

# Salem Partners – Aerospace & Defense

## Quarterly Review

### Introduction

Quarter in Review Q3 2016

Dear Friends,

We hope you had a relaxing, yet productive summer. Here at Salem, we have been hard at work with a full plate of deals aiming for a strong finish to end the year. As per usual, our clients cover a diverse range of sub-verticals in the A&D space, but we are currently most active in the component MRO and aerostructures space.

On the defense front, the upcoming election has presented challenges for industry constituents as program outlooks and funding will remain uncertain until after the election. While every election comes with its own set of trepidations and uncertainties, the sheer unpredictability of this particular election cycle has prompted both acquirers and targets to finalize deals which has contributed to a significant amount of closed M&A deals in Q3 compared to the first half of the year.

Within the commercial sector, Salem Partners notes the emergence of 3-D printing, or additive manufacturing, from a nascent technology to a legitimate force that has the potential to revolutionize both aerospace products and the supply chain as a whole. General Electric's \$1.4 billion acquisition of aerospace 3-D manufacturing equipment makers Arcam and SLS Solutions, has highlighted the technology's remarkable evolution over the past few years. With aircraft orders slowing down in 2016, production backlog remains strong for both Boeing and Airbus. Consequently, with the focus shifting towards fine-tuning the supply chain in order to meet delivery obligations and planned production rate hikes, 3-D printing is primed to play a crucial role in the aerospace supply chain moving forward.

We always welcome your thoughts or questions, and would be happy to reach out to discuss these topics or any others that may interest you.

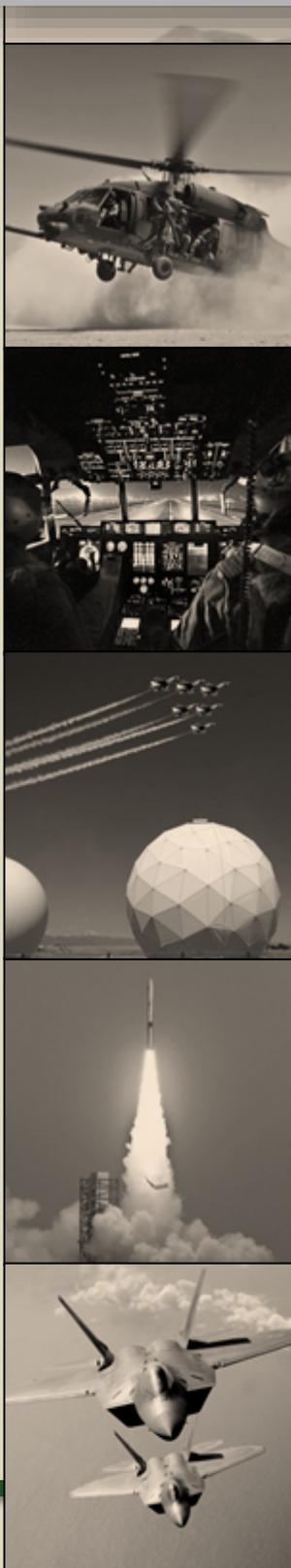
Sincerely,

Trevor Bohn

Ryan Murphy

Managing Director

Vice President



## HIGHLIGHTS

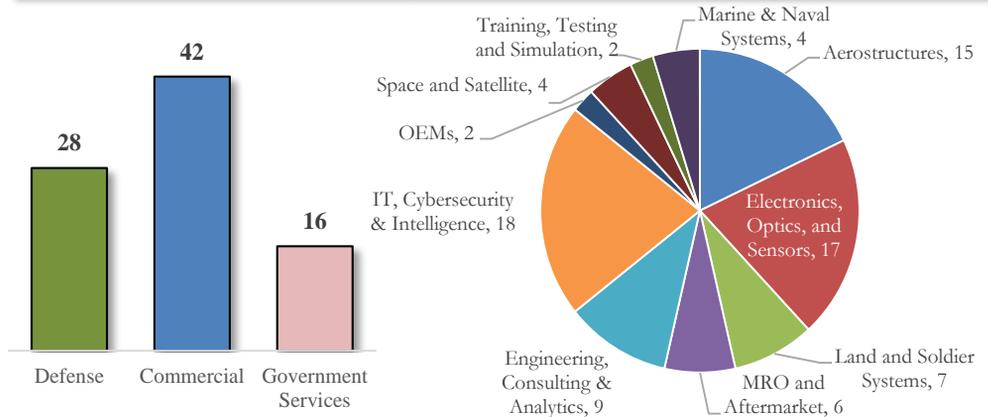
❖ A&D M&A activity remains strong in the third quarter of 2016

