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July 2019

# DEFENSE LOGISTICS AGENCY

## Small Businesses Participate in Reverse Engineering of Spare Parts

Accessible Version

### Small Businesses Participate in Reverse Engineering of Spare Parts

Highlights of [GAO-19-586](#), a report to the Committee on Armed Services, U.S. Senate

View [GAO-19-586](#). For more information, contact Marie A. Mak at (202) 512-4841 or [makm@gao.gov](mailto:makm@gao.gov).

#### Why GAO Did This Study

The Department of Defense spends tens of billions of dollars annually to sustain military assets including aircraft, ships, and missiles. In support of this effort, DLA strives to maintain a competitive supplier base through reverse engineering—the process of examining an item, such as a spare part, with the intent of replicating its design. Contractors consider intellectual property, such as their technical data and patented material, essential to their success. DLA also takes steps to safeguard contractors' intellectual property during reverse engineering.

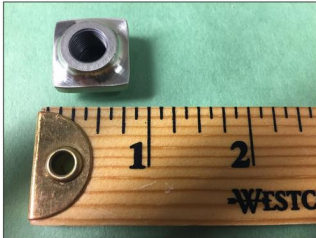


The Senate Armed Services Committee report accompanying a bill for the fiscal year 2018 National Defense Authorization Act included a provision for GAO to review DLA's reverse engineering efforts, including the protection of small businesses' intellectual property. This report describes (1) DLA's reverse engineering programs and the extent to which small businesses participated in these programs from fiscal years 2015 through 2018; and (2) how DLA safeguards certain intellectual property within its reverse engineering efforts.

GAO analyzed data from three DLA commands—Aviation, Land and Maritime, and Troop Support, those that conduct reverse engineering—from fiscal years 2015 through 2018. GAO reviewed a nongeneralizable sample of 19 reverse engineering projects involving 13 parts, selected to include a variety of characteristics, such as the size of the contractors involved. GAO reviewed DLA's guidance and interviewed DLA officials and representatives from small businesses about safeguarding intellectual property as part of reverse engineering.

#### What GAO Found

The Defense Logistics Agency (DLA) is responsible for providing logistics support to the warfighter, including spare parts for military assets. From fiscal years 2015 through 2018, DLA initiated over 1,600 reverse engineering projects for spare parts at three of its commands—Aviation, Land and Maritime, and Troop Support. DLA uses reverse engineering to identify potential new sources for spare parts that are available from only one source and to achieve savings. DLA funded about 1,000 of the reverse engineering projects, while contractors funded the remaining 600 projects. Nearly two-thirds of all reverse engineering projects involved parts in five categories, with examples of the three largest categories illustrated in the figure.

#### Examples of Reverse Engineered Parts

Hardware and abrasives Plain cap nut	Vehicular equipment components Tailgate step	Electrical and electronic equipment components Electrical contact brush holder assembly
		

Source: Defense Logistics Agency (DLA) Land and Maritime (center image); DLA Aviation (all other images). | GAO-19-586

GAO found that the majority of contractors conducting reverse engineering for DLA were small businesses. Specifically, DLA identified 124 contractors that conducted reverse engineering projects from fiscal year 2015 through 2018, 103 of which GAO determined were small businesses. According to small business representatives and DLA officials, reverse engineering is beneficial for small businesses and can help provide opportunities for additional business with DLA.

GAO found that the three DLA commands had processes to safeguard certain intellectual property in their reverse engineering efforts. Specifically:

- Officials from all three commands stated they do not release drawings with limited data rights to contractors interested in reverse engineering parts.
- Aviation and Land and Maritime officials stated that they check for patent markings on parts to ensure patented parts are not reverse engineered. Troop Support officials stated they do not check for patent marks because the parts they supply are often too old to have valid patents.

The small businesses GAO met with did not identify concerns with how DLA handles intellectual property. Further, DLA officials stated that they had not received any complaints from small businesses about their intellectual property being used inappropriately.

