and tested it to the worst case scenario.

A trademarked technology was targeted that involved laser, paint removal with color recognition to ensure the protection of the substrate or subsurface material. Mehring added that the established recipe contained a built-in safeguard that was designed to make necessary passes with the laser while stopping far short from damaging the substrate.

During the second phase engineers worked with a scaled-to-concept production system, testing things such as software, hardware and system function.

Thompson said that engineers worked through numerous challenges that occurred concurrently with testing. Such challenges included an evolving list of test requirements, funding, working with older technology at half laser power and requirements for environmental permissions.

And while the process of implementing the technology came after an extended period, Thompson and Mehring said the process was necessary considering the stakes of throughput, quality and criticality of end products.

“We needed to make sure there would be no hiccups,” said Thompson, “so when production starts to use it they can use it without interruption.”

“It’s a critical process to a critical component,” said Mehring. “We looked at it and relooked. It continues to evolve as it proves its worth.”

According to Julien Miles, Capital Investment Program project manager of the Plant Processing and Engineering Branch, the first system, a prototype, was installed at FRC
Stripping away lengthy process

East in 2009. In 2014 the system received an upgrade to its original, outdated components. The new hardware and software included more powerful lasers, enhanced work-head components and more efficient, user-friendly software. The system also includes a HEPA vacuum functions, which simultaneously captures hazardous waste generated during the stripping process. The system is now approved for use.

“I think it’s great,” said Aaron Lawrence, mechanical parts worker. “It removes the artisan from the hazards we are exposed to in the sandpit. It cuts down on turnaround time — two shift or two days to half a day or two to four hours.”

The system is installed in FRC East’s Blade Shop 94304. “We overcame some obstacles to get it in place,” said Mehring, “and it’s now being advanced all over the place.”

Additional testing and work has to be done in order to use the technology on V-22 and H-1.