June 2023

Industry Insight: Vision Technology Sector Report

Vision Technology: Timing for M&A is critical – example LiDAR

Introduction to the ARTHOS Vision Technology Sector Report

We are pleased to present the ARTHOS Vision Technology Sector Report for June 2023. This report provides comments and analysis on current market trends, valuation developments, and M&A transactions.

Consolidation takes place in the LiDAR autonomous driving assistance systems (ADAS) segment at much lower valuations than historically seen. This is a very visible example of the importance of timing for M&A transactions, which is often underestimated in sales processes of small and medium-sized transactions. There are more timing elements to be considered in an M&A transaction – optimizing timing when participating in a buy & build platform is only one of them.

ARTHOS is an international M&A advisory firm focusing on international technology transactions. Its managing partners have closed more than 200 M&A transactions over the past 20 years. In 2022 ARTHOS and its international AICA M&A alliance partners have advised on almost 55 technology M&A transactions.
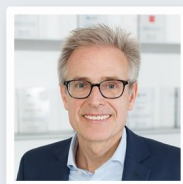
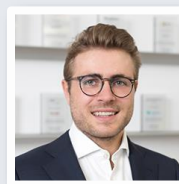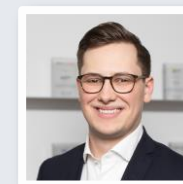**ARTHOS TECHNOLOGY TEAM**

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Vision Technology: Timing for M&A is critical – example LiDAR

Personal Note

Applied Intuition, a PE-backed SW company for autonomous driving assistance systems (ADAS), entered into a definitive agreement to acquire the developer of the ADAS software company Embark (NasdaqGM:EMBK) for a negative enterprise value (EV) of USD 35m. The price was below current trading. Also, Ouster's (NYSE:OUST) public takeover of the sensor developer Velodyne (NasdaqGS:VLDR) closed in February 2023 for an EV of USD 36m was far below historic valuations. **Almost all valuations of LiDAR ADAS stocks collapsed resulting from a significant delay in the introduction of ADAS systems into the market.**

Interestingly recent market studies for LiDAR forecast a CAGR of about 20% for the next 5 years, driven also by increasing demand for ADAS. This growth may seem high however, today's market is smaller than originally anticipated and the CAGR was estimated higher in previous studies. Market leaders as well as many start-ups continue to invest – it is common sense that the ADAS market will be enormous, the open question is when it will take off and to which extent. **The anticipation of when the market will boom is influencing valuations heavily.**

LiDAR technology is the most common 3D vision technology and is used in many different applications. E.g., LiDAR for factory automation is nicely growing for quite some years with a continued good outlook, therefore **timing for M&A in LiDAR for factory automation is quite good right now.** In addition, we see stock-listed companies as well as PE-backed investors in the vision space coming back to execute M&A transactions as seen on page 10 ff..

The example of fluctuating valuations for LiDAR-ADAS companies is an extreme example, but in principle, it can be transferred to many technology segments. The reason is the fluctuating anticipation of future market growth. This effect on pricing is often underestimated especially for small and medium-sized transactions. Also, optimizing timing for participation in buy & build companies have a tremendous impact. Entering as the first participant – called platform investment – is honored by realizing a premium price. And participation as an "add-on acquisition" shortly before the exit of the whole business group delivers high returns fast.

There are more timing elements to be considered for a M&A transaction and early preparation plays an important role. Don't hesitate to call, even if you don't target a transaction soon!

* CAGR: Compound annual growth rate

Market trends

LiDAR global market to grow at a CAGR* of 21% until 2028
(RESEARCH AND MARKETS 05/2023)

Global LiDAR market to grow at a CAGR* of 19% until 2028
(MARKETSANDMARKETS 01/2023)

Consolidation will take place in the LiDAR automotive space
(Yole 05/2023 in EE Times)

TriEye is offering a CMOS-based SWIR sensor with a 1000x price reduction - compared to current InGaAs technology
(https://trieye.tech)

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High valuation multiples of vision technology companies across all sub-sectors

Vision technology sub-sectors	NTM EV/Sales* ■ NTM EV/EBITDA* ■	5y. EPS p.a. growth	Important players
Laser Systems Laser System technology companies utilize laser components for applications in material processing, communications, sensing, medical, instrumentation & many other segments. Laser System companies are valued lower compared to its peers in other verticals but have still strong growth expectations according to analysts.	2.6x / 12.4x	9%	COHERENT, KEYENCE, IPG LASER, Novanta
Machine Vision Machine Vision companies provide imaging-based automatic inspection and analysis for process control. Historically, mainly in industry but increasingly also in other markets. Machine Vision companies exhibit strong valuations combined with still high growth expectations.	2.3x / 14.0x	10%	COGNEX, HEXAGON, TELEDYNE TECHNOLOGIES Everywhereyoulook, TKH GROUP
Semiconductor Manufacturing Equipment (SME) SME companies included in this segment master high-end vision technologies, including metrology, nano inspection and/or lithography. In terms of valuations, SME companies are the champions with the highest multiples based on NTM EV/EBITDA.	5.1x / 17.8x	8%	APPLIED MATERIALS, ASML, KLA, onto innovation
Optoelectronics The Optoelectronics sub-sector includes optoelectronic components & systems companies offering components for vision applications. Valuation multiples and corresponding growth expectations vary a lot in this sub-sector resulting in higher median multiples. Note: the stronger the focus on vision, the higher are valuations.	1.9x / 12.5x	13%	ROHM SEMICONDUCTOR, 三安光电 Sanan Optoelectronics, HAMAMATSU, ams

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Since October 2022 companies' valuations in Vision Sectors developed positively

Stock market performance by vision technology sub-sector indices since January 2021

2021: all sub-indices recovered from the pandemic crisis after 2020; the Semiconductor Manufacturing Equipment (SME) Index started a rally.

Since October 2022: indications that the Fed will scale-back the pace of rate hikes have calmed investors and let stock performances rise. Especially the Semiconductor Equipment Manufacturing sector experienced an increase as worldwide spending on semiconductor equipment has risen again in 2023.

Jan-22 to Sep-22: market correction and a high volatility prevailed as rising interest rates, components shortage and the Ukrainian war dampened all sectors.

