

and the accuracy of the data collected.

- A full metallurgical lab has been installed, thereby enabling analysis of microstructure, coatings, etc, right on the shop floor.

Experience base. As of January 1, PWPS had repaired 370 sets of F-class hardware, including 59 sets from V84.3 and V94.3 engines (Figs B10-B12). The lead set of the 50 sets of first-stage buckets repaired thus far has operated for 72,000 hours; the lead set of the 28 sets of first-stage nozzles repaired is at 48,000 hours.

New hardware. In addition to repairs and field service, PWPS offers an expanding list of new HGP parts for frame machines. The company says these parts reflect its extensive experience in the design of high-temperature on-wing engines. The use of advanced materials, cooling schemes, and coatings extend component lifetimes and reduce life-cycle costs. Components come with reparability guarantees. Here's a short menu of parts for popular engines operated by North American power producers:

- 6B first-stage 12-hole bucket featuring P&W's proprietary directionally solidified (DS) base alloy, internal aluminide coating, external low-pressure plasma spray (LPPS) metallic coating.
- 7B-EA first-stage bucket is made of an equiaxed nickel-base superalloy for long life. High-temperature (up to 2055F) performance is achieved with LPPS and TBC

coatings. PWPS says its bucket design helps prevent platform cracking without increasing the flow of cooling air, which adversely impacts engine performance.

- 7FA+e buckets, nozzles, and combustion parts. First-stage buckets are manufactured using a proprietary DS alloy and TBC, and enhanced cooling scheme, for improved creep and oxidation life. Features built into first-, second- and third-stage buckets assure 72,000 hours/2700 starts—possibly longer depending on the results of a technical evaluation at 72k. Parts performance is backed by reparability guarantees.

Combustion liners, flow sleeves, and transition pieces incorporate alloys and coating systems for superior creep, oxidation, and wear performance aimed at extending parts life beyond the industry average and reducing life-cycle costs. CCJ

Allied dedicates new repair shop, targets F-class market

Meteoritic certainly describes Allied Power Group LLC's business growth since the company's founding 10 years ago. The dedication of its impressive 75,000 ft² repair shop in Houston last May testifies to that. The new shop, which sits on 14 acres, is quadruple the size of the previous facility and

centralizes company headquarters, sales, repairs, and warehousing in one location.

Recall that Allied is a holding company which combined the assets of PowerSpares and Turbine Blade Repair Specialist (TBRS). It was formed to offer gas-turbine owners and operators a single source for high-caliber turbine replacement parts and fast, expert repairs of hot-gas-path (HGP) components.

When the companies came together, PowerSpares had one of the world's largest inventories of GE Frame 5, 6, 7, and 9 parts and TBRS was well known for its capabilities in the inspection, refurbishment, and repair of HGP and combustion-system components.

Current capabilities include an engineering team to determine the best method of repair, grit blasting, a complete NDE (nondestructive examination) line, heat treatment and coatings, welding and machining areas, a clean room for CMM (coordinate measuring machine) and flow testing, and a customer inspection area.

"The new facility allows Allied to control all of its repair operations under one roof—which, in turn, will reduce customer turn times. One of the core values for Allied Power Group," Engineering Manager Alan Lovelace, PE, told the hundreds on hand for the dedication and open house in early May, "is customer responsiveness and the new facility will enhance this key attribute even more."



Don't pass on the opportunity to visit Allied Power Group's new shop next time you get to Houston. Call ahead and make arrangements through CEO Bruce Agardy, Executive VP Mike Elliott, President Keith Marler, or COO Louis Green (l to r on the bed of the VBM shown in Fig C10)

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President Keith Marler added, “We are very excited to have made this next step in the evolution of our business. All of this growth is in response to our customers’ needs, our employees’ dedication, and our team effort that we bring to the table.”

The additional tooling and streamlined work-flow processes made possible by the new facility have increased efficiency and enabled a 50% increase in throughput with capacity to spare. Roughly three-quarters of the company’s business is in refurbishment and repair of F-class components, where Allied believes it has advantages

both in experience and business flexibility.

Regarding the latter, the company remains privately owned, allowing customized repair solutions and financial arrangements. For example, it has pioneered repairs for some W501F components, including ring segments. Declared scrap by the OEM, Allied engineers and technicians told the editors how they developed a fix for about one-third the cost of new parts and have successfully repaired several condemned sets.

The company also has developed a machining process and the fixturing

necessary to machine the side gaps on 501F vanes to close tolerance.

