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**SPADE Defense Index Statistics**

12/31/20 Close	7932.14
12/31/19 Close	7969.83
12/31/18 Close	5754.86

All-time Intraday High:  
13 February 2020 8613.30

All-time Closing High:  
12 February 2020 8599.46

	SPADE Defense	S&P500
<b>4Q20</b>	21.78%	11.69%
<b>3Q20</b>	0.50%	8.47%
<b>2Q20</b>	11.11%	19.95%
<b>1Q20</b>	[26.78%]	[20.00%]
<b>2020</b>	[0.73%]	16.26%
<b>2019</b>	<b>38.49%</b>	<b>28.88%</b>

**Commentary**

After more than twenty years of outperforming the US stock market, by more than 120%+ in each of the past two decades, the defense sector fell out of favor in 2020. The combination of the Boeing 737 Max being pulled from flight and the COVID-19 pandemic reducing commercial air travel by more than 60% (and up to 90% at times), led investors to move to the sidelines or invest in a number of high-flying technology names. Still, in spite of these challenges, the SPADE Defense Index still eked out a small positive return after factoring in dividends. As we have highlighted before, our research has indicated that since the 1980s, the Index has never failed to rebound to prior levels when held for three years with dividends reinvested.

Aerospace and defense stocks have maintained a track record over time, despite economic cycles and international events, because there is no demand shortage for the products these companies sell. Changes in the political leadership at the White House and in Congress can lead to a shift in priorities; however, what drives defense stocks is how safe we feel. The world does not appear to be getting any safer and our level of comfort hasn't risen since the "peace dividend" after the fall of the Soviet Union in the

late 1980s/1990s. While defense spending in the United States remains flat, it continues to be on the rise around the world: China's defense spending rose 6.6% in 2020; in France budgets increased by 4.5% in 2021; and Japan's \$51.6B budget for FY21 is its ninth straight year of growth.

As 2020 ended, the three events that created a drag on stocks in the sector are all moving toward resolution. (1) The FAA and regulatory agencies around the world have approved the Boeing 737 Max to return to flight, though it will likely take several years for commercial airline traffic to return to prior levels. (2) Several vaccines have been approved and it is hoped that significant progress to controlling the pandemic will be made by mid-year followed by a rebound in commercial air traffic. (3) Lastly, considering the U.S. Government is its largest customer, election years add a level of uncertainty that tends to weigh on companies operating in the sector.

Though challenges remain, as can be said in any industry, the underlying trends that have driven the SPADE Defense Index higher over the past two decades remain. It is anticipated that 2021 will provide investors interested in the aerospace and defense sector with a number of opportunities.

**Corporate Actions Affecting the Index During the Quarter**

None. Acquisitions of Aerojet Rocketdyne and FLIR are pending.

**Dividend**

Invesco's Aerospace & Defense ETF issued a dividend of 9.3c on December 21.

**Licensed Products**

**Exchange Traded Fund (ETF)**

The SPADE Defense Index has been licensed to Invesco and serves as the underlying index for the Invesco Aerospace & Defense ETF (NYSE Arca: PPA).

**Options Trading**

Options on the Invesco Aerospace and Defense ETF (ticker: PPA) began trading on November 2019.

**SPADE Defense Index**  
**31 December 2020 Rebalance**

**Telos Corporation (NASDAQ: TEL)**  
Provides cybersecurity and information assurance to defense, intel, and homeland security agencies, from which it generates more than half its revenues.

