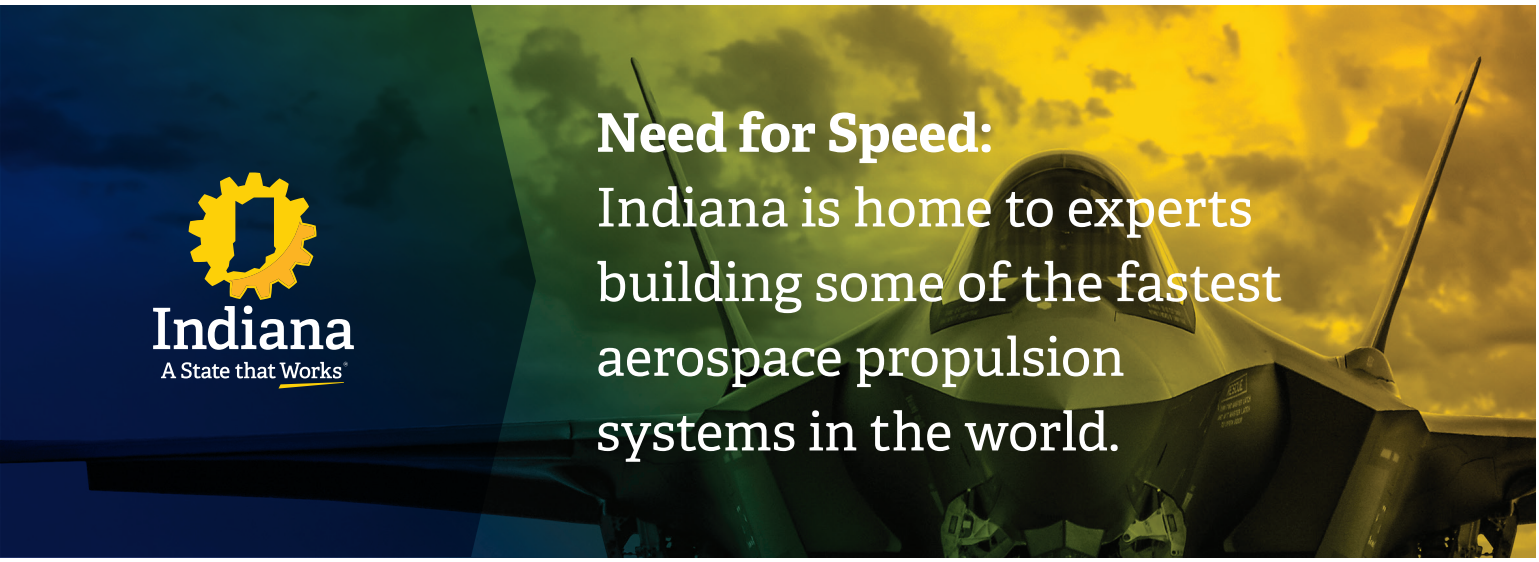

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Department of Defense contractors, by the numbers

The thousands of defense contractors across the country are far too critical to national security to fail, according to the U.S. Under Secretary of Defense for Acquisition and Sustainment, Ellen Lord. In response to the looming facilities shutdown necessitated by COVID-19, Lord issued a memo in March 2020 explaining that suppliers to the Department of Defense have a special responsibility to maintain their normal work schedule.

"We need your support and dedication in these trying times to ensure the security of this nation," Lord wrote.

That's welcome language for suppliers facing the impact of an unprecedented pandemic, and the DOD's words have buoyed the hopes of companies trying to establish new roots or expand operations.

The real threat, however, that generated this nationalistic message may not necessarily be COVID-19, but rather China's pursuit of American supplier ingenuity. Flashes of that coveted innovative spirit are revealed daily across the Hoosier state, from legacy tool and die shops to the hypersonic research labs at Indiana University. The Department of Defense is in a race to shore up support for these contractors.

The DOD has relied on innovative contractors throughout its history, and it's a strategic advantage for the U.S. to lean on the talents of private industry to protect the nation's military interests.

The growing importance of contractors over the past 30 years can clearly be seen in the sheer number of contracts awarded and the type of work being performed. In fiscal year 2018, for instance, the Defense Department awarded more money to fulfill federal contracts — $360 billion — than all other government agencies combined.