Index	Performance
ARTHOS Semiconductor Manufacturing Equipment	+55%
NASDAQ-100	+20%
ARTHOS Machine Vision	+6%
ARTHOS Laser Systems	-8%
ARTHOS Optoelectronics	-29%

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Stock prices of LiDAR specialists for autonomous driving assistance systems collapsed

Stock price performance by LiDAR-ADAS companies over the last two years

Legend:
- LUMINAR TECHNOLOGIES, INC. (NASDAQGS:LAZR) — -61%
- MICROVISION, INC. (NASDAQGM:MVIS) — -63%
- INNOVIZ TECHNOLOGIES LTD. (NASDAQCM:INVZ) — -66%
- AURORA INNOVATION, INC. (NASDAQGS:AUR) — -67%
- AEVA TECHNOLOGIES, INC. (NYSE:AEVA) — -84%
- OUSTER, INC. (NYSE:OUST) — -94%
- AEYE, INC. (NASDAQCM:LIDR) — -98%
- EMBARK TECHNOLOGY, INC. (NASDAQGM:EMBK) — -98%

Sources: Capital IQ (as of 03 July 2023)

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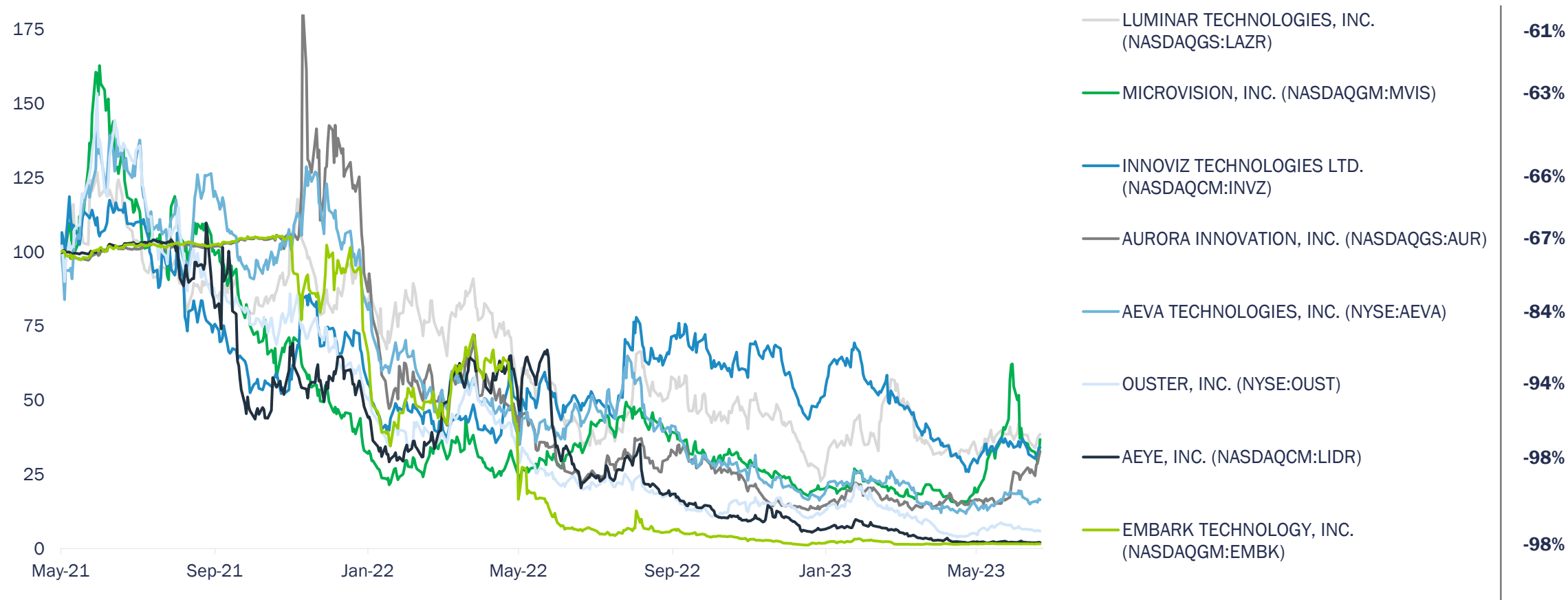
Since autumn 2022 NTM EV/EBITDA multiples of all sub-sectors increased substantially

NTM EV/EBITDA multiple development

➡ The next twelve months' EBITDA valuation multiples show great volatility since January 2020 across all vision sub-sectors.

➡ Except for the Optoelectronics sub-sector, NTM EV/EBITDA multiples experienced a high in April 2021.

➡ Throughout the year 2021, valuations have dropped in line with the overall stock market due to rising interest rates, the war in Ukraine, and the resulting depressed market sentiment.

➡ **Starting in October 2022, NTM EV/EBITDA multiples of all sub-sectors recovered again responding to signs of inflation cooling and positive signals from the Fed's scaled-back interest rate policy.**

NTM EV/EBITDA* multiple development since January 2020

Multiple

Legend:
— ARTHOS Laser Systems Index
— ARTHOS Machine Vision Index
— ARTHOS Optoelectronics
— ARTHOS Semiconductor Manufacturing Equipment
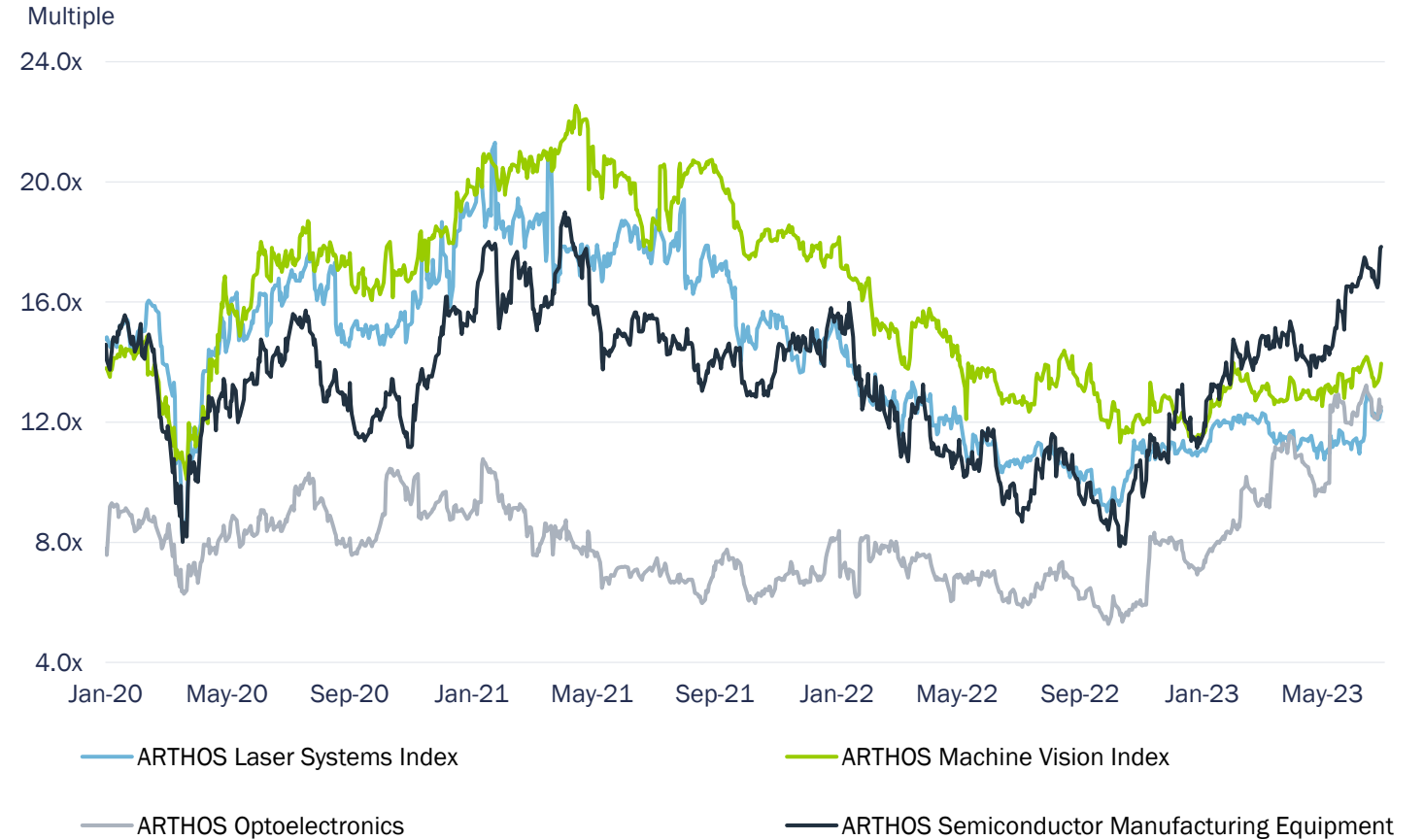
Sources: Capital IQ (as of 03 July 2023)
* NTM EV/EBITDA: Current enterprise value / next twelve months EBITDA estimates [median]