## Market Forecast for 2021

- **Global defense spending continues to rise.** With growth forecasted of 2.8% in 2021, the total market should cross \$2 trillion. Steady spending on aircraft and spacecraft around the world are one of the bright spots. Among those nations increasing their budgets are France, the UK, China, and Japan. France announced its defense spending will rise 4.5% in 2021. In the UK, Boris Johnson promised an extra \$22B USD of additional funds to its annual budget of \$55.4B for the current financial year. China revealed a \$178B military budget in May 2021, rising 6.6% from the prior year. Japan has a \$51.6B budget for FY21, which is its ninth straight year of military spending increases.
- **Defense spending in the United States to remain stable.** The budget for FY21 is in place, and military programs continue to be critical for national defense and security as a number of geopolitical issues remain. With higher priorities for the White House and Congress to tackle during the year, FY22 plans are likely to be consistent with the currently planned budget levels. The question, however, remains if (or when) the Pentagon's budget in the outyears will face pressure. The new White House and Congress will undoubtedly seek to redefine and put their own stamp on budget priorities. Likewise, depending on the economy, debt issued over the past year to provide for pandemic stimuli, could impact the overall availability of funds.
- **Sales of arms and military services to foreign nations.** In 2020, the U.S. recorded \$83.5B in foreign military sales, an amount that helped offset a flat domestic defense budget. Global trade in this area has been on the rise for a number of years and is anticipated to continue. Still, approval of deals will likely receive additional scrutiny by progressive members of Congress wanting to integrate human rights issues into arms transfer policies, limiting defense exports to nations with lesser human rights records. With the largest customers for the US located in the Middle East, a return to the Arms Trade Treaty could impact some sales. One possible example would be limiting sales to Saudi Arabia while it is engaged in military activities with Yemen. According to SIPRI, the global arms business by the top 25 countries increased by 8.5% in 2020 to reach \$361B; and of the top 25 firms, 12 are located in the US.
- **Commercial aerospace.** The pandemic severely impacted all types of firms operating in this sector. As the airlines saw dramatic declines in their business during 2020 (The Int'l Air Transport Association – IATA estimated losses at \$118.5B), new orders for aircraft dried up and previously placed orders were delayed or outright cancelled. A number of stocks operating in this area saw their share prices drop 75% or more. In 2021, we expect to see firms continue to focus on restructuring, transforming supply chains, and cost reduction activities as a means to position themselves for long-term profitable growth. By the second half of 2021, with the vaccine reaching more people, we expect to see passenger traffic rebound, although still significantly below the record levels of recent years. The IATA expects that even with 75% year-over-year growth, it will still be about 40% below pre-pandemic levels. They predict that airline losses in 2021 will drop significantly to \$38.7B. We expect that it is likely 2023 before airline traffic fully recovers. While orders and deliveries for new aircraft will pick up from 2020 levels, it will still be below pre-pandemic levels for some years. Deloitte has forecasted 2021 global commercial aircraft deliveries at 900 aircraft, a decline of 44% from the peak in 2018. Aircraft backlog will likely decline further but this is a given known. On the positive side, an increasing number of planes being converted to carry cargo is reducing excess capacity. Uncertainty prevails for commercial aerospace, but as things stabilizes, orders will rebound and provide a positive catalyst to the many manufacturers and suppliers operating in this sector.
- **Space.** The space industry is likely to remain very strong and is benefiting from military needs, including the launch of the US Space Force and Space Development Agency; increased NASA budgets related to human spaceflight exploration; and a boom in investments for commercial activities in areas ranging from satellite-based data and communications services, imagery and data collection from space, and infrastructure ventures bringing new and expanded capacity and services. In 1H20, space investments by private investors were estimated to be \$12.1 billion. We anticipate continued momentum for additional investments in 2021 as well. The fruits of this are already being seen as consolidation among new space commercial entrepreneurial firms has begun, which should lead to fewer, and likely more stable, firms.

## Themes for 2021

- Our research has indicated that the Index has never declined when held for three years with dividends reinvested. Even in the most trying of years (due to the pandemic and Boeing's 737 Max being withdrawn from service), factoring in the dividends, the index still eked out a small, positive return.

- Pandemic. We are cautiously optimistic that a "return-to-normal" will occur in 2021.

- Security transcends the election. Historically, stocks with a defense and security focus perform well when concerns of safety are front and center. It is less dependent on which party is in control of the White House and Congress and more dependent on how safe we think we are. In times of war, terrorism, or internal strife, it is politically expedient to fund security measures. Only in periods when the US doesn't know what enemy it faces or where the next threat is coming from, does spending on defense and security suffer. Additionally, political party control of the White House and Congress historically has not had a great impact on broader stock market returns. As detailed in the report found at [www.spadeindex.com/defense/election.pdf](http://www.spadeindex.com/defense/election.pdf), overall market returns are more heavily correlated to rises in the misery index (interest rates + unemployment) than political party.

- The world is still a dangerous place. Although most of the news cycle over the past year focused on the COVID-19 pandemic and its impact to the economy, ongoing armed conflicts around the globe continued. The two most deadly were in Afghanistan and the Saudi-Yemen conflict. Other conflicts included border skirmishes in the Kashmir region between India and Pakistan and China, and turmoil in several African nations. The U.S. is dealing with confrontations of differing degrees and types with Russia, China, North Korea, Iran, and Iraq as well as issues on the domestic front, as exhibited by the recent January 2021 riot at the US Capitol in Washington DC.

