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Top Stories

## DoD Releases Landmark Cost of Corrosion Study

### *Agency Completes Data Analysis for Study's First Phase*

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The DoD Office of Corrosion Policy and Oversight has released the first part of a multi-phase study on the cost of corrosion for all military equipment and infrastructure. The landmark report estimates the cost of corrosion for Army ground vehicles and Navy ships.

LMI Government Consulting prepared the report, under the aegis of the DoD Corrosion Prevention and Control Integrated Product Team (IPT). The report is titled "The Annual Cost of Corrosion for Army Ground Vehicles and Navy Ships," and it is available to the public.

The Corrosion Prevention and Control IPT completed the study's second phase on June 30, 2007, which focused on annual corrosion costs for DoD infrastructure, Marine Corps ground vehicles, and Army aircraft and missiles.

### **Cost of Corrosion Study Highlights—Phase One**

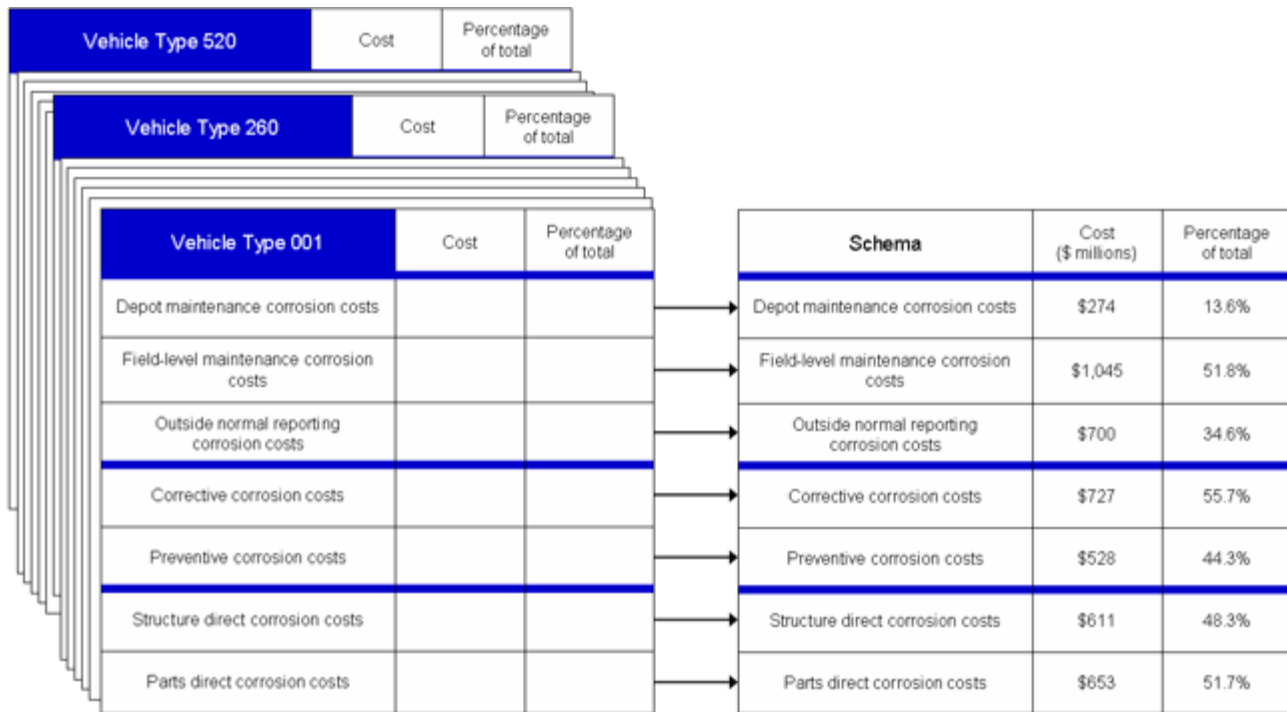
Below is an excerpt taken from the *DoD Corrosion Report* (a document formerly known as the *Report to Congress*), summarizing results of the new cost of corrosion study:

#### ***Army Ground Vehicle Corrosion Costs***

The 2006 study results estimated Army costs according to the three schemas for each of 520 different types of Army ground vehicles, which total more than 446,000 pieces of equipment (see table below).