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Laser Systems sub-sector analysis: Sector consolidation by multiple players

ARTHOS Laser Systems peers

in € mn

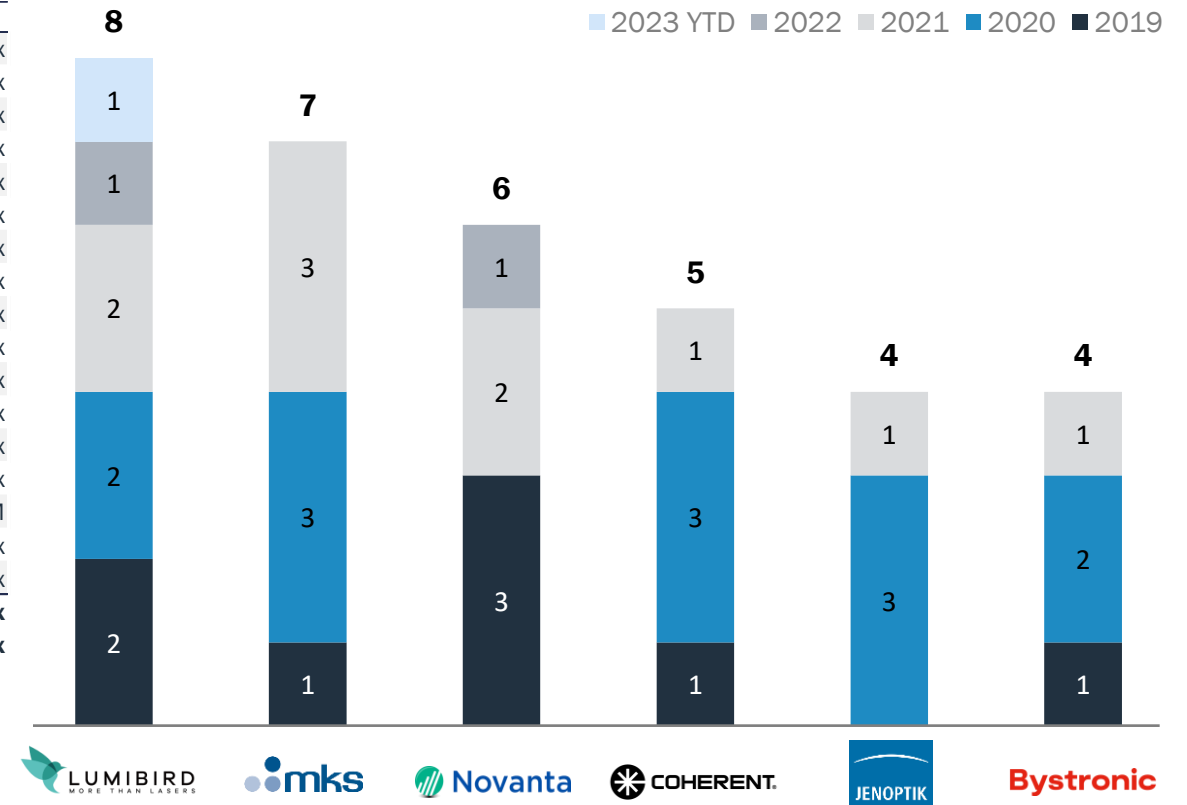| Company Name	EV	LTM Sales	Annual Exp. 5Y EPS Growth	EBITDA Margin	NTM EV/Sales	NTM EV/EBITDA
Bystronic AG	910	1,028	NM	15%	0.9x	10.3x
Coherent Corp.	12,362	4,457	9%	22%	2.8x	12.2x
EL.En. S.p.A.	820	691	NM	12%	1.1x	8.7x
Gooch & Housego PLC	206	162	NM	11%	1.2x	8.6x
Hamamatsu Photonics K.K.	6,204	1,523	NM	34%	4.2x	12.9x
Han's Laser Technology Group	2,930	1,875	22%	7%	1.4x	12.5x
IPG Photonics Corporation	4,925	1,295	9%	21%	3.7x	13.6x
Jenoptik AG	2,276	1,006	7%	19%	2.1x	10.8x
Keyence Corporation	98,293	6,550	8%	55%	15.8x	28.2x
LPKF Laser & Electronics SE	200	126	130%	2%	1.5x	12.2x
Lumentum Holdings Inc.	4,236	1,674	8%	18%	3.0x	15.8x
Lumibird SA	383	191	NM	11%	1.8x	9.9x
MKS Instruments, Inc.	10,542	3,313	-5%	22%	3.0x	14.2x
NKT A/S	2,425	2,212	31%	7%	0.8x	9.6x
nLIGHT, Inc.	563	213	30%	-15%	2.6x	NM
Novanta Inc.	6,398	806	13%	19%	7.6x	33.6x
Wuhan Raycus Fiber Laser Techn	2,176	439	NM	4%	4.1x	27.4x
Mean			**24%**	**16%**	**3.4x**	**15.0x**
Median			**9%**	**15%**	**2.6x**	**12.4x**