- What is the focus of the new administration? Whenever a new administration comes into office, there is an added element of uncertainty. It is highly likely that a Biden Administration will return to a number of international agreements that the US exited out of during the Trump Administration. In the wake of the 2017 National Defense Strategy review, a strategic shift

in planning focused the military on the Great Power competition with China and Russia and away from fighting insurgencies. Questions that only time will answer are:

- (1) Will the Pentagon continue to beef up investments in autonomous vehicles at the expense of legacy platforms? (probably)

- (2) Will the Pentagon continue to shift funds into cyber at the expense of a couple of added fighters or tanks? (likely, considering the digital threat)

- (3) Will the new administration have a more skeptical view toward mergers? (The test is the Lockheed Martin acquisition of Aerojet Rocketdyne for \$4.4B since AJRD has both Raytheon and Boeing as customers and is one of a very small number of companies that supply missile and rocket propulsion systems.)

- (4) Will sales to global partners and nations continue to increase or will there be greater scrutiny? How much of an emphasis will human rights issues play in these decisions?

- Analysts don't have big name defense players rated at a buy...at this time. Many cite two factors—(1) whether future, out-year budgets will see a decline and an unclear direction regarding the approval of international sales by the new Administration, considering the Middle East is the defense sector's second largest customer after the US DoD. In our opinion, we expect a solid continuation for at least 2021 as the new administration and Congress tackle more important priorities. (2) Despite solid quarterly reports... increased earnings and lower share prices mean valuation multiples have contracted. LMT, GD, NOC trade for about 12x 2021 earnings on average while the S&P500 trades for 21x. We recognize that defense stocks usually get a discount to the overall market, but this gap is higher than typical. Analyst-favored picks for 2021 indicate a preference for mid-cap and defense infrastructure-adjacent firms such as those involved with IT, cyber, autonomous platforms, and electronics.

- Homeland security (internal and external) will take on increased importance. The recent event on Capitol Hill has highlighted a number of societal issues. Civil

**4Q20 Leaders**

1	Spirit Aerosystems	106.72%
2	Triumph Gropu	92.93%
3	AAR Corp	92.66%
4	ATI	92.32%
5	CAE	89.74%
6	FireEye	86.72%
7	Howmet	70.69%
8	RADA Electronics	64.42%
9	Ducommon	63.12%
10	Maxar Tech.	54.73%

**4Q20 Laggards**

1	Lockheed Martin	[7.38%]
2	Viasat	[5.06%]
3	Northrop Grumman	[3.41%]
4	Booz Allen	5.06%
5	Cubic Corp	6.65%
6	BWX Tech	7.05%
7	General Dynamics	7.51%
8	PAE Systems	8.00%
9	Parsons	8.56%
10	Elbit Systems	8.73%

**Morningstar Says:**

PPA is a Four-Star Fund \*\*\*\*  
Avg Risk in the Industrials Category,  
With Avg to High Return

**2020 Results**

1	Maxar Technologies	146.27%	27	KBR	1.41%
2	RADA Electronics	87.86%	28	CACI	[0.26%]
3	Howmet	85.32%	29	BWX Technologies	[2.90%]
4	AXON Int'l	67.21%	30	Vectrus	[3.00%]
5	Iridium	59.62%	31	L3 Harris	[4.47%]
6	Kratos Defense	52.30%	32	Moog	[7.07%]
7	Telos Corp	50.59%	33	OSI Systems	[7.46%]
8	Ball Corp	44.09%	34	Lockheed Martin	[8.83%]
9	Aerovironment	40.75%	35	Perspecta	[8.93%]
10	FireEye	39.50%	36	Oshkosh Truck	[9.06%]
11	Mercury Computer	27.42%	37	Northrop Grumman	[11.41%]
12	Jacobs Engineering	26.93%	38	Parsons	[11.80%]
13	Booz Allen	22.56%	39	Kaman	[13.33%]
14	Raytheon Tech	20.56%	40	General Dynamics	[15.61%]
15	Honeywell Intl	20.17%	41	Elbit Systems	[15.65%]
16	Heico	15.99%	42	FLIR Systems	[15.82%]
17	Aerojet Rocketdyne	15.75%	43	Curtiss Wright	[17.42%]
18	Teledyne Tech	13.11%	44	PAE Systems	[17.67%]
19	Mantech Intl	11.34%	45	ATI	[18.59%]
20	Transdigm	10.51%	46	AAR Corp	[19.69%]
21	SAIC	8.76%	47	Huntington Ingalls	[32.05%]
22	Textron	8.36%	48	Hexcel	[33.86%]
23	Leidos	7.39%	49	Boeing	[34.29%]
24	Ducommon	6.27%	50	Comtech	[41.70%]
25	CAE	4.84%	51	Spirit Aerosystems	[46.31%]
26	Woodward	2.61%	52	Triumph Group	[50.30%]
			53	Viasat	[55.39%]