"We need your support and dedication in these trying times to ensure the security of this nation."

Ellen Lord
U.S. Under Secretary of Defense for Acquisition and Sustainment

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The contracts were dominated by five companies: Lockheed Martin Corp., The Boeing Co., Raytheon Co., General Dynamics Corp. and Northrop Grumman Corp. Those companies rely on thousands of subcontractors globally to help make products and provide services.

Indiana is a key player. From 2000 through 2019, Indiana-based companies were awarded 135,686 contracts connected to the U.S. Department of Defense, valued at $69.4 billion. And given the state's rich history of military support, contracts are likely to be rewarded for years to come.

Indiana is a key player. From 2000 through 2019, Indiana-based companies were awarded 135,686 contracts connected to the U.S. Department of Defense.

Five Largest DOD Contractors by Obligations, FY2018

in billions of current dollars

Company	Contracted Dollars
Lockheed Martin Corporation	$39.0
The Boeing Corporation	$27.4
Raytheon Company	$18.1
General Dynamics Corporation	$14.3
Northrop Grumman Corporation	$10.8

Source: FPDS Top 100 Contractors Report, FY2018
Note: Fifty percent of the Bell-Boeing Joint Project Office is attributed to the Boeing Company

Resilient defense budgets support continued demand

Defense budgets are typically more stable and resilient to economic recessions. The revenue of most defense companies is supported by strong backlogs and demand. Companies can bank on the Pentagon's steady spending.

Even though growth is expected to stall in 2021, it's not expected to dip much below 0%. Analysts expect defense spending to pick back up toward the end of 2021 through 2025, with procurement spending leading the way.

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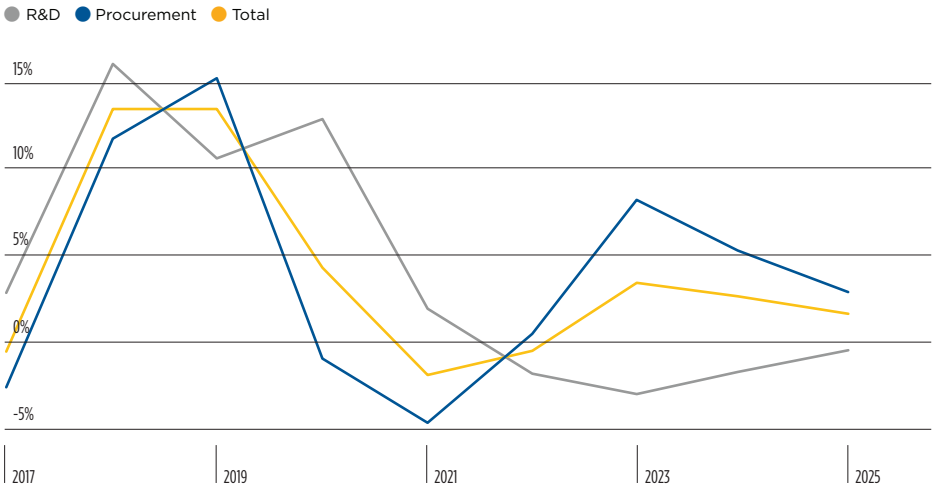
U.S. defense spending YOY change in key items



Economic downturns have little to no bearing on defense spending.

Recession-proof

Economic downturns have little to no bearing on defense spending. In a review of recessions from 1948 through the present day, some came before declines in defense spending and some came after declines in spending; there was no correlation.

Although defense budgets are recession-proof, they are susceptible to deficits and political gridlock, which can lead to across-the-board reductions. The 2008 economic crisis along with the ensuing Budget Control Act is proof of how defense spending can be cut. Defense spending cuts between 2010 and 2015 — a drop from $839 billion to $635 billion— are an example of what could happen if the country's debt continues to increase.

Expect a surge in spending

History offers us some clues to what we might expect from defense spending. In the early 1980s, the U.S. economy endured three years of recession. Still, President Jimmy Carter increased defense spending in his last year in office in response to an aggressive Soviet Union foreign policy, according to an analysis from Matt Vallone, Director of Research and Analysis at Avascent. The Reagan administration took the spending to another level through the mid-1980s as the Cold War with Russia grew tenser.