No. of acquisitions per year of most active buyers

Legend: 2023 YTD | 2022 | 2021 | 2020 | 2019

- LUMIBIRD (total 8): 2019 = 2, 2020 = 2, 2021 = 2, 2022 = 1, 2023 YTD = 1
- mks (total 7): 2019 = 1, 2020 = 3, 2021 = 3
- Novanta (total 6): 2019 = 3, 2021 = 2, 2022 = 1
- COHERENT (total 5): 2019 = 1, 2020 = 3, 2021 = 1
- JENOPTIK (total 4): 2020 = 3, 2021 = 1
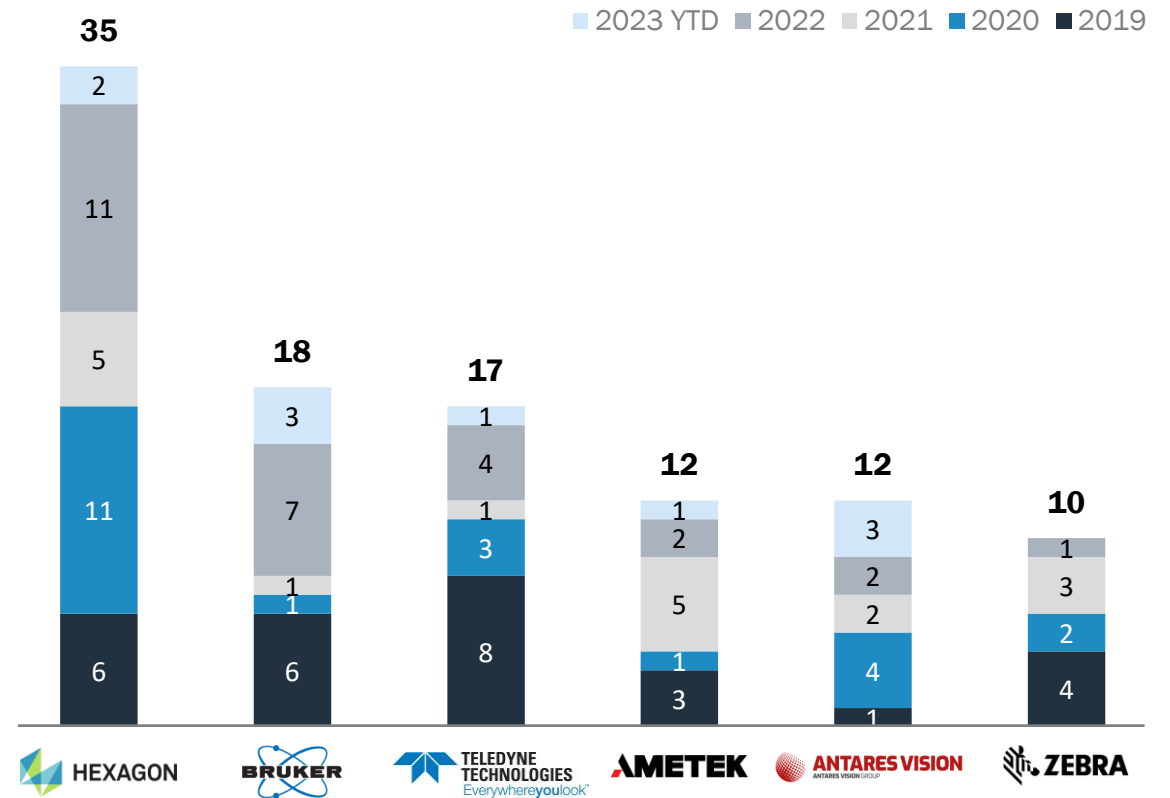- Bystronic (total 4): 2019 = 1, 2020 = 2, 2021 = 1

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Machine Vision sub-sector analysis: Hexagon is continuing to be the most active acquiror

ARTHOS Machine Vision peers

in € mn

Company Name	EV	LTM Sales	Annual Exp. 5Y EPS Growth	EBITDA Margin	NTM EV/Sales	NTM EV/EBITDA
AMETEK, Inc.	36,023	5,789	9%	30%	5.9x	19.5x
Antares Vision S.p.A.	540	224	NM	13%	2.1x	9.4x
Basler Aktiengesellschaft	578	262	16%	10%	2.3x	16.5x
Bruker Corporation	10,537	2,412	26%	22%	3.9x	18.5x
Carl Zeiss Meditec AG	9,018	2,022	10%	19%	4.1x	18.3x
Cognex Corporation	8,544	851	12%	24%	9.6x	36.4x
Datalogic S.p.A.	430	666	21%	10%	0.7x	5.3x
FARO Technologies, Inc.	283	326	30%	-4%	0.9x	NM
Hexagon AB (publ)	33,630	5,286	10%	34%	6.1x	15.2x
Jenoptik AG	2,276	1,006	7%	19%	2.1x	10.8x
Kapsch TrafficCom AG	330	553	NM	1%	NM	NM
Nynomic AG	239	117	NM	14%	1.8x	10.5x
Olympus Corporation	19,013	6,106	7%	27%	3.2x	12.3x
OMRON Corporation	10,571	6,066	1%	15%	1.9x	13.7x
OPT Machine Vision Tech Co., Ltd	2,341	157	20%	27%	11.5x	37.2x
Stemmer Imaging AG	216	160	11%	18%	1.3x	7.1x
Teledyne Inc.	20,610	5,081	6%	24%	3.9x	15.9x
TKH Group N.V.	2,251	1,817	NM	14%	1.2x	7.4x
Tomra Systems ASA	4,620	1,137	2%	15%	3.7x	18.3x
Varex Imaging Corporation	1,214	810	23%	12%	1.4x	9.3x
Viscom AG	111	108	NM	8%	1.0x	7.0x
Zebra Technologies Corporation	15,933	5,296	10%	20%	3.1x	14.3x
Mean			13%	17%	3.4x	15.1x
Median			10%	16%	2.3x	14.0x

No. of acquisitions per year of most active buyers

Legend: 2023 YTD, 2022, 2021, 2020, 2019

Hexagon: 35 (2: 2023 YTD, 11: 2022, 5: 2021, 11: 2020, 6: 2019)
Bruker: 18 (3: 2022, 7: 2021, 1: 2020, 6: 2019)
Teledyne Technologies: 17 (1: 2023 YTD, 4: 2022, 1: 2021, 3: 2020, 8: 2019)
Ametek: 12 (1: 2022, 2: 2021, 5: 2020, 1: 2020, 3: 2019)
Antares Vision: 12 (3: 2023 YTD, 2: 2022, 2: 2021, 4: 2020, 1: 2019)
Zebra: 10 (1: 2022, 3: 2021, 2: 2020, 4: 2019)

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Notable Vision M&A transactions (1 of 3)

Date*	Buyer	Target	Comment	Country
Jun 2023	HEXAGON	Additive CADS	> Hexagon (OM:HEXA B) completed the acquisition of CADS Additive GmbH, a provider of a digital-reality software solution for additive metal manufacturing (~21 FTEs). > Acquisition will see CADS Additive further integrate its specialized computer-aided design (CAD) tools into Hexagon's software portfolio.	(Austria flag)
Jun 2023	PERCEPTO		> Percepto, a provider of vision software for recognition and tracking in drones and UAVs, has raised € 67m in a Series C funding led by existing investor Koch Disruptive Technologies (>50 FTEs). > The company plans to use the additional funding to enable the mass deployment of its technology and to expand its footprint in the US, Europe, and the Middle East.	(Israel flag)
May 2023	AZIMUT LIBERA IMPRESA	NEXT IMAGING	> The financial sponsor Azimut Libera Impresa completed the acquisition of Next Imaging Spa, a distributor of computer vision and imaging systems (~50 FTEs). > Acquisition aims to create an international distribution platform of imaging and Machine Vision solutions.	(Italy flag)
May 2023	LUMIBIRD MORE THAN LASERS	Convergent	> Lumibird has signed an agreement to acquire Convergent Photonics, a subsidiary of Italian company Prima Industrie, as well as the Convergent assets of Prima Industrie North America. > Convergent is a designer and manufacturer of semiconductor lasers and laser diode packaging strengthening Lumibird's position as a developer of semiconductor and high-power fiber lasers.	(Italy flag)
May 2023	TKH	euresys Empowering Computer Vision	> TKH Group N.V. (ENXTAM:TWEKA) completed the acquisition of Euresys (2022 rev. € 27m), a high-tech designer and SW developer for image analysis, as well as video capture and processing. > Euresys technology complements TKH's existing Machine Vision technologies, and adds strong software expertise, interface technologies and know-how to TKH capabilities.	(Belgium flag)
Apr 2023	Nikon	AVONIX IMAGING	> Nikon Americas Inc. entered into an equity purchase agreement to acquire Avonix Imaging which engages in manufacturing, sales, and services relating to X-ray and CT Systems (>35 FTEs). > With the acquisition, Nikon aims to provide solutions to various inspection/measurement needs in the area of X-ray and CT inspection. The deal is expected to close in Summer 2023.	(US flag)