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## Abbreviations

DLA	Defense Logistics Agency
DOD	Department of Defense

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July 31, 2019

The Honorable James M. Inhofe  
Chairman  
The Honorable Jack Reed  
Ranking Member  
Committee on Armed Services  
United States Senate

Sustaining the Department of Defense’s (DOD) military assets, such as aircraft, ships, and missiles, is crucial to support the warfighter. DOD spends tens of billions of dollars annually to ensure these assets are available for military operations, with the Defense Logistics Agency (DLA) supporting the sustainment efforts. DLA is DOD’s combat logistics support agency and is responsible for purchasing, storing, and distributing most consumable, expendable, and reparable parts, including spare parts, for DOD. Military assets are often operational for decades and a single contractor sometimes supplies the parts needed to sustain them. This situation potentially leaves DLA vulnerable to higher costs and disruption in supply if that supplier can no longer provide the part.<sup>1</sup>

If DLA cannot obtain needed items due to price or obsolescence, it can attempt to reverse engineer the part. This is one way DLA strives to maintain its supplier base and obtain savings. Reverse engineering is the process of examining an item, such as an antenna or an electrical cable, with the intent of replicating the item’s design. Reverse engineering efforts can be funded by DLA or by contractors that want to become new suppliers. During this process, DLA takes steps to safeguard against unauthorized patent infringement and protect the existing suppliers’ intellectual property—such as certain technical data and other proprietary information for their spare parts. Contractors consider intellectual property essential to the success of their businesses.

The Senate Armed Services Committee report accompanying a bill for the fiscal year 2018 National Defense Authorization Act included a provision for us to review DLA’s reverse engineering efforts, including DLA’s processes for protecting small businesses’ intellectual property, such as

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<sup>1</sup>For additional information on DOD’s management of single sources of supply, see GAO, *Defense Supply Chain: DOD Needs Complete Information on Single Sources of Supply to Proactively Manage the Risks*, [GAO-17-768](#) (Washington, D.C.: Sept. 28, 2017).

patented materials, if those businesses' parts are reverse engineered by other businesses. This report describes (1) DLA's reverse engineering programs and the extent to which small businesses participated in these programs from fiscal years 2015 through 2018; and (2) how DLA safeguards certain intellectual property within its reverse engineering efforts.

To describe the results of DLA's reverse engineering programs and small business participation in fiscal years 2015 through 2018, we analyzed DLA data describing the number of projects initiated in each fiscal year by three major subordinate commands—Aviation, Land and Maritime, and Troop Support. DLA identified these three major subordinate commands as having formal reverse engineering programs. DLA's data included projects funded by contractors and projects funded by DLA. To categorize the types of parts involved in reverse engineering, we compared the first two digits in the national stock number for each part to its corresponding Federal Supply Groups description, which DLA uses to identify parts. We also analyzed DLA's reverse engineering data to identify the number of contractors involved in reverse engineering as well as the amount of savings reported by DLA.

In addition, we compared data provided by DLA for contractors involved in reverse engineering—both those that supplied parts prior to reverse engineering and those that conducted reverse engineering—to small business information in the System for Award Management and the Federal Procurement Data System – Next Generation.<sup>2</sup> We assessed data reliability by (1) reviewing existing data and information about the systems used to produce the data, (2) comparing the data provided to documentation for a selection of reverse engineering projects, and (3) interviewing agency officials knowledgeable about the data. Although we found some inconsistencies in the data, we determined that the data were sufficiently reliable to discuss the number and types of reverse engineering projects in DLA.

In addition, we selected a nongeneralizable sample of 19 reverse engineering projects, involving 13 parts, chosen to obtain variety across the following characteristics: DLA command, project completion status,

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<sup>2</sup>The System for Award Management is the primary database of contractors doing business with the federal government. The Federal Procurement Data System–Next Generation is the central repository for capturing information on federal procurement actions.

contractor- and DLA-funded projects, and types of entities conducting reverse engineering efforts. For example, we sought to include projects where the approved suppliers (prior to reverse engineering) or the contractors conducting reverse engineering were small businesses. We also included projects that reported savings as a result of reverse engineering. For these selected 19 projects, we reviewed documentation including requests for approval from military service engineers, agreements between DLA and contractors, acquisition history information, and documentation of prices paid to support savings calculations. We identified 15 small businesses that were involved in these 19 projects either as a small business whose parts had been reverse engineered or as a small business that conducted reverse engineering.<sup>3</sup> We spoke with or received written responses from 10 of these 15 small businesses. We also conducted follow-up with DLA command officials to obtain additional information.

To describe how DLA safeguards intellectual property within its reverse engineering efforts, we reviewed relevant DOD procedures.<sup>4</sup> We also reviewed documentation for the nongeneralizable selection of 19 reverse engineering projects to understand how officials implemented the procedures. For these selected projects, we interviewed or received written information from 10 of the 15 small businesses regarding how DLA's reverse engineering affects small businesses and any concerns about how their intellectual property is protected during the reverse engineering process. We also interviewed DLA competition advocates and small business officials about issues raised to them by small businesses with whom they interact. Further, we interviewed representatives from industry associations whose members include small business manufacturers that conduct work with DOD, specifically the Aerospace Industries Association, the National Defense Industrial Association, and the National Association of Manufacturers, as well as the Council of Defense and Space Industry Associations.

