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# MILITARY DEPOTS

## DOD Can Benefit from Further Sharing of Best Practices and Lessons Learned

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the military services.”<sup>3</sup> In March 2018, DOD submitted a report to Congress describing a number of groups, committees, and activities related to a governance framework of joint collaboration.<sup>4</sup> In June 2018, the Senate Armed Services Committee, in a report accompanying a bill for the National Defense Authorization Act for Fiscal Year 2019, stated that it is not clear if DOD is effectively sharing and implementing best practices and lessons learned identified by its individual depots.<sup>5</sup> As such, the Senate Armed Services Committee report included a provision for us to review DOD’s sharing and implementation of best practices and lessons learned among the depots. In this report, we examine the extent to which DOD experiences benefits and has challenges with (1) sharing and (2) implementing best practices and lessons learned among the depots. This report is the first in a series of reports examining depot maintenance requirements and timeliness for aviation, ground vehicles, and naval shipyards.

To address these objectives, we reviewed relevant laws and DOD and military service guidance that govern depot maintenance. We conducted a survey of 17 DOD depots performing depot-level maintenance to gain an understanding of how each depot shares with each other and implements best practices and lessons learned.<sup>6</sup> The response rate for the survey was 100 percent. To gather detailed examples of DOD’s efforts to share and implement best practices and lessons learned, we visited a non-generalizable sample of five depots. To select our sample, we considered variation in geographic location, military service representation, and types of weapon systems maintained. At these sites, we conducted group discussions with depot officials and maintainers to gain insight into their roles in sharing and implementing best practices and lessons learned.

Additionally, we interviewed officials from the Office of the Secretary of Defense, military headquarters, military logistics or materiel components, and military lessons learned centers. We reviewed our prior reports related to challenges experienced at DOD depots and DOD’s report to

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<sup>3</sup>Pub. L. No. 115-91 (2017).

<sup>4</sup>DOD, *Report to Congress on Sharing of Best Practices for Depot-Level Maintenance Among the Military Services* (March 2018).

<sup>5</sup>S. Rep. No. 115-262, at 147 (2018).

<sup>6</sup>To capture the full range of activities surrounding best practices and lessons learned, our unit of analysis for each survey was the depot as a whole. As such, our results will be reported by number of depots, rather than depot commanders or other metrics.

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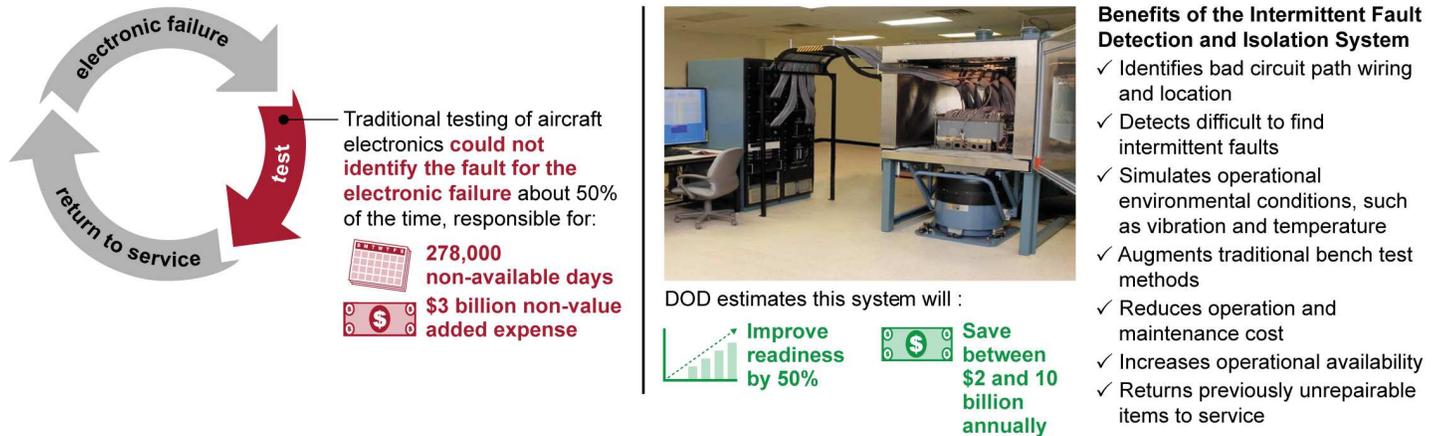
cold spraying each gearbox costs about \$1,300 whereas replacing each gearbox costs about \$38,000; at 13 units per year, this amounts to almost \$500,000 in annual cost avoidances. Additionally, it would take 95 weeks to build and receive a new gearbox unit; however, with the cold spray repair the unit is back in service in 4 weeks. Ogden officials are currently working to include cold spraying gearboxes for the F-15, C-5 and E-3 weapon systems to its workload.<sup>29</sup>

**Inter-service collaboration.** Depots from two or more military services are collaborating to implement best practices and lessons learned which has led to benefits. For example, the Navy's Fleet Readiness Center Southwest implemented a best practice learned from Ogden Air Logistic Complex to improve testing of electrical circuits. Specifically, according to depot officials, a maintainer at Ogden created a method—Intermittent Fault Detection and Isolation System—which tests systems and software to detect, isolate, and repair intermittent problems due to open circuits, short circuits, and poor wiring by replicating the environment of the aircraft in flight (See fig. 8.). According to Ogden officials and program documentation, by implementing this best practice, they have recovered out-of-service assets and generated about \$62 million in cost savings. For example, after testing its F-16 chassis, Ogden officials recovered 138 out-of-service assets—amounting to \$42 million of flight hardware returning to service.