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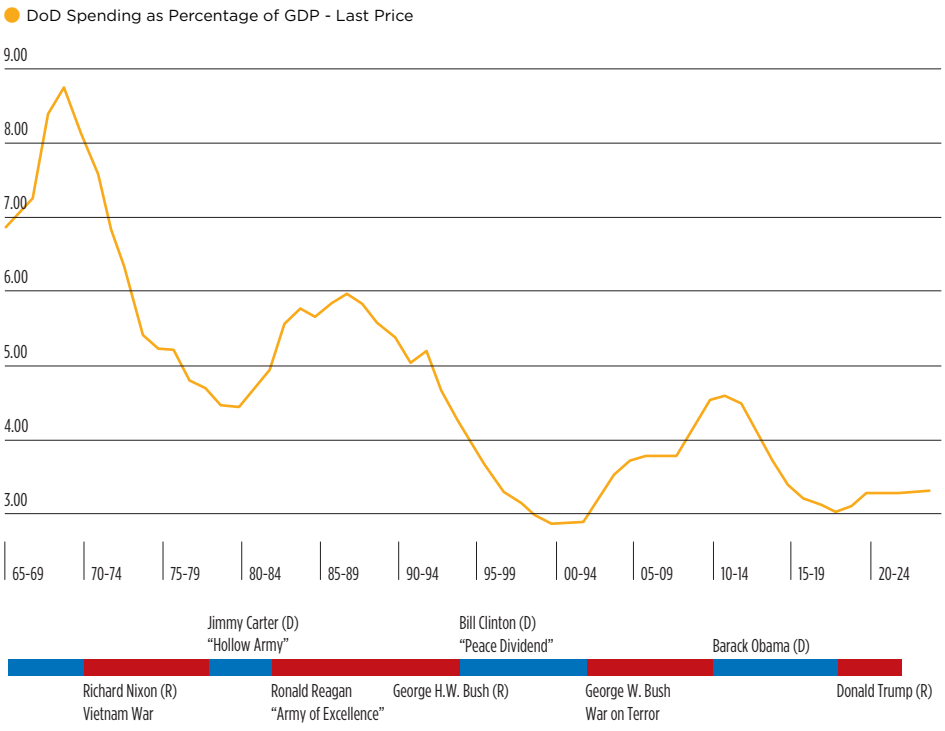
Generally, defense spending is nonpartisan, though it is often used as a political football depending on what's happening at the moment, the indicators to look for are interest rates and U.S. foreign relations. Defense spending could increase after the COVID-19 pandemic subsides if legislators grow concerned about foreign threats, namely from China, Russia, Iran and North Korea.

As interest rates rise, the amount of money that the government needs to service the national debt increases, which means less money for spending on national defense. Interest rates on the federal debt were key factors behind the Clinton administration's spending cuts in the early 1990s.

Defense spending as percentage of GDP, highlighted by party in the White House



Source: Green Book 2019, Office of the Under Secretary of Defense (Comptroller)

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Backlog drives demand

Lockheed Martin is getting a new surge in orders for its F-16 Fighting Falcon aircraft. It now has a backlog of 130 jets, with more countries on tap to place orders.

"We're seeing a … resurgence of the F-16 business," said Michele A. Evans, Lockheed's Executive Vice President of Aeronautic, in a September 2020 interview with *Air Force Magazine*. "We're up to about 4,600 aircraft delivered, and can see possibly getting up to 5,000."

The backlog doesn't include orders from India, from which Lockheed expects a contract for an advanced version of the F-16, to be called the F-21. In addition, current F-16 sales could translate into future F-35 customers, Evans said.

The current backlog will keep the F-16 in production through 2025, though Lockheed has indicated it will increase the production rate if demand increases. The strong backlog is welcome news for F-16 suppliers nationwide, including Indiana suppliers like St. John-based Midwest Aerospace LTD, which supplies a range of parts including airframe components, navigational equipment and landing gear.

"We're seeing a … resurgence of the F-16 business."