We conducted this performance audit from July 2018 to July 2019 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain

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<sup>3</sup>Two small businesses were both approved suppliers of parts and also reverse engineered parts.

<sup>4</sup>DOD Manual 4140.01, Volume 9, DOD Supply Chain Materiel Management Procedures (February 16, 2018) and DLA Standard Operating Procedure 4245.01-01, Reverse Engineering (May 17, 2018).

sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

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## Background

DLA's primary purpose is to meet the logistics requirements of the armed forces for food, clothing, fuel, spare parts, and other items. DLA's major responsibilities are to buy and distribute about 5 million distinct consumable, expendable, and reparable items. In order to fulfill the logistics requirement of the armed forces, DLA provides more than \$35 billion in goods and services annually. As part of its responsibility to provide spare parts, DLA officials stated that three of DLA's major subordinate commands conduct reverse engineering—Aviation, Land and Maritime, and Troop Support. These commands are directly responsible for meeting the following military services' needs. Specifically:

- **Aviation** provides aviation weapons systems spare parts, flight safety equipment, maps, environmental products, and industrial plant equipment.
- **Land and Maritime** provides for ground-based and maritime weapons systems spare parts, small arms parts, and fluid handling systems.
- **Troop Support** handles food, textiles, construction material, industrial hardware, and medical supplies and equipment, including pharmaceuticals.

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## DLA Reverse Engineering Process

Reverse engineering is the process of replicating a design by physically examining and measuring an existing item to develop the technical data necessary to reproduce the item functionally and dimensionally. In other words, it is the process of extracting information about an item from the item itself. According to DLA's procedure, the intent of reverse engineering is either to develop an approved technical data package—the details needed to duplicate the item such as drawings or specifications, among other things—or approve a new supplier. The technical data package could be used for future competitive procurements when the item is needed for sustainment purposes.



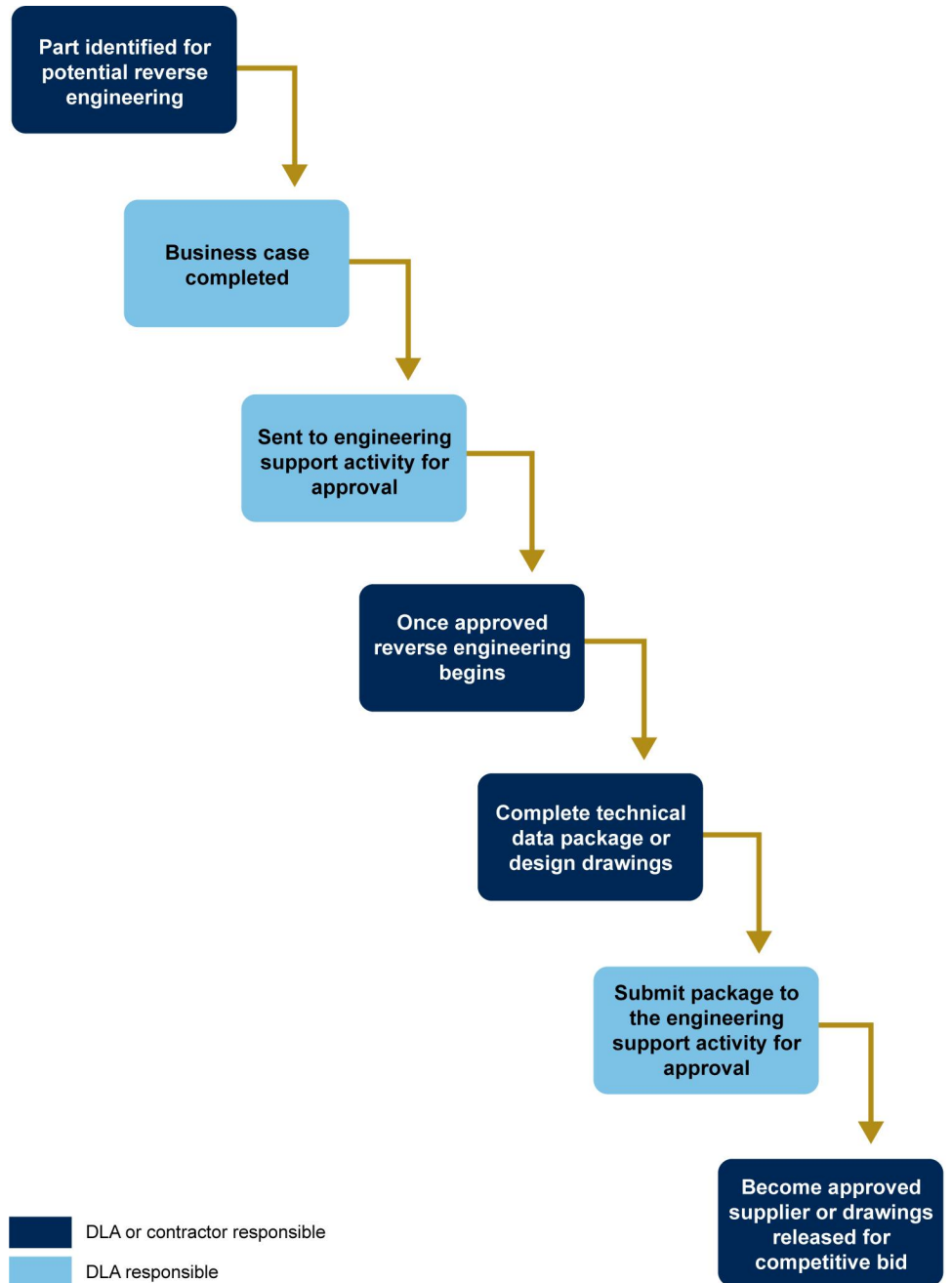
DLA uses reverse engineering for several reasons, such as identifying potential new sources for obsolete parts or those supplied by only one source, increasing competition, and achieving savings. Parts are identified for reverse engineering generally because the government does not have necessary legal rights to the drawings or lacks data needed to facilitate competitive procurements. However, reverse engineering is generally considered the least attractive alternative for replenishing parts because it is expensive and time-consuming. Therefore, according to DLA guidance, before starting reverse engineering DLA personnel should try to buy data from the original equipment manufacturer, previous manufacturing sources, or other data rights holder. DLA personnel also need to consider the costs of acquiring the data rights before initiating reverse engineering. DLA guidance for its reverse engineering processes is the same regardless of the size of the businesses involved.