❖ Notable A&D acquisitions demonstrate heightened interest in proprietary products & engine components

## Market Snapshot

### Select Aerospace & Defense M&A Activity

#### Q3 Deal Volume by End-Market and Product Category



#### Q3 Notable Transactions

Target	Buyer	Price (\$mm)	EV / EBITDA
ITP	Rolls Royce	\$796	6.2x
5.11, Inc.	Compass Diversified Holdings	\$293	10.5x
Honeywell Technology Solutions	KBR [KBRwyle]	\$266	NP
Young & Franklin	Transdigm Group	\$260	NP

#### KBRwyle acquires Honeywell Technology Solutions

KBR announced a definitive agreement to acquire Honeywell's government services provider for \$266 million. HTSI will be integrated into KBRwyle to create a total capability government services provider benefitting from HTSI's higher-end technical services to achieve higher margins.



#### Rolls Royce acquires ITP (Industria de Turbo Propulsores)

Rolls Royce has acquired the remaining 53% it did not previously own to take full control of Spanish engine manufacturer ITP for \$796 million. The deal will boost Rolls-Royce's long-term aftermarket revenues, including from the high volume Trent 1000 and Trent XWB engines, where ITP has been a key risk and revenue sharing partner.



#### Transdigm acquires Young & Franklin

Transdigm acquired proprietary, highly-engineered valves and actuators manufacturer Young & Franklin for \$260 million. Young and Franklin fits into Transdigm M&A acquisition strategy of acquiring proprietary products manufacturers in established and growing niches in the aerospace market.



## HIGHLIGHTS

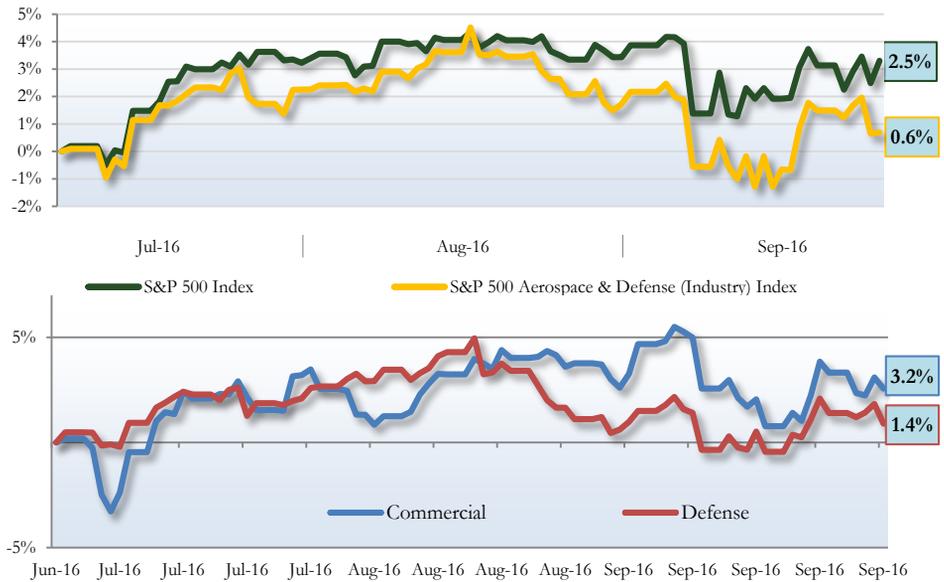
❖ Aerospace and defense equity made modest gains in Q3 of 2016

❖ Commercial and defense performance based on select industry constituents

# Market Snapshot

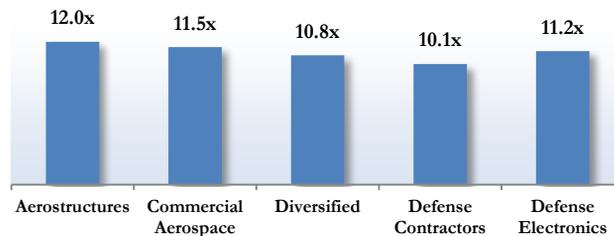
## Select Aerospace & Defense Public Markets Activity

### Q3 Relative Performance



Source: Capital IQ, analyst estimates, and other publicly available information

### Enterprise Value/EBITDA by Subsector



Commercial aero stocks mostly experienced modest to moderate gains during the period with Moog and Spirit among the highest gainers with strong quarterly earnings results.