**Cost of Corrosion for Army Ground Vehicles (FY2004)**



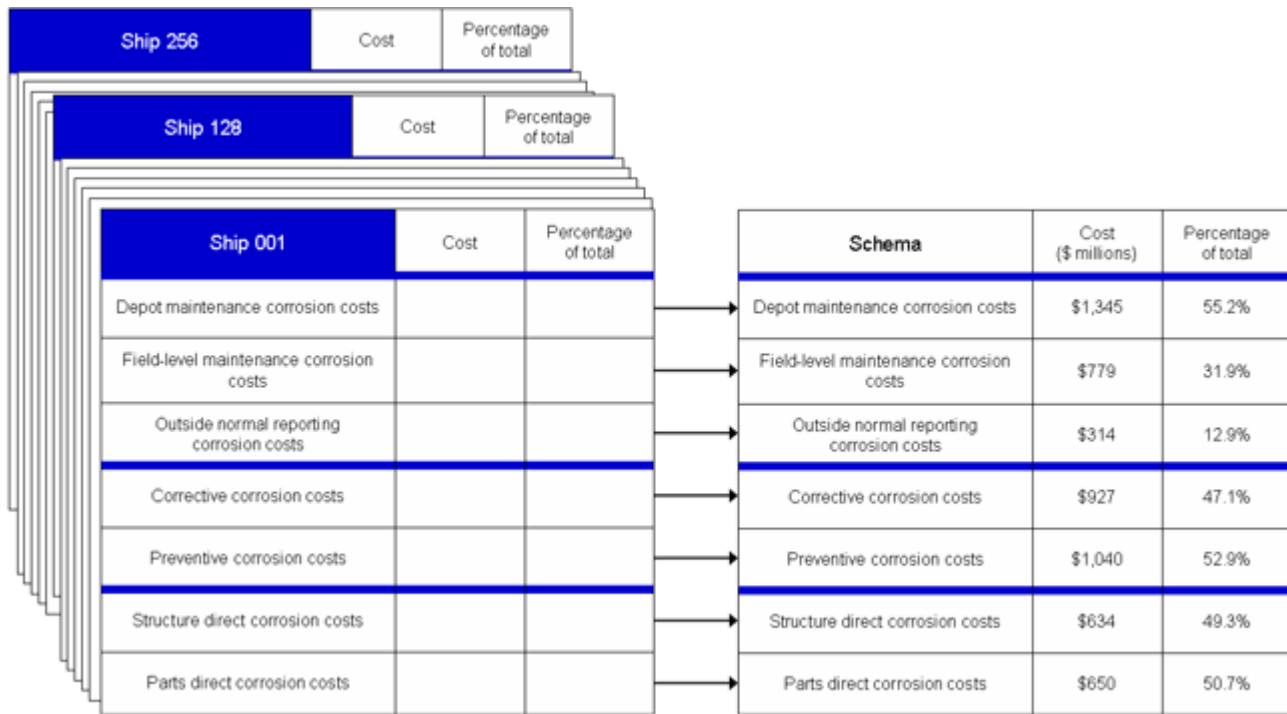
The total annual corrosion cost estimate for Army ground vehicles is \$2.019 billion. The highest costs of corrosion occur during field-level maintenance, which incurs more than half the total corrosion cost for Army ground vehicles. This result can be misleading, however, because the total expenditures for field-level maintenance for Army ground vehicles is much higher than the expenditures for depot maintenance of Army ground vehicles. It is more useful to look at the ratio of corrosion-related field-level maintenance costs to the total field-level maintenance costs for ground vehicles (15 percent), and the ratio of corrosion-related depot maintenance costs to total depot maintenance costs for ground vehicles (14 percent).

The significant costs identified as "outside normal reporting" are driven by the large population of vehicle operators and the corrosion maintenance they perform as operators or maintainers.

**Corrosion Costs of Navy Ships**

The cost of corrosion study determined Navy corrosion-related costs according to the three schemas for each of the Navy's 256 ships (see figure below).

Cost of Corrosion for Navy Ships (FY2004)



The total annual corrosion cost estimate for Navy ships is \$2.438 billion. Unlike the Army, the largest cost of corrosion for Navy ships occurs during the performance of depot maintenance. Corrosion-related depot maintenance costs represent more than half of the total corrosion costs for Navy ships. Corrosion costs also represent a relatively high percentage of total maintenance costs for Navy ships—28 percent of the total depot maintenance costs, and 13 percent of total field-level maintenance costs.