In order to start a reverse engineering project, DLA has established criteria, such as documenting a business case and showing that the part meets certain yearly purchase thresholds. Specifically, according to DLA guidance, procurements of the part over the past 2 years generally should exceed \$10,000 in each year. Additionally, the engineering support activity at a military department (Army, Air Force, or Navy) responsible for the part generally approves a project before reverse engineering can begin.<sup>5</sup> Once reverse engineering is completed, the technical data package must be approved by the appropriate engineering support activity. Figure 1 shows the general process from identifying a part as a potential candidate for reverse engineering to approving a technical data package or a new source of supply, and indicates whether DLA or a contractor is responsible at each step.

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<sup>5</sup>An engineering support activity is the organization at a military service that has engineering responsibility for ensuring a weapon system works safely and effectively.

**Figure 1: Summary of Defense Logistics Agency's (DLA) and Contractor Responsibilities in Reverse Engineering Process for DLA and Contractor Funded Efforts**



Source: GAO Analysis of Defense Logistics Agency (DLA) information. | GAO-19-586

DLA has two reverse engineering programs—the Replenishment Parts Purchase or Borrow program, funded by contractors, and the DLA internally funded efforts.<sup>6</sup>

### Contractor-Funded Efforts

Through the Replenishment Parts Purchase or Borrow program, contractors reverse engineer a part at their own expense. DLA's goals for this program are to increase competition and achieve savings. After successful reverse engineering and military approval of a technical data package, the contractor becomes a new source of supply for the part. Contractors may identify parts for reverse engineering—mostly small hardware items and electrical components, such as antennas and cables—from a candidate list on a DLA website or through their own research. To conduct reverse engineering, contractors may purchase or borrow parts under agreement with the government subject to certain conditions, such as the part is not classified or considered a critical part—one that is crucial enough that a failure of that part would result in serious injury or impact the success of a mission—among other things. The government incurs minimum cost, if any, in this program.

### DLA-Funded Efforts

The goal of DLA-funded reverse engineering is to develop a technical data package that will be used in future competitive procurements. Typically, DLA funds efforts for parts that are available from only one source, are obsolete, or have limited data rights. These efforts occur in several ways:

- DLA engineers conduct the reverse engineering.
- DLA funds the efforts through partnerships with other DOD entities.
- DLA awards contracts to companies to create drawings of parts that the government can then use in competitive procurements. The government obtains full use of these drawings.

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<sup>6</sup>Procedures for DLA's reverse engineering programs are provided in Section 8.3 of DOD Manual 4140.01, Volume 9, DOD Supply Chain Material Management Procedures, which replaced DOD Directive 4140.57; Defense Logistics Agency, Standard Operating Procedure, Reverse Engineering eSOP 4245.01-01: May 17, 2018.