Michele A. Evans
Executive Vice President of Aeronautic
Lockheed Martin

Contractors and the Pentagon are speeding up cash to suppliers

In March 2020, the Department of Defense announced it was increasing the cash flow for its legions of defense contractors. It is doing this by increasing the percentages paid to contractors, known as periodic progress payments. For large contractors, defense items under contract will increase from 80% of cost to 90%; for smaller contractors, percentages will go from 90% of cost to 95% of cost. Essentially, it allows contractors to get more of their cash up front, positioning them better to weather pandemic-induced financial storms.

To be sure, the move doesn't solve all problems for smaller defense contractors. The impacts of COVID-19 can seep deep into the balance sheet, and have affected the production and delivery abilities of smaller suppliers. For instance, production of the F-35 was temporarily halted in Italy and Japan because of the coronavirus. The same could happen in the U.S. if state governments issue mandates to stay home. It's far more difficult for a small business to get restarted

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after a shutdown; for some, bailouts and an economic stimulus would be too little and too late. A 2018 Pentagon report on the defense-industrial base warned of "domestic extinction" among sole suppliers of critical industrial parts if they faced poor economic conditions for an extended period.

States like Indiana know the value of defense suppliers to their economy and will do everything possible to keep companies healthy. For its part, the U.S. Small Business Administration likely will use emergency loan programs to shore up financial support for vulnerable key defense suppliers.

In addition to improving percentages paid to contractors, Lt. Col. Mike Andrews said in March 2020 that the Department of Defense is accelerating payments through several means to prime contracts, and directing prime contractors — Lockheed Martin Corp., The Boeing Co., Raytheon Co., General Dynamics Corp. and Northrop Grumman Corp. — to expedite payments to subcontractors.

The March announcement also was issued with a warning that "it is especially important to understand that during this crisis the [defense-industrial base] is vulnerable to adversarial capital and we need to ensure companies stay in business without losing their technology." That language was a semi-veiled security threat warning about the impact of potential Chinese investments into American defense suppliers that possess competitive technology.

For local suppliers, the announcement should offer some assurance that the Department of Defense is standing by, ready to ensure continuity in the supply chain.

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Hypersonics are increasingly important as geopolitics remain tense

The Defense Department is partly driven to help suppliers stay financially solvent because of pressure to go full throttle on advancements like hypersonics. The U.S. government is refusing to allow the threat of COVID-19 to relinquish its leadership position with this technology. The study of hypersonics has generated such strong global interest because of its powerful potential, and mastering it could mean military leverage for generations to come.

Hypersonic refers to the ability of aircraft and weapons to travel at least five times faster than the speed of sound, or 60 miles per minute. Hypersonic systems can provide advantages in speed, maneuverability, survivability and ability to reach well-defended targets. Advanced missile and hypersonic vehicle technologies will enhance end-to-end strike force systems, increasing the potential to deter future threats.

The study of hypersonics has generated such strong global interest because of its powerful potential.

As one might imagine, traveling that fast creates a physics and engineering puzzle that the world's brightest minds are racing to figure out. According to Lockheed Martin, moving that fast comes with specific challenges, including:

Heat — At hypersonic speeds, friction and air resistance create an enormous amount of heat that must be properly managed. Suppliers will need to develop sensors and electronics hardened enough to withstand extreme conditions.

Maneuverability — Hypersonic systems are designed to operate in contested environments and must be able to overcome a wide range of defenses.

Accuracy — Since the aircraft or missiles are moving a mile per second, they need to operate with an incredible degree of control and precision.

Communication — A hypersonic system must maintain connectivity to operators and decision makers through global communications and sensor systems.

Given the challenges, it's no small matter for Indiana to be chosen for key hypersonics research. In October 2020, the Department of Defense announced it will use the Naval Surface Warfare Center in Crane, Ind. as a hypersonics facility. Some 30 engineers and program managers will work to improve the technology and capabilities of hypersonics by leveraging NSWC Crane's network of government, industry and academic partners.

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"This exciting announcement is the culmination of the hard work and dedication of many people," said Rick Davidoff, an acting director of the Joint Hypersonics Transition Office located at Crane. The new facility will help the government "improve their hypersonic weapons with more rapid, adaptable and modular upgrades. Indiana and the larger Midwest will have a long-term, critical role in this important national security mission."