**ETF Statistics (NYSE Arca: PPA)  
Invesco Aerospace & Defense**

Exchange / Ticker Symbol:	NYSE / PPA
Assets (12/31/20)	\$ M
Closing Price (12/31/20)	\$67.87
Dividend Yield*	1.38%
4Q20 Volume**	2,765,800
Turnover*	18%
Morningstar Rating	**** (4 Star)

source: \* Morningstar & \*\* Yahoo Finance 12/31/20

Capture Ratio*	3-Yr	5-Yr	10-Yr
Upside	103	110	107
Downside	109	101	73

Portfolio Price / Earnings*	21.82
Portfolio Price / Book*	2.68
Portfolio Price / Sales*	1.51
Portfolio Price / Cash Flow*	9.56
Beta (3-year) *	1.19
Alpha (3-years)*	-1.31
R-squared (3 years)*	76.56
Sharpe Ratio	0.41
Long-Term Earnings*	10.97%
Historical Earnings*	12.95%
Sales Growth*	6.36%
Cash Flow Growth*	0.02%
Book Value Growth*	12.37%
Historical Sustainability Score (% Rank)	76%

source: \* Morningstar 12/31/20

**Themes for 2021** (Continued from Page 3)

unrest has become a major focal point that needs to be addressed in the very immediate future. This should benefit firms involved with homeland security, intelligence, surveillance & reconnaissance, data analysis, and data mining.

- **Defense M&A.** High stock prices and valuations continue to provide ammunition for defense companies to pursue deals. Recent years saw the combination of Raytheon and United Technologies, L3 and Harris, and Northrop Grumman and Orbital Sciences. In late 2020, Lockheed Martin proposed an acquisition of Aerojet

Rocketdyne, and FLIR is set to be acquired by Teledyne. In 2021, a number of smaller firms are likely targets. Among those mentioned by analysts are Mercury Systems and ViaSat, both defense electronics firms with a manageable size; and Maxar, which restructured its balance sheet over the past year and has solid contracts and skills related to intelligence satellites and data analysis. It would also not be a surprise if Axon (Taser) attracted interest from a cloud/data company wanting its technology and contracts in the security/law market.

**M&A Activity**

**Lockheed Martin (LMT)** announced its planned acquisition of **Aerojet Rocketdyne (AJRD)** for \$4.4B. The deal needs approval from DoD and regulatory agencies. Aerojet is just one of two primary suppliers for rocket and missile engines in the US.

**Teledyne** announced its planned acquisition of FLIR Systems. **FLIR**, earlier in 4Q20 completed its 4th acquisition in four years of an unmanned systems maker--Altavian

**Mantech** acquired two cybersecurity-focused companies in the quarter—Tapestry Tech for its architecture and policy development capabilities (adds 150 cleared professionals and works with Cyber Command, NIST, NSA) and Minerva Engineering was a Fast 50 fastest growing company in 2016.

**Northrop Grumman** sold its IT services business to Peraton (owned by Veritas Capital)

**Leidos** bought 1901 Group for its managed services capabilities \$215M

**AeroVironment**, known for its unmanned aerial vehicles acquired Telerob for \$45.4M/cash to bolster its ground platforms and opportunities there.

**Mercury Systems** paid \$310M for Physical Optics Corp’s platform and mission management content technology for use in defense applications

**Transdigm** acquired Cobham subsidiary (Aero Connectivity), which provides antennas and radio systems for \$965M.

**PAE** paid \$92M/cash for Metris Solutions to expand offerings and capability in intel analysis, training, and program support. It also paid \$208M for Centra Tech (MA), an intelligence analysis service provider

**Kratos** acquired software engineering firm 5-D Systems to expand unmanned aerial systems and establish a tech center in the Austin Area

**Parsons** paid \$300M for Braxton Science and Technology to expand its space, intel, and cyber offerings

**Lockheed Martin** acquired the hypersonic strike and defense business from Integration Innovation Inc. (Huntsville AL).

**Raytheon** sold its Forcepoint cyber division to Francisco Partners (owns LogMeIn, WatchGuard, and SonicWall)

**PPA Dividend History**

2020	\$0.598	2012	\$0.444
2019	\$0.651	2011	\$0.199
2018	\$0.444	2010	\$0.155
2017	\$0.363	2009	\$0.202
2016	\$0.708	2008	\$0.145
2015	\$0.501	2007	\$0.055
2014	\$0.215	2006	\$0.051
2013	\$0.383	2005	\$0.022

A complete archive of *The SPADE Investor* including our commentaries and industry data can be found at—  
[www.spadeindex.com / defense](http://www.spadeindex.com/defense)