Defense stocks were a mixed bag over the quarter with General Dynamics the biggest gainer while Northrop and Lockheed had similar modest declines despite securing several substantial DoD program wins.

After positive momentum in Q2 and despite delivering its first C-Series to Swiss Air in June, Bombardier dropped to a 5-month low after it slashed its 2016 delivery forecast citing engine delivery delays from Pratt & Whitney.

Triumph Group experienced a steep decline in Q3 after missing its Q1 profit forecasts for fiscal 2017 which was already expected to be a transition year for the company amid corporate restructuring, facility consolidations, and company-wide cost reductions.

### Q3 Share Price Performance

Boeing	1.4%
Bombardier	-7.2%
Crane	11.1%
Embraer	-20.5%
General Dynamics	11.4%
L-3 Communications	2.8%
Lockheed Martin	-3.4%
Moog	10.4%
Northrop Grumman	-3.7%
Raytheon	0.1%
Rockwell Collins	-0.9%
Spirit Aerosystems	3.6%
Textron	8.7%
Triumph Group	-21.5%
United Technologies	-0.9%

**HIGHLIGHTS**

❖ *There are two main types of 3-D printing used in aerospace: Powder Bed Fusion and Direct Energy Deposition*

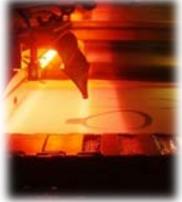
❖ *While 3-D has the potential to revolutionize aerospace manufacturing, there remains a few drawbacks which must be resolved before the technology can reach widespread adoption across the supply chain*

# Commercial Focus: 3-D Printing

## 3-D Printing Driving Innovation in Aerospace Manufacturing

The aerospace industry has been one of the earliest adopters of additive manufacturing. As new 3-D printing technologies and techniques are developed, aerospace manufacturers are realizing that additive manufacturing has the potential to revolutionize aerospace design and manufacturing for the foreseeable future.

### Types of Additive Manufacturing Used in Aerospace

<p><b>Powder Bed Fusion</b></p> <ul style="list-style-type: none"> <li>Utilize a laser or electron beam to melt and fuse material powder layer by layer in a powder bed.</li> <li>Examples: Selective Laser Sintering (SLS), Electron Beam Melting (EBM), Selective Laser Melting (SLM)</li> </ul>   <p><i>GE LEAP Engine Fuel Nozzle</i></p>	<p><b>Direct Energy Deposition</b></p> <ul style="list-style-type: none"> <li>Utilizes focused energy (laser or electron beam) to fuse materials by melting as the material is being deposited by 4- or 5- axis arm into the desired shape.</li> <li>Examples: Electron Beam Additive Manufacturing (EBAM) and Laser Engineered Net Shaping (LENS)</li> </ul>   <p><i>Lockheed Martin Propulsion Tank</i></p>
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### Advantages of Additive Manufacturing

<p><b>Revolutionary Complex Designs</b></p> <ul style="list-style-type: none"> <li>Allows for complex geometries, including more organic designs and internal grooves previously impossible to produce with conventional machining. Subassemblies that were previously welded together can be printed in a single part</li> </ul>	<p><b>Reduce Lead Times</b></p> <ul style="list-style-type: none"> <li>Reduces lead times, particularly for tooling, which has long been a bottleneck for many aerospace manufacturers, allowing for performance improvements in the component development cycle as more time is devoted to perfecting the design</li> </ul>
<p><b>Reduce Weight</b></p> <ul style="list-style-type: none"> <li>Reduce the weight of parts without compromising functionality by printing more efficient geometries and complex lattice structures that require less material compared to conventionally-machined part</li> </ul>	<p><b>Eliminate Waste</b></p> <ul style="list-style-type: none"> <li>Produces less scrap than conventional machining and allows manufacturers to approach a 1-to-1 buy-to-fly ratio as any leftover material can be re-used reducing material costs and improving sustainability</li> </ul>