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Notable Vision M&A transactions (2 of 3)

Date*	Buyer	Target	Comment	Country
Apr 2023	PHOTONIS Reveal the invisible	proxi VISION	› Photonis announced the acquisition of ProxiVision, a manufacturer of high-grade optoelectronic components and detectors for UV, visible light, x-rays and particles (>60 FTEs). › With the acquisition, Photonis strengthens its positioning in ultra-violet and solar blind imaging devices with further expertise and manufacturing capabilities.	🇩🇪
Apr 2023	PHOTONIS Reveal the invisible	TELOPS	› Photonis announced the acquisition of Telops, a specialist developer and manufacturer of high-performance hyperspectral imaging systems and infrared cameras (>100 FTEs). › Through the acquisition, Photonis extends its technology expertise by adding hyperspectral capabilities to the portfolio.	🇨🇦
Mar 2023	UNION PARK CAPITAL / KPM	SMARTVISIONWORKS Bringing Automation the Power of Sight	› Union Park completed the acquisition of Smart Vision Works, a technology company providing AI and machine learning platforms for vision systems for agriculture and food industries (~40 FTEs). › With this closed acquisition, Union park capital's portfolio company KPM Analytics has significantly expanded its vision inspection portfolio with new AI technologies.	🇺🇸
Mar 2023	XXII		› Startup XXII, specialized on video analytics software enabled by AI, has raised € 22m in a Series A funding round led by Fonds Innovation Défense (>50 FTEs). › The company plans to use the additional funding to enable the mass deployment of its technology and to expand its footprint in the US, Europe, and the Middle East.	🇫🇷
Feb 2023	CYTEK TRANSCEND THE CONVENTIONAL	Luminex	› Cytek Biosciences, Inc. (NasdaqGS:CTKB) completed the acquisition of Flow Cytometry & Imaging (FCI) business unit from Luminex Corporation, a subsidiary of DiaSorin, for an EV of $ 44m. › Acquisition will expand Cytek's product portfolio to include imaging and menu-based application-driven flow cytometry to provide full cell analysis solutions to its customers.	🇺🇸
Feb 2023	ANTARES VISION ANTARES VISION GROUP	pygsa GROUP	› Antares Vision (BIT:AV) closed a binding agreement to acquire 30% of PYGSA, a designer and manufacturer of complete industrial vision systems. › With the acquisition, Antares is expanding its presence in the Spanish and Portuguese markets and named PYGSA as an exclusive distributor of Antares' solutions.	🇪🇸

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Notable Vision M&A transactions (3 of 3)

Date*	Buyer	Target	Comment	Country
Feb 2023	EXCELITAS TECHNOLOGIES	Phoseon TECHNOLOGY	› Excelitas completed the acquisition of Phoseon, a designer and manufacturer of industrial UV LED curing systems and UV LED illumination solutions (~120 FTEs). › Excelitas adds further alternatives in UV lighting solutions across industrial curing, scientific illumination and non-contact UVC disinfection to its illumination technologies portfolio.	🇺🇸
Feb 2023	resideo	teknique.	› Resideo Technologies Inc. (NYSE:REZI) announced that it has completed the acquisition of Teknique, a provider of Ambarella-based vision components and camera modules (>50 FTEs). › Founded in 2004 and based in New Zealand, the company is expected to expand the video product portfolio and accelerate providing actionable intelligence for customers.	🇳🇿
Jan 2023	TOPTICA	AZURLIGHT SYSTEMS	› TOPTICA Photonics AG completed the acquisition of a majority stake in Azur Light Systems SAS, a manufacturer of fiber lasers for scientific, industrial, and biomedical applications. › Resulting combination of the portfolios of diode and fiber lasers with frequency conversion provides solutions ranging from low to high power and from ultraviolet to infrared wavelengths.	🇫🇷
Jan 2023	FISBA Innovators in Photonics	GRAY OPTICS	› FISBA AG completed the acquisition of Gray Optics, a developer of precision optical systems for biomedical, life science, and industrial markets (~20 FTEs). › With the acquisition of Gray Optics, FISBA is continuing to expand in North America by leveraging the experience and capabilities in high precision optical systems of Gray Optics.	🇺🇸
Jan 2023	ZEISS	LENSO	› ZEISS announced the acquisition of LENSO, a specialist for 3D line-scan optical measurement systems in quality control, development, and production (>30 FTEs). › By acquiring LENSO, ZEISS expands its market presence in Poland and improves its Industrial Quality & Research segment.	🇵🇱
Jan 2023	BRUKER	ACQUIFER	› Bruker (NasdaqGS:BRKR) closed the acquisition of ACQUIFER Imaging, a manufacturer of cell-based automated microscopy imaging systems and secure data storage hardware (EV € 7m). › ACQUIFER adds high-performance on-premise processing, secure storage, and networking technology to Bruker's advanced fluorescence microscopy imaging products.	🇩🇪

Sources: Capital IQ (as of 03 July 2023), Press releases
* Transaction announcement

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Notable LiDAR M&A transactions (1 of 3)

Date*	Buyer	Target	Comment	Country
Jun 2023	MicroVision		› MicroVision (NasdaqGM:MVIS) sells, at its option, up to an aggregate of $ 45m in shares of its common stock through Craig-Hallum, as a sales agent. › MicroVision anticipates that the net proceeds from the sale of the securities will be used for general corporate purposes such as working capital and capital expenditures.	🇺🇸
Jun 2023	LeddarTech		› LeddarTech, an automotive ADAS and AD software company is expected to become listed on Nasdaq under the ticker symbol "LDTC" via a business combination with the special purpose acquisition company (SPAC) Prospector (NasdaqCM:PRSR) for an implied equity value of $ 200m. › In total, LeddarTech raised $ 347.5m in funding, the latest being $ 140m in February 2022.	🇨🇦
May 2023	Applied Intuition	EMBARK	› Applied Intuition a PE-backed SW company for ADAS entered into a definitive merger agreement to acquire publicly listed company Embark (NasdaqGM:EMBK) a developer of ADAS software for a negative EV of $ 35m. Offering was below current trading. › Applied will integrate Embark's internal tools, data, and SW assets to further improve its offering.	🇺🇸
Feb 2023	adaps ADAPS PHOTONICS		› Adaps Photonics, a developer of SPAD-based dToF sensor chips and system solutions announced that it has received $ 14.7m in a Series C funding round lead by Costone Capital. › In total, Adaps Photonics raised $ 40.3m with the largest funding round being an earlier Series C in April 2022 of $ 31.4m invested by Longzhu Capital, Kinzon Capital and Gaorong Capital.	🇨🇳
Jan 2023	Baraja		› Baraja, a manufacturer of high-resolution 3D Machine Vision systems for autonomous vehicles, robotics, site surveying received growth capital in an undisclosed amount from Veoneer. › Previously, Baraja has raised $ 63.9m in funding over 5 rounds, with the largest funding round being a Series B of $ 40m in March 2021.	🇦🇺
Nov 2022	LUMOTIVE		› Lumotive, a developer of LiDAR solutions for autonomous systems in the automotive, UAV, robotics received $ 13m in a Series A funding lead by Samsung Ventures. (Post-Money: $ 65.6m). › Previously, Lumotive only received $ 9m funding in July 2022 and will use all proceeds for the development of optical semiconductor devices that enable the next generation of LiDAR sensors.	🇺🇸