## Questions for 2021 / Our Wall of Worry

- 1. What will a Biden Administration and Democratic control of Congress mean for the sector?** – Does the U.S. continue the strategic shift toward a power competition with China and Russia or will it seek to put a new stamp as it re-engages a policy of globalization? Will exports of defense systems continue to grow or will they receive greater scrutiny?
- 2. China** – As their economy and influence around the world grows, China has emerged as a “Great Power” threat to U.S. supremacy. China’s military budget continues to grow, and they have made significant progress in the development of military equipment, space travel, and technologies that rival, in many areas, capabilities found in the U.S.
- 3. Russia** – Vladimir Putin has put in place security measures so that he and those that support him will remain in power for the next decade and beyond. Over the years, the nation has rattled its sabers a number of times and is considered a major cyber threat to US stability.
- 4. Iran** – Increasingly being isolated, especially as Israel and the Arab States plan cooperation. Iran has a stockpile of enriched uranium and a number of spinning centrifuges meaning it is close to the capability of developing nuclear weapons.
- 5. Middle East** – Are the recent peace deals between Israel and several Arab nations the beginning of a new understanding in the region or will old tensions flare once the incentive of weapons sales by the US and a common enemy in Iran diminish?
- 6. Hot spots/crisis around the globe** – The focus of the past year has been on the COVID-19 pandemic, but hot spots remain around the globe. From border skirmishes between India, Pakistan, and China in the Kashmir region to ISIS encouragement of turmoil in Africa. All far-from-home for now, but several involve nations and regions with nuclear weapons or areas ripe for terrorist recruiting. From the Caucasus to the Horn of Africa to the Himalayas, several conflicts, some frozen for decades, erupted in violence. In the aftermath of the coronavirus pandemic and the ensuing economic crisis, tensions are threatening to flare up further in 2021 especially as humanitarian need skyrockets, governments and aid groups face budget shortfalls, and climate change increasingly forces people to flee or fight over scarce resources.
- 7. Nuclear arms race resurfaces** – Much of the progress made in this area since the fall of the Soviet Union has been lost. Several major treaties have expired or been canceled, and a U.S. and Russia arms control pact is set to expire. China plans to double its nuclear arsenal over the next decade; Iran and Pakistan continue to spill blood over the disputed territory Kashmir; and Iran and North Korea both seek to enter the small group of nations with nuclear capabilities.
- 8. North Korea** – Although the country continues to be troubled by failed economic planning (even admitted to by its leader Kim Jong-Un to his “parliament”), the nation has made significant strides in recent years toward improving its long-range missile technology and its nuclear capabilities. Left unchecked, North Korea is well on its way to becoming a nuclear power.
- 9. The economy** – It is hard to judge the true state of the economy and where we are in the economic cycle (though many professional economists would differ). The pandemic has radically disrupted the economy and some areas are believed to be in an incredible bubble (i.e., see the market capitalizations of green transportation companies) while others are in severe depression (restaurants, entertainment, etc.) Interest rates, thankfully, remain near historic lows and are accommodative. However, what happens when interest rates start to rise? Nations around the world have taken on massive amounts of debt to stabilize the economy due to the impact of COVID-19 and need interest rates to remain low. This would buy time for economies to hopefully grow their way out of the debt as GDPs rise. While interest rates are envisioned to remain low and stable for at least 2021, rising rates could put additional pressure on out-year budgets which the defense sector relies on. A market recoil due to interest rates remains on the horizon.
- 10. Emerging conflict areas** – The U.S. military plans for actions against varying types of adversaries (whether nation states or decentralized players) across five strategic domains -- air, land, water, space, and cyber. Changes to technology and the needs of the economy require military strategists to constantly evaluate future needs and what is necessary to control or stabilize required supplies. We have all seen increased attention in the area of cyber. As the world becomes more digital, keeping the arena safe and secure has become paramount. With billions of private capital being investing in developing new and commercial

## Questions for 2021 (Continued from Page 3)

space technologies, the creation of the Space Force and related agencies provide an additional focus onto a sector that offers great strategic value in the areas of communications, reconnaissance, navigation and positioning, science, and future transport capabilities. In the domains of water and land, global warming is opening up new shipping lanes in the Arctic region and access to minerals and resources. Likewise, copper, lithium, nickel, cobalt, etc. are needed for the ongoing boom in electric vehicles, energy storage, handheld electronics, and solar and wind generation. Yet, the sources for these strategic resources are sometimes in less-than-stable areas of the world.

11. **Terrorism** – Whether from sources domestic or abroad, the pandemic has limited travel and funding resources. Most of 2020 appeared relatively quiet, yet as recently seen by the events in Washington DC and in several African nations, instability can rear up at any time.