### Challenges in Additive Manufacturing

<p><b>Materials</b></p> <ul style="list-style-type: none"> <li>The materials, whether powder or wires, used in metal 3-D printing are still quite costly and limited in variety. Powders can be 100x more expensive than the same material in another form</li> </ul>	<p><b>NDT</b></p> <ul style="list-style-type: none"> <li>Traditional NDT methods cannot properly detect defects and allow for corrections. New 3-D printing-specific NDT techniques will have to be developed before 3-D printing gains widespread adoption in the aerospace industry</li> </ul>
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## HIGHLIGHTS

- ❖ *3-D printing's coming of age in the aerospace industry is evidenced by GE's acquisition of two 3-D printing equipment companies, Arcam and SLM Solutions for \$1.4 billion in September*

# Commercial Focus: 3-D Printing

## 3-D Printing Coming of Age

Aerospace OEMs and Tier Is are already realizing the promise of additive manufacturing. While 3-D printing had demonstrated its value in rapid prototyping, tooling and short-run applications for the past few years, the next stage of evolution for the technology is well underway as mass produced, flight-critical 3-D printed components are starting to make their way for end-use on aircrafts.

### Aerospace Additive Manufacturing Value Chain



### Example 3-D Printed Flight-Critical Parts by OEMs and Tier I Suppliers

Company	Platform	Part	Notes
	Various	-	<ul style="list-style-type: none"> <li>Currently has thousands of 3-D printed parts flying on 10 different military and commercial aircrafts.</li> </ul>
	LEAP 1A & 1B		<ul style="list-style-type: none"> <li>Before it was 3-D printed, the fuel nozzle was made of 20 different parts procured from different suppliers then welded together</li> <li>The 3-D printed nozzle is 25% lighter and 5x stronger than its predecessor.</li> </ul>
	A350XWB		<ul style="list-style-type: none"> <li>There are more than 1,000 3-D printed parts on the A350XWB including a titanium alloy cabin bracket (shown).</li> </ul>
	PW1500G/ Bombardier C-Series		<ul style="list-style-type: none"> <li>3-D printed compressor stators (shown) and synch ring brackets for the PW1500G engine on the C-Series which led to 15-month lead time savings and 50% weight reduction.</li> </ul>
	Trent XWB-97		<ul style="list-style-type: none"> <li>In 2015, the world's largest 3-D printed structure made its first flight on the Trent XWB-97 engine on the A350.</li> </ul>
	Satellite Propellant Tank		<ul style="list-style-type: none"> <li>Lockheed developed 3-D printed propellant tanks for satellites that contributed to 80% reduction in lead time and 55% reduction in cost.</li> </ul>

- ❖ *Flight-critical, 3-D printed components have already made their way onto next-gen aircraft and engine platforms*

## HIGHLIGHTS

❖ *The outcome of the Presidential Election on November 8<sup>th</sup> will have a significant impact on defense spending in the near future*

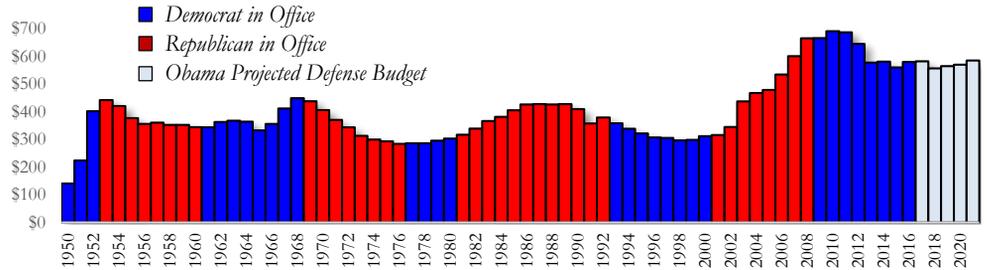
❖ *On September 7<sup>th</sup>, Trump released a detailed defense spending plan advocating for increased spending across all departments of the DoD*

❖ *Although yet to release a detailed defense-specific policy proposal, Clinton has argued for a more aggressive foreign policy than current administration*

# Defense Focus: Presidential Election

## Hillary vs. Trump: Potential Impact on Defense Budget

### Defense Spending under Democratic vs. Republican Administrations Since 1950 (In Billions):



It is to no one's surprise that Clinton and Trump have significantly different visions of what they perceive a strong, well-equipped US military to be and their plans and rhetoric throughout the election cycle reflect their respective visions. Below we will examine how each would tackle defense spending if elected:

### Donald Trump



While Trump's non-interventionist, anti-NATO foreign policy ideas diverge from conventional wisdom in his party, his stance on the need for increased military spending does not. Trump has repeatedly stressed that the US current military arsenal is both obsolete and insufficient and his detailed plan advocates for increased investment across all branches of the DoD: Army, Navy, Marine Corps, and the USAF.