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<sup>29</sup>The F-16 Fighting Falcon, F-15 Eagle, C-5 Galaxy, and E-3 Sentry are aircraft operated and maintained by the Air Force. The F-16 and F-15 are tactical fighter aircraft; the C-5 is a transport aircraft; and the E-3 is a warning and control system aircraft.

**Figure 8: Benefits of the Intermittent Fault Detection and Isolation System**



Source: GAO analysis of Department of Defense (DOD) and military service documentation; DOD (photos). | GAO-20-116

Moreover, officials at Fleet Readiness Center Southwest visited Ogden during a benchmarking trip to discuss the process of implementing the Intermittent Fault Detection and Isolation System to test their systems. According to officials from the Office of the Secretary of Defense, the intermittent faults due to aircraft electrical systems amounted to more than \$300 million in operating and support costs in fiscal year 2014. The Fleet Readiness Center Southwest used the Intermittent Fault Detection and Isolation System to test its F/A-18 aircraft generators, which provide electrical power to the aircraft. As a result of testing these generators using the Intermittent Fault Detection and Isolation System, the mean time between failures for the generators has increased, according to officials, from 104 flight hours to over 400 flight hours, and the Navy anticipates a reduction of about 30 to 90 days of repair time.<sup>30</sup>

**DOD and external entities.** Depots are also partnering with private industry to implement best practices and lessons learned, which has led to time-savings benefits (See fig. 9.).

<sup>30</sup>The mean time between failures predicts, in hours, the average amount of time the part will operate before a failure occurs.

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Moreover, in 2018, we reported on steps that DOD is taking to improve its information technology systems.<sup>32</sup> Specifically, the Secretary of Defense asked the Defense Business Board to provide actionable recommendations that DOD could adopt to transform its six core business processes, including acquisition and procurement, logistics and supply, and real property management, and their supporting information technology systems. We recommended, in part, that DOD identify timeframes and deliverables for identifying and adopting optimal information technology solutions. DOD concurred with this recommendation and is taking steps to improve its information technology systems, such as issuing its initial plan for business operations reform in April 2019, collecting federal and private industry benchmarks, and reviewing information technology costs.

**Approval process.** Eight of the 17 depots reported that the approval process and guidance for implementing best practices is challenging. Specifically, depots reported that the layers of leadership approval prevent timely implementation of best practices and, at times, can cause enthusiasm for a project's implementation to wane. Depot officials also told us that implementing new ideas for maintaining or repairing weapon systems is challenging because they have to get multiple approvals from their chain of command as well as the program manager for a specific weapon system, thus making implementation more difficult and less timely. For example, depot officials told us that implementing best practices at the depot from one weapon system to another requires retesting of the practice and approval from each program manager. Additionally, in response to the survey, a depot reported that many of the essential, time-sensitive engineering decisions for one of its new weapon system reside at another location, which has caused delays in making timely decisions. In another example, depot officials told us that they had to get approval from individual program managers to implement the cold spray technology and the Intermittent Fault Detection Isolation System.

To mitigate challenges in the approval process, such as these, depot officials told us it is beneficial when technological development that affect the DOD-wide logistics enterprise or an entire military service occurred at a higher organizational level, making it easier for new ideas to be implemented at the lower levels. For example, one depot reported on the Navy's approach of implementing a best practice across its platforms to

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<sup>32</sup>GAO, *Defense Management: DOD Needs to Address Inefficiencies and Implement Reform across Its Defense Agencies and DOD Field Activities*, [GAO-18-592](#) (Washington, D.C.: Sept. 6, 2018).

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eliminate corrosive plating on its weapon systems. Navy officials told us that these decisions are made at the headquarters level and implemented across the depots. Moreover, one depot reported allowing decision authority for specific weapon systems to reside within the depot, rather than at another location, to help the depot make timely decisions on implementing new ideas. Finally, the Office of the Assistant Secretary of Defense is providing specific guidance in implementing best practices and lessons learned, such as the memorandum issued in April 2019 on the Intermittent Fault Detection and Isolation System directing the military services to adopt this best practice.<sup>33</sup>

**Acquisition and contracting policies.** Five of the 17 depots reported acquisition and contracting policies as a challenge to implementation. Specifically, depots reported that current acquisition and contracting policies are complex and time consuming, which causes government to lag behind industry in implementing best practices. For example, officials from one depot told us that even when two depots need the same item to repair a weapon system, each depot was encouraged to pursue a separate contract. Depot officials described this as an inefficient and burdensome process, which sometimes resulted in an inferior item. Similarly, officials from another depot told us that they started an initiative to make equipment and software more similar across their service's depots; however, they were unable to implement this initiative for similar reasons. Further, officials from one depot told us that the procurement of a weapon system does not always include access to all data necessary to maintain the system.<sup>34</sup> According to depot officials, this limits their ability to implement a best practice or lesson learned from a similar weapon system because the contractor retains ownership of the intellectual property needed to repair or optimize the system.

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<sup>33</sup>Deputy Assistant Secretary of Defense for Materiel Readiness Memorandum, *Addressing Electronics Intermittence Across DOD's Sustainment Enterprise* (April 11, 2019).

<sup>34</sup>GAO has reported in the past that DOD needs access to technical data—recorded information used to produce, support, maintain, or operate a system—which can enable the government to complete maintenance work in-house, as well as to competitively award contracts for the acquisition and sustainment of a weapon system. See GAO, *Defense Acquisition: DOD Should Clarify Requirements for Assessing and Documenting Technical-Data Needs*, [GAO-11-469](#) (Washington, D.C.: May 11, 2011).