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## Intellectual Property: Data Rights and Patents

Intellectual property derives from the work of the mind or intellect and is an application, right, or registration relating to property—such as an idea, invention, or process.<sup>7</sup> It includes patents and proprietary information:

- **Patents**—grants an inventor the right to exclude others from making, using, or selling an invention in the United States, typically for a period of 20 years. The holder of a valid patent is the only authorized supplier of the patented item unless another supplier has acquired a license to manufacture and sell the item.
- **Proprietary information**—includes technical data which represents trade secrets usually developed at private expense, such as design, material composition, or manufacturing processes.<sup>8</sup> The owner of a specific item does not make the information available to others without obligations concerning its confidentiality. This confidentiality of proprietary information does not protect it from discovery by reverse engineering.

In order to share technical data, for example, to issue a solicitation for competitive procurement of an item, DLA needs to have sufficient data rights. Data rights are the government's contractual license rights for technical data—recorded physical and material characteristics, such as item specifications, engineering drawings, or operating and maintenance manuals. If the government is entitled to and acquires unlimited data rights, it is allowed to use, reproduce, or disclose that technical data.<sup>9</sup>

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<sup>7</sup>*Merriam-Webster*, s.v. "intellectual property," accessed July 24 2019, //www.merriam-webster.com.

<sup>8</sup>"Technical data" means recorded information (regardless of the form or method of the recording) of a scientific or technical nature (including computer databases and computer software documentation). This term does not include computer software or financial, administrative, cost or pricing, or management data or other information incidental to contract administration. (see 41 U.S.C. 116). FAR § 2.101.

<sup>9</sup>All contracts that require data to be produced, furnished, acquired or used in meeting contract performance requirements, must contain terms that delineate the respective rights and obligations of the government and the contractor regarding the use, reproduction, and disclosure of that data. Data rights clauses do not specify the type, quantity or quality of data that is to be delivered, but only the respective rights of the government and the contractor regarding the use, disclosure, or reproduction of the data. Accordingly, the contract shall specify the data to be delivered. FAR § 27.403.

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When the government acquires limited rights the government may only use the data internally, such as for the operation of equipment, but may not disclose technical data for the purpose of procuring an item from another contractor. DLA procedures indicate the government should consider the cost of acquiring the data rights before initiating reverse engineering.

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## Reverse Engineered Spare Parts Resulted in Some Lowered Prices and Increased Supplier Opportunities for Small Businesses

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### Number of Reverse Engineered Spare Parts

DLA's Aviation, Land and Maritime, and Troop Support major subordinate commands initiated over 1,600 reverse engineering projects during fiscal years 2015 through 2018, according to DLA data.<sup>10</sup> Table 1 describes the number of projects initiated in each fiscal year by DLA's Aviation, Land and Maritime, and Troop Support for both the contractor- and DLA-funded efforts.

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<sup>10</sup>DLA officials defined initiated reverse engineering projects as those where a project was accepted and started. For example, a project is considered initiated once a project is created in its value engineering database. It is possible that reverse engineering was not performed for some of the initiated projects, but DLA does not track whether projects are canceled before or after reverse engineering work is performed, according to officials.

**Table 1: Number of Reverse Engineering Projects Initiated by the Defense Logistics Agency in Fiscal Years 2015 through 2018**

<b>Command and program</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>	<b>Total 2015-2018</b>
<b>Aviation total</b>	<b>250</b>	<b>141</b>	<b>74</b>	<b>136</b>	<b>601</b>
<i>Contractor-funded</i>	90	65	43	43	241
<i>DLA-funded</i>	160	76	31	93	360
<b>Land and Maritime total</b>	<b>234</b>	<b>194</b>	<b>190</b>	<b>193</b>	<b>811</b>
Contractor-funded	120	78	99	49	346
DLA-funded	114	116	91	144	465
<b>Troop Support total</b>	<b>18</b>	<b>166</b>	<b>21</b>	<b>33</b>	<b>238</b>
Contractor-funded	11	5	5	9	30
DLA-funded	7	161	16	24	208
<b>Defense Logistics Agency Total</b>	<b>502</b>	<b>493</b>	<b>285</b>	<b>362</b>	<b>1642</b>
Contractor-funded	221	148	147	99	617
DLA-funded	281	353	138	261	1033

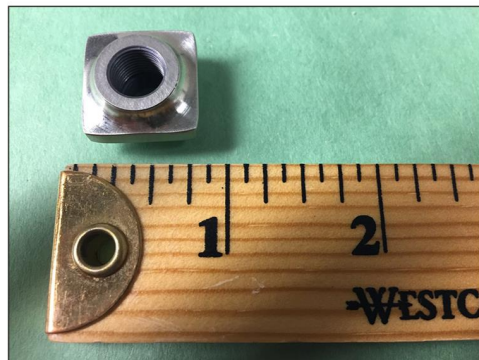




Source: GAO analysis of Defense Logistics Agency data | GAO-19-586

Nearly two-thirds of all reverse engineer projects involved parts in the following five categories.