Curriculum vitae

Technical Director Aaron Frost offered an overview of Allied’s deep experience in the repair and refurbishment of F-class parts at the 7F Users Group meeting a week after the open house. One example: The company claims the largest repair experience base on DLN2.6 components—caps, liners, and transition pieces (TPs)—outside the OEM.

It had repaired more than 50 sets



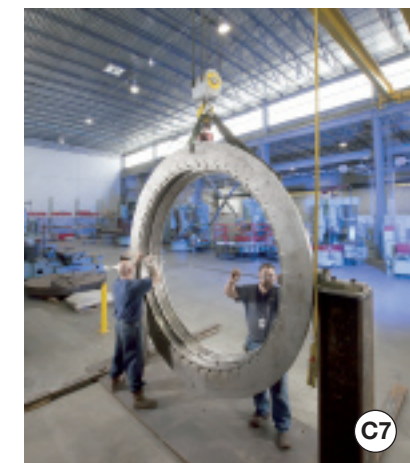
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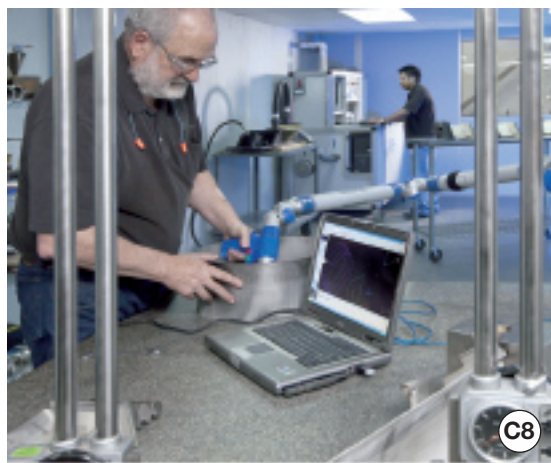
C3



C4



C7



C8



C9

Tour Allied Power's new shop

C1. Machining area. CNC (computer numerical control) and manual equipment is in full view as you look down the aisle. Note the high-tech turning center from Haas Automation Ltd at the lower left

C2. Nozzle and vane area. Completed nozzle row is lifted from table while assembly of a 7EA second-stage nozzle row is just getting underway

C3. Compressor diaphragm assembly area

of combustion caps and made more than 420 individual effusion-plate replacements; repaired more than 60 sets of combustion liners, including more than 80 aft-end replacements; and repaired more than 40 sets of TPs. Some of the combustion liners and TPs were in the shop for the third repair, having more than 36,000 hours of service and 1800 starts.

Scorecard of 7FA+e HGP component repairs: Over 100 sets of HGP components—including buckets, nozzles, and shroud blocks. For the 7EA: Over 230 sets of HGP components (including buckets, nozzles, and shroud blocks);

C4. Welding and customer inspection area. Proper fit-up of turbine buckets is confirmed in foreground; at right, 7FA+e combustor covers and liners are set out for inspection after coating. The welding area has 25 booths

C5. Visual inspection of parts prior to fluorescent penetrant inspection

C6. Dimensional check of 7FA+e flow sleeves

C7. 501F R2 vane ring was preassembled for dimensional inspection

C8. Repaired combustion liner is inspected using a sophisticated coordinate measuring machine from FARO

plus, 94 sets of combustion liners, 93 sets of TPs, 12 sets of flow sleeves, 58 sets of bullhorn brackets, and 34 sets of crossfire tubes.

Scorecard of W501F HGP component repairs: Over 200 sets of HGP components—including blades, vanes, and ring segments. In addition, more than 100 rows of compressor diaphragms have been repaired along with blade rings for seven compressors and four turbines.

Shop tour

For now a shop tour in print will

Technologies Inc—typically called a FARO arm. Flow testing is in the background

C9. Repairs are made to the aft end of a 7FA+e combustor liner

C10. 501F compressor case is prepped for machining on a 130-in. (maximum swing) vertical boring mill

C11. Final dimensional inspection of repaired 7EA third-stage buckets is conducted after airfoils are installed in turbine disc

C12. Special fixturing is used for checkout of 7FA+e second-stage nozzles

have to suffice. To see more, contact Lovelace, Marler, Frost, Marketing Manager Kelly Moore, CEO Bruce Agardy, Executive VP Mike Elliott, or COO Louis Green—you're sure to know one or more them—and arrange for visit next time you get to Houston.

The first four pictures in the sequence are overviews of the specialized work and inspection areas, the next four are of inspection processes, Figs C9 and C10 show repair work, and C11 and C12, the all-important fixturing to assure proper fit-up during reassembly at the plant. CCJ