**Increase Size of Army and Marine Corps:** - Trump vows to increase army size from the 450,000 target set by the Obama administration by 90,000 to 540,000 troops; expanding the Army from 31 active duty brigade combat teams to 40. Trump also proposes to increase the size of the Marine Corps from the planned 182,000 to 240,000 i.e. from 24 active-duty infantry battalions to 35.

**Reinvigorate the Navy:** - While the US still possess the strongest and most advanced navy fleet in the world, made up of 273 active ships, Trump outlines a plan to increase the size of the Navy to 350 ships by 2030.

**Expand Air Force Fleet:** Under a Trump presidency, the Air Force's aerial fleet would be increased from its current planned level of 1,100 aircraft to 1,200. A number consistent with a proposal from prominent Republican think-tank, the Heritage Foundation.

- Overall, factoring into these proposals, Trump's implied budget would be \$60 billion per year above Obama's five-year plan, and approximately \$90 billion per year above the parameters set by the Budget Control Act (BCA) enacted in 2011.
- Trump argues that his administration will be able to pay for these spending increases by enacting "common sense reforms" across the DoD eliminating waste and unnecessary programs.

### Hillary Clinton



Often lauded for her detailed approach to policy-making, Hillary has outlined numerous spending plans since the start of her campaign. However, she has been more discreet about her plans as commander-in-chief regarding defense spending and has yet to release a detailed defense budget.

At this time in the election cycle, it would be safe to assume that a detailed plan from the Clinton campaign is highly unlikely. But while Clinton has offered few specifics around this subject in this election cycle, her track record as Secretary of State as well as campaign rhetoric indicates a more hawkish stance towards foreign policy and defense to the traditional Democratic party line advocating for defense spending cuts.

- Under a Clinton Administration, one would expect a defense budget at least as large as the current budget proposed by Obama.
- Clinton has argued a more aggressive foreign policy regarding ISIS and Russia, which would require increased OCO funding and additional weapons programs.

## Public Market A&D Valuations

### Select Company Trading Levels as of September 30, 2016

Company	Market Cap.	Enterprise Value	Revenue	EBITDA	EV/Revenue	EV/EBITDA	Debt/EBITDA
B/E Aerospace Inc.	\$5,250	\$7,194	\$2,809	\$601	2.6x	12.0x	3.5x
BAE Systems plc	21,660	24,177	22,686	2,183	1.1x	11.1x	2.6x
Boeing Co.	82,183	84,033	96,809	7,871	0.9x	10.7x	1.1x
Bombardier Inc.	3,100	10,077	17,378	362	0.6x	n/a	14.7x
CAE Inc.	3,815	4,525	2,009	390	2.3x	11.6x	2.6x
Chemring Group plc	512	661	579	77	1.1x	8.6x	3.2x
Cobham plc	3,700	4,843	2,580	449	1.9x	10.8x	3.6x
Dassault Systemes SA	22,093	20,275	3,240	842	6.3x	24.1x	1.3x
Embraer SA	3,173	5,006	6,992	428	0.7x	11.7x	7.1x
Esterline Technologies Corp.	2,235	2,883	1,927	232	1.5x	12.5x	3.2x
Finmeccanica SpA	6,511	11,549	13,810	1,575	0.8x	7.3x	3.8x
General Dynamics Corp.	47,367	48,904	31,192	4,664	1.6x	10.5x	0.7x
GKN plc	7,139	8,166	10,439	1,151	0.8x	7.1x	1.3x
Hexcel Corp.	4,097	4,766	1,934	428	2.5x	11.1x	1.4x
Honeywell International Inc.	88,710	95,948	39,106	7,978	2.5x	12.0x	1.6x
ITT Corporation	3,211	2,978	2,504	397	1.2x	7.5x	0.6x
L-3 Communications Holdings Inc.	11,642	14,703	10,452	1,255	1.4x	11.7x	3.3x
Lockheed Martin Corporation	72,614	86,154	48,994	6,501	1.8x	13.3x	2.4x
Meggitt PLC	4,553	6,215	2,308	363	2.7x	17.1x	3.5x
MTU Aero Engines AG	5,198	6,330	5,034	625	1.3x	10.1x	2.3x
Northrop Grumman Corporation	38,206	43,457	23,629	3,479	1.8x	12.5x	1.8x
Orbital ATK	4,464	5,997	4,628	623	1.3x	9.6x	2.8x
Raytheon Co.	40,171	43,128	23,909	3,547	1.8x	12.2x	1.6x
Rheinmetall AG	2,976	3,563	5,984	524	0.6x	6.8x	1.9x
Rockwell Collins Inc.	10,958	13,156	5,198	1,185	2.5x	11.1x	1.8x
Rolls Royce Holdings plc	17,239	18,653	18,369	2,311	1.0x	8.1x	1.7x
SAAB AB	3,784	3,617	3,505	295	1.0x	12.3x	2.6x
Safran SA	29,950	32,123	20,709	4,370	1.6x	7.4x	0.9x
Smiths Group plc	7,538	8,829	3,916	696	2.3x	12.7x	2.7x
Spirit AeroSystems Holdings, Inc.	5,748	6,146	6,715	896	0.9x	6.9x	1.1x
Textron Inc.	10,711	13,962	13,738	1,632	1.0x	8.6x	2.3x
Thales SA	19,456	18,091	16,172	1,634	1.1x	11.1x	1.1x
TransDigm Group Incorporated	15,400	24,033	3,106	1,394	7.7x	17.2x	7.1x
Triumph Group, Inc.	1,381	2,894	3,820	(148)	0.8x	n/a	n/a
Ultra Electronics Holdings plc	1,618	2,042	1,010	167	2.0x	12.2x	2.9x
United Technologies Corp.	85,032	102,656	56,319	10,175	1.8x	10.1x	2.0x
Zodiac Aerospace	6,749	8,573	5,537	310	1.5x	n/a	3.6x
<b>Average</b>					<b>1.8x</b>	<b>11.2x</b>	<b>2.8x</b>
<b>Median</b>					<b>1.5x</b>	<b>11.1x</b>	<b>2.4x</b>