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Notable LiDAR M&A transactions (2 of 3)

Date*	Buyer	Target	Comment	Country
Nov 2022	OUSTER	Velodyne LiDAR	> Ouster (NYSE:OUST) completed the acquisition of the Lidar sensor developer and publicly listed manufacturer Velodyne (NasdaqGS:VLDR) in February 2023 (EV $ 35.8m; EV/Revenue 0.8x). > Merger is expected to reduce operating costs of both companies and synergy effects of at least $ 75m are expected in the first nine months after the transaction.	🇺🇸
Nov 2022	SCANTINEL PHOTONICS		> Scantinel, a developer of LiDAR solutions for mobility and industrial applications, received a € 10m extended Series A backed by PhotonDelta, Scania Growth Capital and ZEISS Ventures. > Previously, Scantinel raised € 7.5m in a Series A round from Scania Growth Capital and the proceeds are used for the rollout of Frequency Modulated Continuous Wave LiDAR devices.	🇩🇪
Oct 2022	outsight		> Outsight, a developer of real-time 3D Light Detection and LiDAR solutions, received $ 22m in a Series B funding round co-led by Energy Innovation Capital and a Bpifrance managed fund. > Previously, Outsight only raised a Seed round in December 2019 in an undisclosed amount and will use the funds to strengthen its strategic position as a leading Software Pure Player.	🇫🇷
Oct 2022	SiLC		> SiLC Technologies, a manufacturer of integrated chips for machine imaging applications, raised a $ 25m in a Series B funding round led by the investor Plug and Play Tech Center. > In total, the company raised $ 53.6m in funding, with the previous funding round being a Series A amounting to $ 23.1m in March 2021.	🇺🇸
Oct 2022	mobileye		> Mobileye successfully completed an IPO at $21/share raising about $ 800m with an EV of ~ $ 17bn after Intel completed the acquisition of Mobileye with an EV of ~$ 15bn in Aug 2017. > Proceeds from this offering will be used for repayment on a note owed to Intel Corporation, and Mobileye intends to use the remaining for working capital and general corporate purposes.	🇮🇱
Sep 2022	SEOUL ROBOTICS.		> Seoul Robotics, developer of LIDAR perception software for 3D object detection and 3D computer vision has received $ 25m in a Series B round of funding led by existing investor KB Investment. > In total, the company raised $ 49.2m in funding using the proceeds to grow its team and expand automated vehicle technology to potential partners across industries.	🇰🇷

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Notable LiDAR M&A transactions (3 of 3)

Date*	Buyer	Target	Comment	Country
Sep 2022		**BRIDGER** PHOTONICS	› Manufacturer of laser-based sensors and radars Bridger Photonics received $ 55m in an equity round of funding led by Carica Sustainable Investments. › Previously, Bridger Photonics only received Series A funding by Carl Zeiss in an undisclosed amount in November 2018.	🇺🇸
Jul 2022		Blickfeld LiDAR / scan your world	› German-based company Blickfeld, a manufacturer of LiDAR sensors has received € 16.2m in a round of venture debt funding from European Investment Bank. › In total, Blickfeld received funding of € 56m with the previous funding round being a Series A amounting to $ 31m in March 2020.	🇩🇪
Mar 2022		WeRide	› WeRide (JingChi Inc), a developer of software for autonomous vehicles received $ 400m in a Series D funding led by Bosch with Carlyle and GAC as further investors (Post-Money: $ 4.4bn). › In total, the company raised $ 502m with the largest funding rounds being a Seed round of $ 52m in September 2017 and a Series A of $ 20m in January 2019.	🇺🇸
Mar 2022		TerraDrone	› Terra Drone, a provider of LiDAR, and hyperspectral sensors as well as industrial drone solutions has received $ 66.4m in its Series B round of funding led by new investor Mitsui & Co. › In total, the company raised $ 94.2m using the proceeds to increase its headcount and fuel its global expansion into Europe, the United States and Southeast Asia	🇯🇵
Jan 2022		芯视界微电子 visionICs	› VisionICs Microelectronics, a manufacturer of LiDAR chips and related products has received $ 314m in its Series B funding led by Contemporary Amperex Technology (SZSE:300750). › The company will use the proceeds for mass production of chips and R&D of advanced dToF sensor technology.	🇨🇳
Apr 2021		**INNOVIZ** TECHNOLOGIES	› Innoviz technologies successfully completed an IPO through a merger with a SPAC with an EV of $~1.4bn. The company is a leading developer and manufacturer of high-performance LiDAR sensors and perception software for autonomous vehicles. › Access to new capital levels the path to become one of the dominant players in the industry.	🇮🇱

ARTHOS

ARTHOS – International Tech M&A advisory

ARTHOS – International tech M&A advisory firm with a focus on technology transactions

Partner-led and global

ARTHOS Corporate Finance is an independent, owner-managed M&A advisory firm based in Munich and part of a global alliance of 40 M&A advisory firms with 200 managing partners. All our projects are managed by an experienced managing partner who has successfully closed more than 100 company disposals, acquisitions or fund raisings. The majority of ARTHOS transactions have a volume of between 10 and 100 million euros.

M&A 360°

With our 360° approach we can advise our customers in a targeted and comprehensive manner – from the initial planning through the detailed preparation to the efficient execution of a transaction. That is why we see ourselves not only as deal makers, but rather as competent M&A experts, experienced process managers and financial advisers for our client's long-term goals.

Technology

Our focus on digital media, information technology and high-tech industries provides several powerful advantages to our customers: we know the M&A terms and conditions, business models and decision-makers within these industry sectors. With this knowledge, we are able to implement sustainable, creative solutions. This is why our M&A projects achieve above average results.