1. Hardware and abrasives. For example, screws, nuts, washers, and keys.
2. Vehicular equipment components. For example, floor mats, vehicle door hinges, and tailgates.
3. Electrical and electronic equipment components. For example, pressure switches, electrical assemblies, and antennae.
4. Electric wire, and power and distribution equipment. For example, batteries, wiring harnesses, and special purpose cable assemblies.
5. Aerospace craft components and accessories. For example, insulation blankets, filters, and door handles.

Figure 2 shows examples of items in these categories.

**Figure 2: Examples of Spare Parts from Defense Logistics Agency Reverse Engineering Projects**

<b>Hardware and abrasives</b> Plain cap nut	<b>Vehicular equipment components</b> Tailgate step	<b>Electrical and electronic equipment components</b> Electrical contact brush holder assembly
		
<b>Electric wire, and power and distribution equipment</b> Electrical special purpose cable assembly	<b>Aerospace craft components and accessories</b> Door handle	
		

Source: Defense Logistics Agency (DLA) Land and Maritime (top center image); DLA Aviation (all other images). | GAO-19-586

## Some Reverse Engineering Projects Resulted in Lowered Prices

Some of DLA's projects resulted in lower prices for the reverse engineered parts in subsequent procurements. According to DLA data, the agency saved at least \$22 million from reverse engineering projects initiated from fiscal years 2015 through 2018 as a result of lower prices

paid.<sup>11</sup> For example, in one project we reviewed, a small business successfully reverse engineered a retaining ring, which assists in securing parts in an aircraft engine, purchased by Troop Support and became a new approved source of supply. A subsequent purchase of this part resulted in a unit price that was almost \$70 lower per unit compared to the most recent purchase before reverse engineering. We found that Troop Support saved over \$11,000 through this project.

We found that 141—or less than 10 percent—of all projects initiated from fiscal years 2015 through 2018 were successfully completed.<sup>12</sup> Table 2 describes the number of projects that were completed, in-process, and canceled as of December 2018, according to DLA.

**Table 2: Status of DLA Reverse Engineering Projects Initiated from Fiscal Year 2015 through 2018, as of December 2018**

Status	Contractor-funded	DLA-funded	Total
Completed	55	86	141
In-process	487	422	909
Canceled <sup>a</sup>	75	525	600
<b>Total</b>	<b>617</b>	<b>1033</b>	<b>1650</b>

Source: GAO analysis of DLA data. | GAO-19-586

<sup>a</sup>Canceled projects were stopped at some point in the reverse engineering process. This includes projects that were initiated but disapproved before reverse engineering steps were undertaken as well as projects that underwent reverse engineering and the end products—the technical data packages or source approval requests—were disapproved. DLA does not track whether projects are canceled before or after reverse engineering work is performed, according to officials.

DLA officials told us that less than 10 percent of projects have been completed for several reasons. DLA officials stated that the engineering support activities at the military services sometimes take a long time to respond to requests for approval, which adds time to reverse engineering projects. For contractor-funded projects under the Replenishment Parts Purchase or Borrow program, reasons include the following:

<sup>11</sup>DLA calculates savings by comparing the unit price paid before reverse engineering to the unit price after reverse engineering, multiplied by the number of units purchased after reverse engineering. The savings calculations do not include the cost of conducting reverse engineering. More than half of all savings reported to us by DLA were from projects under the Replenishment Parts Purchase or Borrow program, which has little cost to the agency.

<sup>12</sup>We consider projects to have been successfully completed when the military service or DLA approved a technical data package developed during reverse engineering or a new contractor is approved as a source of supply following reverse engineering.



- DLA officials explained that contractors sometimes decide not to complete reverse engineering because the contractors determine the effort would be more labor intensive than originally anticipated or their priorities shift.
- DLA officials also stated that DLA does not necessarily hear back from a contractor after it purchases a part to begin the reverse engineering process.
- Representatives from contractors we spoke with told us that they experience delays in obtaining responses from DLA and military service engineers regarding approvals for their projects.