12. **The rise of COVID-19 emergent strains.** If any impact the effectiveness of the developed vaccines, it will severely delay when air travel will resume, and the industry gets back to normal.

## By the Numbers

**\$740B** Approved DoD budget for FY21

**\$51.5B** Japanese defense budget, 7th consecutive yearly increase

**\$23.3B** Congress to NASA for FY21, \$2B less than requested

**\$23B** Sale approved of F35s and drones to UAE to deter Iran

**\$13.3B** USAF to Northrop Grumman for the GNSD, replaced the LGM-30G Minuteman III ICBM

**\$11B** DISA put its IT Enclave Services solicitation for broad IT services out to bid

**\$9.8B** Boeing from Saudi Arabia to update its F-15 aircraft over next 10 years

**\$9B** Ryanair in talks to buy 75 more 737 Max planes from Boeing

**\$4.8B** Northrop Grumman for Global Hawk UAV modernization

**\$4.4B** Amount Lockheed Martin is paying for Aerojet Rocketdyne

**\$4B est** South Korea paying Lockheed Martin for 40 F35 aircraft including 20 short takeoff variants

**\$3.4B** Amount Northrop Grumman received from Veritas Capital for its IT unit so that it can focus on its 'core' business

**\$1.8B** State Department approval of a weapons sale to Taiwan (Lockheed Martin and Boeing hardware)

## By the Numbers

**\$1.7B** FAA to Leidos for systems integration rebid contract for broad systems integration support services.

**\$1.4B** USAF to Lockheed Martin for C-130J aircraft services

**\$1B** Congress notified of sales to Morocco of precision guided munitions by Boeing, Lockheed Martin, Raytheon, and General Atomics.

**\$878M** South Korea to Sikorsky for 12 MH-60R helicopters

**\$700M** USAF to Collins (Raytheon Tech) for upgrades to F-15 ejector seats

**\$690M** Defense Intelligence Agency to Northrop Grumman for "Transforming All Source Analysis with Location Based Object Services" program

**\$664M** Northrop and Raytheon teamed for a joint proposal for the Next Generation Interceptor

**\$600M** USAF to Boeing for the production of the Wideband Global Satcom 11 satellite starting in 2021

**\$579.8M** DoD to Pratt & Whitney (RTX) for F135 propulsion systems

**\$550.4M** Navy to Sikorsky for 6 CH-53K helicopters

**\$507M** Army to Sikorsky for Black Hawk helicopters

**\$498.4M** Navy to Lockheed Martin for UGM-1331 Trident II D5 sub launched ballistic nuclear missiles and support

**\$496M** Navy to L3 for aircraft jamming systems pods

**\$400M** USAF to Boeing for 2 years of engineering services for the B-1 and B-52H Stratofortress aircraft

### Total Price Return (Annual %)

	SPADE Defense Index
1-Yr	<b>0.48%</b>
3-Yr	<b>9.08%</b>
5-Yr	<b>15.03%</b>
10-Yr	<b>15.17%</b>
Inception	<b>11.69%</b>

Data through 12/31/20

### Index Performance (ex div)

	SPADE Defense Index	S&P500	Alpha (bps)
2020	[0.73%]	<b>16.26%</b>	[1699]
2019	<b>38.49%</b>	28.88%	961
2018	[8.15%]	<b>[6.24%]</b>	191
2017	<b>28.92%</b>	19.43%	949
2016	<b>17.95%</b>	9.53%	842
2015	<b>3.23%</b>	[0.73%]	396
2014	<b>11.77%</b>	11.39%	38
2013	<b>48.27%</b>	29.60%	1867
2012	<b>16.30%</b>	13.41%	289
2011	[2.75%]	<b>[0.00%]</b>	[275]
2010	9.62%	<b>12.78%</b>	[316]
2009	21.71%	<b>23.45%</b>	[174]

	SPADE Defense Index	S&P500	Alpha (bps)
2008	<b>[38.03%]</b>	[38.49%]	46
2007	<b>22.17%</b>	3.53%	1864
2006	<b>19.33%</b>	13.62%	571
2005	<b>5.30%</b>	3.00%	230
2004	<b>20.47%</b>	8.99%	1148
2003	<b>37.27%</b>	26.38%	1089
2002	<b>[2.87%]</b>	[23.37%]	2050
2001	<b>0.94%</b>	[13.04%]	1488
2000	<b>4.98%</b>	[10.14%]	1512
1999	15.31%	19.53%	[422]
1998	6.63%	26.67%	[2004]

### Price Return by Decade (ex div)

	SPADE Defense	S&P500	Alpha (bps)
<b>2010-2019</b>	<b>310.26%</b>	<b>189.73%</b>	<b>12,053 (120.53%)</b>
<b>2000-2009</b>	<b>97.07%</b>	<b>-24.11%</b>	<b>12,118 (121.18%)</b>

## About the SPADE Defense Index

The SPADE Defense Index (NYSE: DXS) provides an investment benchmark for the value that the market ascribes to companies involved with defense and its homeland security, and space components.