ARTHOS TECHNOLOGY TEAM
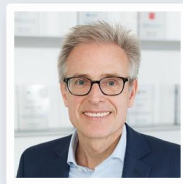
Arne Tödt
Managing Partner

Arno Pätzold
Managing Partner

Moritz Böck
Analyst

Christian Thiel
Analyst

ARTHOS

ARTHOS – 20-year track record in international technology M&A transactions

KETEK
Munich, Germany

has sold assets to

BROADCOM
San Jose, CA, USA

Worldwide leading 3D-wideband
Silicon Photomultiplier Technology

MaxxVision
Stuttgart, Germany

has been acquired by

Indutrade
Stockholm, Sweden

Selling to a strategic investor targeting
buy and build in Vision Technology

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tacterion
Munich, Germany

has received growth capital from

Miele
Gütersloh, Germany

Creating the leading tactile sensor company
to enable the tactile internet of the future

---

eurotech
UNLEASHING THE POWER OF THE EDGE
Amaro, Italy

has acquired

InoNet
Taufkirchen, Germany

Accelerating Eurotech's growth strategy
in the Edge Computing market in AIoT

SHAPE DRIVE
Munich, Germany

has been acquired by

wenglor
the innovative family
Tettnang, Germany

Accelerating market presence
in Structured Light Technology

---

visionary solutions
image sensing systems
incorporated
St. Paul, MN, USA

has acquired

CitySync
Stevenage, UK

Extending ISS' software-based detection
solutions portfolio with ALPR technology

Indutrade
Stockholm, Sweden

has acquired

stein
AUTOMATION
Villingen-Schwenningen, Germany

Expansion in industry 4.0 conveyor systems
for production process optimization

Infineon
Munich, Germany

has acquired

MERUS AUDIO
Copenhagen, Denmark

Energy-efficient integrated
audio amplifier solutions

ARTHOS worldwide – Partner within the global AICA alliance

Global reach – international cooperation

AMERICA
USA
Canada
Argentina
Brazil
Bolivia
Ecuador
Colombia
Mexico
Paraguay

EMEA
Belgium
Czech
Finland
France
Germany
Italy
Ireland
Israel
Netherlands
Norway
Poland
Slovenia
South Africa
Spain
Sweden
Switzerland
Turkey
UK

ASIA & OZEANIA
Australia
China
India
Japan
Korea
Singapore
Thailand
Vietnam
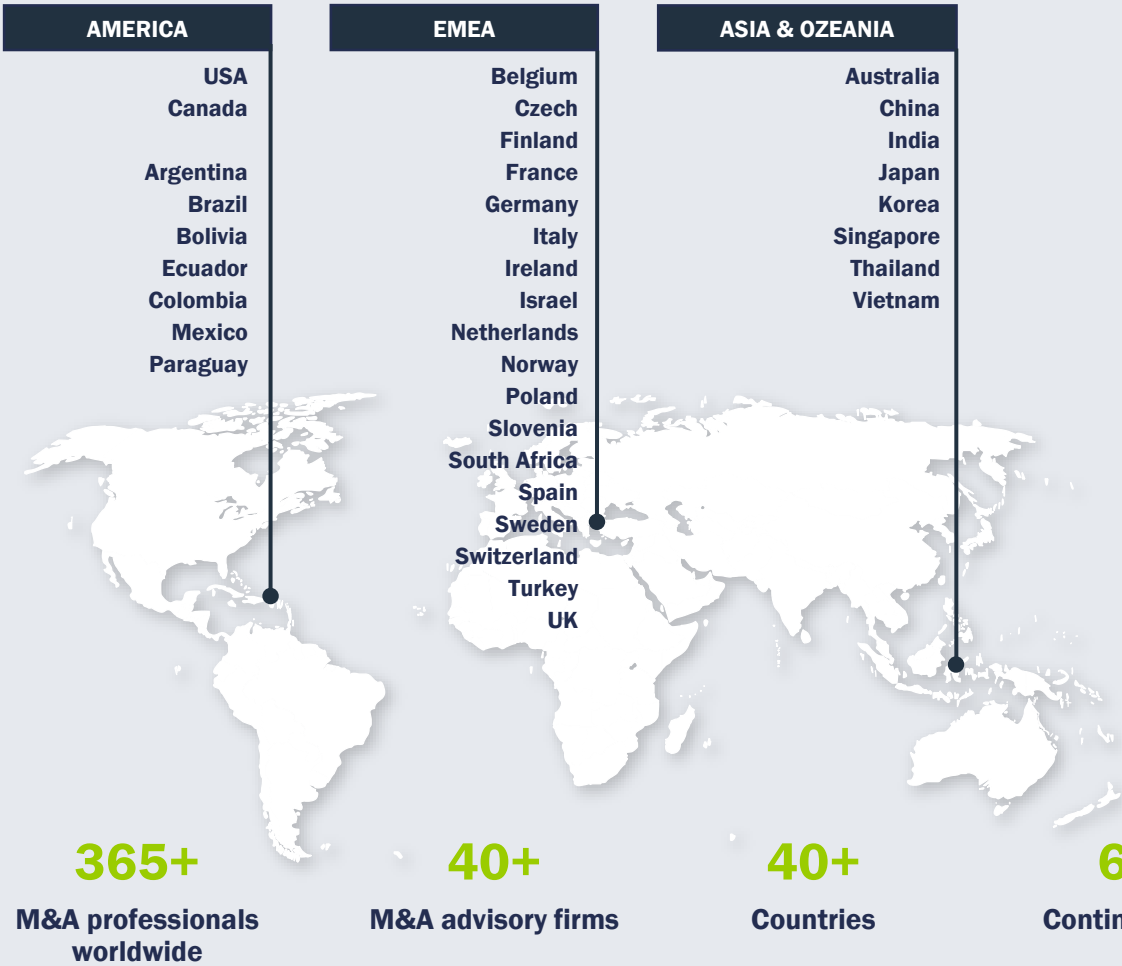
Transactions by sector in 2022
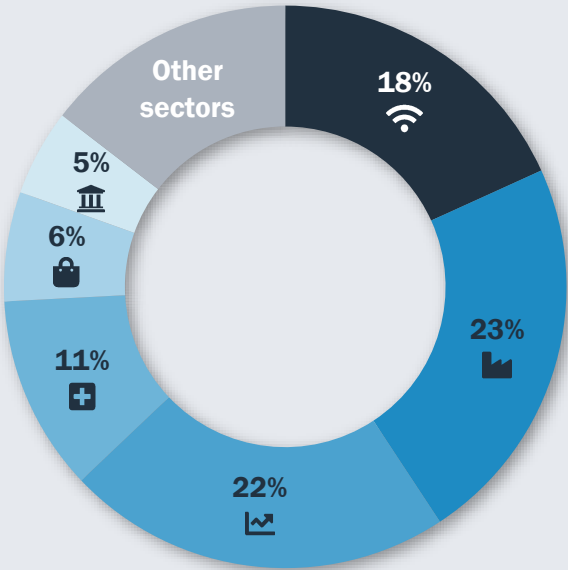
- 18% — Technology
- 23% — Industrials
- 22% — Business Services
- 11% — Healthcare
- 6% — Consumer Products
- 5% — Financial Services
- Other sectors

365+
M&A professionals worldwide

40+
M&A advisory firms

40+
Countries

6
Continents

302
Deals closed

$9.5bn
Total transaction value

~$31mn
Ø deal value

ARTHOS

19

Contact us for technology M&A advice

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Managing Partner

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Appendix: Public comps by sub-sector