In addition, DLA officials explained that the completion rate for DLA-funded projects is low for the following reasons:

- More urgent priorities arise after a project begins. Personnel who work on reverse engineering typically have other duties in addition to these efforts and if more urgent priorities emerge after a reverse engineering project has started, the effort may need to be postponed or abandoned to attend to the more pressing priority.
- The need no longer exists for some parts that were identified as reverse engineering candidates.

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## Most Businesses Conducting Reverse Engineering Were Small Businesses

We found that DLA's reverse engineering programs created opportunities for contractors—particularly small businesses—to become new suppliers. According to DLA data, 124 contractors participated—or had the opportunity to become new sources of supply for parts—in the contractor-funded reverse engineering program from fiscal years 2015 through 2018. Of these, we determined that 103 were small businesses.<sup>13</sup> In addition, while DLA performed reverse engineering work for most of the DLA-funded projects, DLA awarded contracts to 6 companies to conduct reverse engineering, all of which were small businesses.

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<sup>13</sup>We were unable to determine business size for 4 contractors that conducted reverse engineering under contractor-funded projects because the information was not available in DLA's data, the System for Award Management, or the Federal Procurement Data System – Next Generation.

Roughly one-third of the 124 contractors worked on only one spare part during the time frame we reviewed, while the others initiated reverse engineering for multiple parts. For example, one small business requested to reverse engineer more than 50 parts during fiscal years 2015 through 2018. A representative for this contractor told us they use a business analytics system that queries publicly available information in order to identify opportunities for reverse engineering.

While most companies conducting reverse engineering were small businesses, almost half the contractors that supplied parts prior to reverse engineering were not small businesses. Specifically, for fiscal years 2015 through 2018, DLA identified 74 contractors whose parts had been successfully reverse engineered, of which we determined that 34 were not small businesses and 26 were.<sup>14</sup>

In general, representatives at the small businesses we spoke with stated that the reverse engineering programs help small businesses. For example, representatives of one contractor that requested to reverse engineer a part told us that DLA's reverse engineering program as a whole benefits small businesses because most of the parts being reverse engineered are originally from other than small businesses, and the program is a path that allows small businesses to become approved suppliers. In addition, representatives from one contractor that reverse engineered multiple projects stated that working with DLA has allowed their business to establish past performance ratings, which will help in future government procurements.

Officials from DLA competition advocate and small business offices stated that reverse engineering is generally beneficial for small businesses. They stated that small businesses have not registered complaints about DLA's reverse engineering program. Rather, small businesses seek opportunities for additional business with DLA, which reverse engineering can help provide. In addition, industry associations we spoke with stated that reverse engineering is a way to involve small business. They stated that reverse engineering projects provide small businesses opportunities to become qualified suppliers and compete for future DLA contracts.

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<sup>14</sup>We were unable to determine business size for 14 contractors that supplied parts that were successfully reverse engineered because the information was not available in DLA's data, the System for Award Management, or the Federal Procurement Data System – Next Generation.

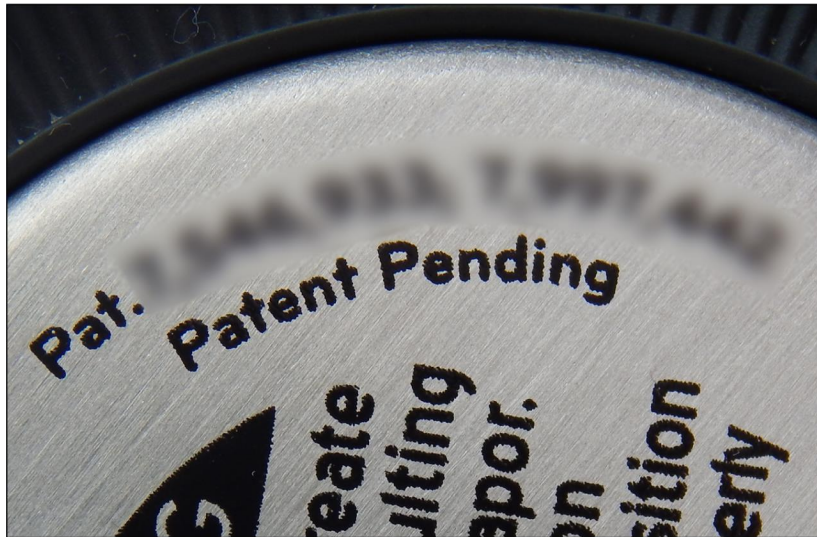
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## DLA Processes Generally Safeguard Intellectual Property in Reverse Engineering Efforts

We found that DLA has processes to protect intellectual property, such as patented designs and proprietary information during reverse engineering. Of the 10 small businesses we spoke with that were involved with our 19 selected projects, none of the representatives identified concerns with DLA's practices for protecting intellectual property. Although DLA's standard operating procedure applies to both DLA-funded efforts and contractor-funded efforts, the provisions that safeguard against patent infringement are specific to the contractor-funded program. According to these provisions, patented materials should not be approved or shared for reverse engineering.