The Index is designed to reflect the broad diversity of activities that is representative of companies involved with the sector – including industrial firms that manufacture aircraft, tanks, ships, and missiles; and those involved with current and next generation systems related to network centric warfare and information technology; intelligence, surveillance, and reconnaissance; satellites; border security; and defense systems that protect the lives of our servicemen and servicewomen.

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SPADE Indexes specializes in designing and managing equity benchmarks for ETF and other products.

## Rules

The Index was designed to be RIC (registered investment company) compliant for the purpose of enabling financial products. Companies are required to meet a variety of eligibility criteria including market valuation, liquidity, and listing on a major U.S. exchange. Each firm is considered to be systematically important to the defense of the United States and defense is systematically important to the business, revenues, and health of the firm.

Full details are available on our website.

\* Market Cap: Minimum \$100M

\* Share Price: Minimum \$5.00

\* Sufficient Liquidity

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End of 4Q20		100.00%					Market	Forward	Price/	Price/	PEG	
							Cap	P/E	Sales	Book	5 yr	Div Yld
		Percent	30-Sep-20	31-Dec-20	YTD	QTD	intraday	(ttm)	ttm	mrq	expected	forward %
Company	Ticker	12/31/20%	Price	Price	% Ch	% Ch						
AXON International Inc.	AAXN	1.77%	90.7	122.53	67.21%	35.09%		7.79	94.98	12.42	8.70	5.87
AAR Corp	AIR	0.29%	18.8	36.22	-19.69%	92.66%		1.28	16.17	0.72	1.4	1.72
Aerojet Rocketdyne	AJRD	0.93%	39.89	52.85	15.75%	32.49%		4.04	26.96	1.98	5.77	6.99
ATI	ATI	0.48%	8.72	16.77	-18.59%	92.32%		2.13	43.00	0.64	1.23	0.76
AeroVironment	AVAV	0.48%	60.01	86.9	40.75%	44.81%		2.10	40.99	5.55	3.96	3.30
Boeing Co	BA	6.51%	165.26	214.06	-34.29%	29.53%		120.84	157.40	1.99	10.22	1.91
Booz Allen	BAH	2.73%	82.98	87.18	22.56%	5.06%		12.02	20.86	1.54	12.38	1.93
Ball Corp	BLL	3.99%	83.12	93.18	44.09%	12.10%		30.48	27.90	2.67	10.56	2.30
BWX Technologies	BWXT	1.31%	56.31	60.28	-2.90%	7.05%		5.75	19.32	2.78	10.44	2.31
CACI Intl	CACI	1.43%	213.16	249.33	-0.26%	16.97%		6.29	15.46	1.08	2.26	1.45
CAE	CAE	1.68%	14.62	27.74	4.84%	89.74%		7.79	29.2	---	4.46	3.55
Comtech	CMTL	0.12%	14	20.69	-41.70%	47.79%		0.52	21.33	0.89	1.12	0.59
Cubic Corp	CUB	0.44%	58.17	62.04	-2.41%	6.65%		1.96	17.00	1.32	2.02	5.02
Curtiss Wright	CW	1.10%	93.26	116.35	-17.42%	24.76%		4.83	15.49	2.03	2.68	0.12
Ducommun	DCO	0.14%	32.92	53.7	6.27%	63.12%		0.63	19.25	0.96	1.97	4.23
Elbit Systems	ESLT	1.31%	120.3	130.8	-15.65%	8.73%		5.76	20.28	1.25	2.58	1.92
FireEye	FEYE	1.19%	12.35	23.06	39.50%	86.72%		5.41	65.89	5.83	7.89	0.87
Flir Systems	FLIR	1.31%	35.85	43.83	-15.82%	22.26%		5.75	18.73	3.04	3.18	2.95