Scott Greene, Executive Vice President of Lockheed Martin Missiles and Fire Control, said the demand to build hypersonic strike and defense systems is growing so fast that it requires his industry "to think 10 steps ahead and put our best and brightest in front to solve our numerous engineering challenges."

"We are partnering with a consortium of universities to leverage new talent, utilize state-of-the-art testing facilities and build collaborative relationships."

Scott Greene
Executive Vice President
Lockheed Martin Missiles and Fire Control

Greene said it is imperative to form partnerships with universities to not only address the research aspect of hypersonics, but also talent acquisition.

"We are partnering with a consortium of universities to leverage new talent, utilize state-of-the-art testing facilities and build collaborative relationships," Greene said.

Indiana academia is stepping up to the plate. Purdue University and the University of Notre Dame are working with the Air Force to build a series of new wind tunnels for hypersonic technology testing. The Air Force wants to use wind tunnels to both minimize freestream disturbances and yield more accurate aerothermodynamics predictions.

Indiana University also is cultivating hypersonic talent through its School of Informatics, Computing and Engineering and its IU Pervasive Technology Institute, which will partner directly with the new hypersonic facility in Crane, Ind. Students are learning parallel programming, supercomputing systems and software that facilitates the use of advanced supercomputers.

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Partnering to grow defense investments

With ambitious goals for hypersonics and a push to stay globally competitive, defense industry demand for domestic suppliers is strong. Despite COVID-19, defense deals have continued to flow in Indiana. Some 2020 defense contracts awarded to Indiana suppliers include:

$1.3 Billion – Rolls-Royce Corp. was awarded a new $1.2 billion contract from the U.S. Navy to continue its work on engines for the V-22 Osprey. The aircraft has tiltrotor systems, meaning it can take off like a helicopter but cruise like a turboprop aircraft.

The company also was awarded a $9 million contract extension from the U.S. Navy for three spare AE1107C engines for the Japanese government's V-22 Osprey program.

Additionally, Rolls-Royce was awarded a $67 million contract from Defense Logistics Agency Aviation for supplies to upgrade T-56 turboprop engines, used by the U.S. Air Force and Navy.

$54M – AAR Aircraft Services Inc. was awarded a $45 million contract modification for work on the Boeing P-8 Poseidon, an aircraft used for anti-submarine warfare. The aircraft is armed with torpedoes and sonar-equipped buoys. Some of the work will support the government of Australia.

The company also will provide maintenance and repair for four P-8A Poseidon aircraft in a $9 million contract for the U.S. Navy.

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$20M – Harris Corp. was awarded a contract from the U.S. Missile Defense Agency to build the "Hypersonic and Ballistic Tracking Space Sensor (HBTSS) program," which includes new capabilities for the U.S. missile shield.

$9.5M – GTA Containers Inc. has been awarded a contract to build collapsible fuel tanks for the U.S. Air Force. This is an extension of a previous $24 million order.

$8M – George Koch Sons LLC was awarded a contract from the U.S. Army Contracting Command to design, fabricate, supply and install metal finishing processes.

That said, without the right connections, it's difficult for a company to break into the defense industry or expand operations.

The Department of Defense sends the lion's share of its dollars to the aforementioned five largest contractors known in the industry as the primes. State leaders and defense supplier associations have a history of helping the primes find suitable subcontractors.

Indiana, already among the nation's leading states for defense industry dollars, recently set an ambitious goal to do better. In March 2020, Governor Eric J. Holcomb said the state will triple federal defense investment by 2025, supported by a new office of defense development housed within the IEDC.

Landing the federal hypersonics research program for Crane, Ind. was a major step toward the governor's goal. During the announcement of that research program, Dr. Mark Lewis, Acting Under Secretary of Defense for Research and Engineering, paid Indiana a generous compliment.

"Leveraging the capabilities at NSWC Crane, we can not only develop effective hypersonic technologies, but we can also develop them affordably at the speed of relevance to our warfighters," Dr. Lewis said.

In Indiana, perhaps the only thing faster than hypersonic is the "speed of relevance."

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