Aviation and Land and Maritime officials stated that they physically review parts for patent marks before reverse engineering can take place for contractor-funded efforts under the Replenishment Parts Purchase or Borrow program. However, Troop Support officials said they do not check for patents under this program because they are supplying parts for legacy systems—systems that are typically 20 years or older—which means any potential patents would have expired. They also stated that they conducted reverse engineering to a limited extent through the Replenishment Parts Purchase or Borrow program. We found Troop Support initiated 30 of the 617 Replenishment Parts Purchase or Borrow efforts from fiscal years 2015 through 2018.

For DLA-funded efforts, Aviation and Land and Maritime officials stated that they physically review parts for patents, and the project is stopped if one is found. For example, officials from Land and Maritime canceled a project for an eye guard because officials found drawings marked with a patent number. The officials could not determine if the patent had expired so they canceled the project. Aviation officials also stated that they rarely encounter patent markings; they have seen four or five in the last 2 years. Troop Support officials stated they do not check for patent markings and they rely on the engineering support activities to check for patents. Figure 3 shows an example of a patent marking.

**Figure 3: Example of a patent marking**

Source: GAO. | GAO-19-586

DLA's guidance for reverse engineering also does not allow the release of limited rights data for the contractor-funded projects under the Replenishment Parts Purchase or Borrow program. DLA officials at all three major subordinate commands told us that they do not release drawings that have limited data rights to contractors conducting reverse engineering under this program. DLA guidance does not cover whether data can be used under DLA-funded efforts. Officials at Aviation, Land and Maritime, and Troop Support all stated that proprietary or limited release drawings or technical data related to the part cannot be used by engineers who work on reverse engineering efforts. Aviation officials noted that the tracking system records those who have seen propriety drawings, and this information is used to ensure that these individuals do not work on reverse engineering projects related to those drawings. Land and Maritime officials stated that the tracking system used for reverse engineering projects also identifies drawings marked as proprietary and controls who has access to drawings.

In general, the small businesses we met with did not express any concerns about how DLA handles intellectual property. We spoke with four small businesses that supplied parts that had been reverse engineered by other businesses. Representatives of these four small businesses confirmed that they did not hold patents on the parts that were reverse engineered. Further, the small businesses that conducted reverse engineering stated that DLA adequately protected intellectual

property. In one case, a representative from a small business that participates in the Replenishment Parts Purchase or Borrow program stated that DLA has never released a part that had controlled data to them and DLA takes protection of proprietary data seriously. Another contractor who performs DLA funded reverse engineering efforts stated drawings are not released and sometimes the function of the part is not even shared with contractors.

DLA command officials stated they had not heard of any concerns from small businesses about their intellectual property being used inappropriately. In addition, officials from the DLA small business office stated they had not heard concerns from any small businesses. Further, one official from the small business office noted that the parts DLA purchases are not new innovations and so do not necessarily have protected intellectual property. Competition advocates stated they received no complaints from small businesses. The industry associations we met with asked their small business membership if there were any specific concerns regarding DLA's protection of intellectual property. Officials from the Aerospace Industries Association, the National Defense Industrial Association, and the National Association of Manufacturers stated there were no complaints from the small businesses represented by their groups about the businesses' experiences working with DLA.

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## Agency Comments

We provided a draft of this report to DOD for review. DOD had no comments.

We are sending copies of this report to the Secretary of Defense; the Director, Defense Logistics Agency; appropriate congressional committees; and other interested parties. This report will also be available at no charge on GAO's website at <http://www.gao.gov>.

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If you or your staff have any questions concerning this report, please contact me at (202) 512-4841 or by e-mail at [makm@gao.gov](mailto:makm@gao.gov). Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. Key contributors to this report are listed in appendix II.



Marie A. Mak  
Director, Contracting and National Security Acquisitions

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# Appendix I: GAO Contact and Staff Acknowledgments

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## GAO Contact

Marie A. Mak, (202) 512-4841 or [makm@gao.gov](mailto:makm@gao.gov)

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## Staff Acknowledgments

In addition to the contact named above, Penny Berrier, Assistant Director; Brandon Booth, Alexandra Dew Silva, Stephanie Gustafson, Victoria Klepacz, Jean McSween, Ralph Roffo, Roxanna Sun, Anne Louise Taylor, and Alyssa Weir made key contributions to this report.

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