General Dynamics	GD	4.45%	138.43	148.82	-15.61%	7.51%		42.70	12.99	---	3.07	4.09
Heico	HEI	1.63%	104.66	132.4	15.99%	26.50%		16.66	48.86	9.32	9.03	12.66
Huntington Ingalls	HII	1.57%	140.75	170.48	-32.05%	21.12%		6.90	16.36	0.77	3.67	28.84
Honeywell Intl	HON	6.70%	164.61	212.7	20.17%	29.21%		149.25	26.82	4.49	8.26	10.02
Howmet	HWM	2.81%	16.72	28.54	85.32%	70.69%		12.38	---	0.96	---	2.01
Hexcel	HXL	0.92%	33.55	48.49	-33.86%	44.53%		4.051	96.98	2.29	2.7	7.43
Iridium	IRDM	1.19%	25.58	39.33	59.62%	53.75%		5.24	231.32	9.1	3.70	8.74
Jacobs Engineering	J	3.22%	92.58	108.96	26.93%	17.69%		14.16	---	1.04	---	1.84
Kaman	KAMN	0.36%	38.97	57.13	-13.33%	46.60%		1.58	23.51	1.89	2.05	2.71
KBR	KBR	1.00%	22.36	30.93	1.41%	38.33%		4.41	14.94	0.77	2.61	1.81
Kratos Defense & Security	KTOS	0.77%	19.28	27.43	52.30%	42.27%		3.37	58.36	4.64	4.03	32.65
Leidos	LDOS	3.40%	89.15	105.12	7.39%	17.91%		14.96	16.27	1.25	4.03	1.51
L3 Harris	LHX	4.55%	169.84	189.02	-4.47%	11.29%		39.72	14.30	1.65	1.83	1.20
Lockheed Martin	LMT	6.66%	383.28	354.98	-8.83%	-7.38%		99.32	13.56	1.55	20.05	1.79
Mantech International'a'	MANT	0.55%	68.88	88.94	11.34%	29.12%		3.54	25.48	1.42	2.31	3.24
Maxar Technologies	MAXR	0.54%	24.94	38.59	146.27%	54.73%		2.36	7.73	1.41	2.36	1.25
Moog Inc.	MOGA	0.53%	63.53	79.3	-7.07%	24.82%		2.69	15.83	0.93	2.05	2.51
Mercury Computer Sys	MRCY	1.12%	77.46	88.06	27.42%	13.68%		4.91	34.13	5.95	3.44	1.46
Northrop Grumman	NOC	4.83%	315.49	304.72	-11.41%	-3.41%		50.80	12.59	1.44	4.85	1.76
OSI Systems	OSIS	0.38%	77.61	93.22	-7.46%	20.11%		1.67	17.72	1.48	2.99	2.41
Oshkosh Truck	OSK	1.33%	73.5	86.07	-9.06%	17.10%		5.88	12.35	0.86	2.06	0.99
PAE Systems	PAE	0.19%	8.5	9.18	-17.67%	8.00%		0.84	---	0.32	---	---
Perspecta	PRSP	0.88%	19.45	24.08	-8.93%	23.80%		3.88	12.54	0.87	2.83	2.34
Parsons	PSN	0.83%	33.54	36.41	-11.80%	8.56%		3.67	25.28	0.92	2.12	---
RADA Electronics	RADA	0.10%	5.93	9.75	87.86%	64.42%		0.43	40.62	6.32	6.16	---
Raytheon Technologies	RTX	6.72%	57.54	71.51	20.56%	24.28%		108.60	---	1.30	---	1.6
SAIC	SAIC	1.25%	78.42	94.64	8.76%	20.68%		5.51	12.86	0.80	3.66	1.16
Spirit Aerosystems	SPR	0.94%	18.91	39.09	-46.31%	106.72%		4.13	20.05	0.92	3.53	0.14
Transdigm	TDG	4.54%	475.12	618.85	10.51%	30.25%		33.69	37.83	6.60	8.48	13.14
Teledyne Technologies	TDY	3.29%	310.21	391.98	13.11%	26.36%		14.46	34.81	4.65	4.78	1.36
Triumph Group	TGI	0.15%	6.51	12.56	-50.30%	92.93%		0.69	40.52	0.29	0.61	3.09
Telos Corp.	TLS	0.48%	21.9	32.98	50.59%	50.59%		3.35	---	---	---	---
Textron	TXT	2.52%	36.09	48.33	8.36%	33.92%		11.06	17.90	0.92	1.93	7.24
Vectrus	VEC	0.13%	38	49.72	-3.00%	30.84%		0.58	13.29	0.41	2.04	---
Viasat Inc	VSAT	0.51%	34.39	32.65	-55.39%	-5.06%		2.23	653.00	0.98	0.97	4.68
Woodward	WWD	1.74%	80.16	121.53	2.61%	51.61%		7.65	27.81	3.06	3.81	12.71

Data Provided by Yahoo Finance, Thomson Reuters (P/E, PEG), Morningstar (div)