**Corrosion Cost Focus Areas**

**Army**

Although the corrosion costs that are attributable to removable parts slightly exceed corrosion costs associated with the body frame or structure of Army ground vehicles, the situation is drastically different when comparing these corrosion costs as a percentage of maintenance costs. Structural corrosion costs are 25 percent of structural maintenance costs, whereas corrosion costs are only 13 percent of the maintenance attributable to removable parts. This conclusion is important, because there are more opportunities to find common preventive and corrective corrosion solutions that affect the body frame or structure of ground vehicles than there are common solutions that affect the hundreds of thousands of different removable vehicle parts.

The study stratified corrosion costs for Army ground vehicles by total cost and cost per vehicle. Four Army ground vehicles were among the top 20 in both total corrosion cost and corrosion cost per vehicle. These vehicles, which are listed in the table below, are candidates for further focus.

**Army Ground Vehicles with the Highest Combined Average Corrosion Cost per Vehicle and Total Corrosion Cost**

Description	Average corrosion cost per vehicle	Rank in the top 20 average	Total corrosion cost	Rank in the top 20 total
Tank, combat—120mm M1A1	\$25,151	3	\$133,549,785	2
Tank, combat—120mm M1A2	\$16,668	6	\$22,335,378	17
Truck, cargo—tactical	\$12,982	11	\$23,159,719	16
Truck, utility—armored TOW carrier	\$12,465	12	\$23,796,003	15

**Navy**

Of the five categories of Navy ships in this study (aircraft carriers, amphibious, surface warfare, submarines, and other ships), amphibious ships have the highest corrosion costs, particularly at the depot level of maintenance. More than 50 percent of total depot maintenance costs for amphibious ships are corrosion-related.

For corrosion costs that can be assigned to an expanded ships work breakdown structure (ESWBS), more than 42 percent are attributable to the top five ESWBS areas. Because there are more than 550 ESWBS codes with associated corrosion costs, this is a significant concentration of corrosion costs. These five ESWBS codes are listed in the table below.

**Navy Ships ESWBS Codes with Highest Contribution to Corrosion Cost**

ESWBS	Description	Corrosion cost	Percentage of total corrosion cost
123	Tanks and enclosures	\$204 million	10.70%
992	Bilge cleaning and gas freeing	\$182 million	9.60%
631	Painting	\$166 million	8.70%
863	Dry-docking and undocking	\$149 million	7.80%
634	Deck covering	\$103 million	5.40%
Total		\$804 million	42.20%
All others		\$1,098 million	57.80%

## Schedule

The DoD Corrosion Prevention and Control IPT created a timeline and cost schedule for each phase of the cost of corrosion study (see table below).

Schedule of Cost of Corrosion Studies		
Year	Study area	Corrosion costs
2004–2005	Air Force (USAF funded, USAF methodology)	\$1.5 billion
2005–2006	Army ground vehicles Navy ships	\$2.0 billion \$2.4 billion
2006–2007	DoD facilities Army aviation and missiles USMC ground vehicles	\$1.8 billion <sup>a</sup> \$1.6 billion <sup>a</sup> \$0.7 billion <sup>a</sup>
2007–2008	Navy aviation, USMC aviation, and Coast Guard aviation and ships	
2008–2009	Air Force aviation, Navy ships, and Army ground vehicles	
2009–2010	Repeat FY2006/FY2007	
2010–2011	Repeat FY2007/FY2008	

<sup>a</sup> Preliminary estimate.

The incremental approach and schedule outlined above will enable DoD to establish an accepted cost-of-corrosion baseline. In addition, as soon as reliable corrosion cost estimates are available, they are being used to identify areas that require aggressive action and to prioritize resources for prevention and mitigation.

Finally, repeating the studies every three years will provide trending information that can be used to measure progress toward the Department's goal of preventing or mitigating corrosion. Also, a three-year study cycle will provide "refreshed data" to assist the Services in targeting areas that are most in need of resources.

To download a copy of the report *The Annual Cost of Corrosion for Army Ground Vehicles and Navy Ships*, [click here](#). DoD officials explain the results, history, goals, and methodology of the Cost of Corrosion study in their most recent *DoD Corrosion Report*, which can be downloaded by [clicking here](#).

*Look for in-depth reports on different phases of the Cost of Corrosion study in future issues of CorrDefense.*