Market data as of September 30th, 2016; financial data per most recent filing available as of September 30th, 2016  
 \$US in mm; conversion rate, if applicable, based on historical exchange rate as of most recent filing date  
 Source: Capital IQ, analyst estimates, and other publicly available information

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 <b>PROCESS FAB INC.</b> A PORTFOLIO COMPANY OF Venice Street Capital HAS BEEN ACQUIRED BY  SALE OF COMPANY	 <b>IMPRESA</b> AEROSPACE A PORTFOLIO COMPANY OF  HAS BEEN ACQUIRED BY  SALE OF COMPANY	 <b>Merlin RAMCo, Inc.</b> <i>Weapons of World</i> HAS BEEN ACQUIRED BY  SALE OF COMPANY	 <b>DYNAMIC</b> PAINT SOLUTIONS HAS BEEN ACQUIRED BY  SALE OF COMPANY	 <b>Chronos Plus International, Inc.</b> HAS BEEN ACQUIRED BY  SALE OF COMPANY
 <b>CSI</b> HAS BEEN ACQUIRED BY  SALE OF COMPANY	 <b>COAST PLATING, INC.</b> <i>"Premier Metal Finishing"</i> HAS BEEN RECAPITALIZED BY  RECAPITALIZATION	 <b>Ascend</b> A PORTFOLIO COMPANY OF <b>VPC</b> Victory Park Capital HAS BEEN ACQUIRED BY  SALE OF COMPANY	 <b>SHEFFIELD</b> MANUFACTURING HAS BEEN RECAPITALIZED BY  RECAPITALIZATION	 <b>SOUTHWEST</b> UNITED FEATURES A PORTFOLIO COMPANY OF  HAS BEEN ACQUIRED BY  ACQUISITION ADVISORY
 <b>TJC</b> THE JORDAN COMPANY HAS ACQUIRED  ACQUISITION ADVISORY	 <b>NAAS</b> A PORTFOLIO COMPANY OF  HAS ACQUIRED  ACQUISITION ADVISORY	 <b>NAAS</b> HAS BEEN RECAPITALIZED BY  RECAPITALIZATION	 <b>KAZAK</b> HAS BEEN ACQUIRED BY  SALE OF COMPANY	 <b>D&amp;C</b> MACHINE AND  STRATEGIC REVIEW AND RECAPITALIZATION



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