Public comps – Laser Systems

Currency in EUR

Company Name	HQ	Employees	Share Price €	Market Cap € mn	EV € mn	Cash € mn	LTM Sales	LTM Gross Margin	LTM EBITDA Margin	Exp. 5Y EPS Growth	NTM Sales	NTM EBITDA Margin	NTM Multiples EV/Sales	NTM Multiples EV/EBITDA
Bystronic AG	Switzerland	3,609	609.1	1,260	910	346	1,028	54%	15%	NM	999	9%	0.9x	10.3x
Coherent Corp.	United States	23,658	46.7	6,509	12,362	810	4,457	36%	22%	9%	4,354	23%	2.8x	12.2x
EL.En. S.p.A.	Italy	2,105	11.0	878	820	165	691	36%	12%	NM	721	13%	1.1x	8.7x
Gooch & Housego PLC	United Kingdom	903	7.2	184	206	7	162	30%	11%	NM	167	14%	1.2x	8.6x
Hamamatsu Photonics K.K.	Japan	5,491	44.5	6,893	6,204	841	1,523	55%	34%	NM	1,492	32%	4.2x	12.9x
Han's Laser Technology Group	China	18,335	3.3	3,482	2,930	1,264	1,875	33%	7%	22%	2,151	11%	1.4x	12.5x
IPG Photonics Corporation	United States	6,230	124.4	5,885	4,925	984	1,295	38%	21%	9%	1,318	27%	3.7x	13.6x
Jenoptik AG	Germany	4,493	31.4	1,800	2,276	58	1,006	36%	19%	7%	1,080	19%	2.1x	10.8x
Keyence Corporation	Japan	10,580	429.9	104,251	98,293	6,678	6,550	82%	55%	8%	6,212	56%	15.8x	28.2x
LPKF Laser & Electronics SE	Germany	700	8.4	205	200	8	126	66%	2%	130%	135	12%	1.5x	12.2x
Lumentum Holdings Inc.	United States	6,815	52.0	3,570	4,236	1,534	1,674	43%	18%	8%	1,413	19%	3.0x	15.8x
Lumibird SA	France	1,000	14.8	331	383	62	191	100%	11%	NM	212	18%	1.8x	9.9x
MKS Instruments, Inc.	United States	10,450	99.0	6,611	10,542	811	3,313	43%	22%	(5%)	3,480	21%	3.0x	14.2x
NKT A/S	Denmark	4,291	55.6	2,381	2,425	144	2,212	32%	7%	31%	2,861	9%	0.8x	9.6x
nLIGHT, Inc.	United States	1,100	14.1	648	563	100	213	21%	(15%)	30%	213	0%	2.6x	NM
Novanta Inc.	United States	3,000	168.6	6,038	6,398	76	806	44%	19%	13%	846	22%	7.6x	33.6x
Wuhan Raycus Fiber Laser	China	3,540	3.8	2,181	2,176	69	439	17%	4%	NM	532	15%	4.1x	27.4x
Mean								**45%**	**16%**	**24%**		**19%**	**3.4x**	**15.0x**
Median								**38%**	**15%**	**9%**		**18%**	**2.6x**	**12.4x**

Abbreviations:
HQ: Headquarter; NTM: Next twelve months; EPS: Earnings per share; NTM multiples - EV/Estimates: EV as of 03 July 2023 divided by NTM estimates (mean of analysts)
EV: Enterprise Value = share price * outstanding shares + total debt + preferred stock + minority interest – cash & short-term investments

ARTHOS

Public comps – Machine Vision

Currency in EUR

Company Name	HQ	Employees	Share Price €	Market Cap € mn	EV € mn	Cash € mn	LTM Sales	LTM Gross Margin	LTM EBITDA Margin	Exp. 5Y EPS Growth	NTM Sales	NTM EBITDA Margin	NTM Multiples EV/Sales	NTM Multiples EV/EBITDA
AMETEK, Inc.	United States	19,600	148.3	34,175	36,023	368	5,789	35%	30%	9%	6,156	30%	5.9x	19.5x
Antares Vision S.p.A.	Italy	1,158	6.9	476	540	88	224	79%	13%	NM	255	22%	2.1x	9.4x
Basler Aktiengesellschaft	Germany	1,139	17.1	510	578	19	262	48%	10%	16%	256	14%	2.3x	16.5x
Bruker Corporation	United States	8,525	67.7	9,935	10,537	565	2,412	52%	22%	26%	2,668	21%	3.9x	18.5x
Carl Zeiss Meditec AG	Germany	4,624	99.0	8,858	9,018	12	2,022	58%	19%	10%	2,211	22%	4.1x	18.3x
Cognex Corporation	United States	2,441	51.3	8,857	8,544	351	851	72%	24%	12%	887	27%	9.6x	36.4x
Datalogic S.p.A.	Italy	3,056	7.0	395	430	84	666	42%	10%	21%	644	13%	0.7x	5.3x
FARO Technologies, Inc.	United States	1,490	14.8	280	283	82	326	49%	(4%)	30%	319	0%	0.9x	NM
Hexagon AB (publ)	Sweden	24,195	11.3	30,316	33,630	611	5,286	66%	34%	10%	5,484	40%	6.1x	15.2x
Jenoptik AG	Germany	4,493	31.4	1,800	2,276	58	1,006	36%	19%	7%	1,080	19%	2.1x	10.8x
Kapsch TrafficCom AG	Austria	4,039	11.5	149	330	47	553	59%	1%	NM	NM	NM	NM	NM
Nynomic AG	Germany	471	34.9	228	239	27	117	27%	14%	NM	132	17%	1.8x	10.5x
Olympus Corporation	Japan	32,844	14.4	17,996	19,013	1,251	6,106	68%	27%	7%	5,878	26%	3.2x	12.3x
OMRON Corporation	Japan	28,034	55.5	10,933	10,571	729	6,066	45%	15%	1%	5,423	14%	1.9x	13.7x
OPT Machine Vision Tech Co., Ltd.	China	2,098	20.8	2,536	2,341	207	157	66%	27%	20%	203	31%	11.5x	37.2x
Stemmer Imaging AG	Germany	323	38.9	253	216	46	160	38%	18%	11%	172	18%	1.3x	7.1x
Teledyne Technologies Inc.	United States	14,700	376.6	17,716	20,610	612	5,081	43%	24%	6%	5,324	24%	3.9x	15.9x
TKH Group N.V.	Netherlands	6,198	45.4	1,862	2,251	185	1,817	47%	14%	NM	1,927	16%	1.2x	7.4x
Tomra Systems ASA	Norway	5,000	14.7	4,352	4,620	63	1,137	58%	15%	2%	1,265	20%	3.7x	18.3x
Varex Imaging Corporation	United States	2,400	21.6	872	1,214	96	810	32%	12%	23%	838	16%	1.4x	9.3x
Viscom AG	Germany	567	9.2	82	111	6	108	64%	8%	NM	115	14%	1.0x	7.0x
Zebra Technologies Corporation	United States	10,500	271.0	13,937	15,933	100	5,296	46%	20%	10%	5,094	22%	3.1x	14.3x
Mean								**51%**	**17%**	**13%**		**20%**	**3.4x**	**15.1x**
Median								**49%**	**16%**	**10%**		**20%**	**2.3x**	**14.0x**

Abbreviations:
HQ: Headquarter; NTM: Next twelve months; EPS: Earnings per share; NTM multiples - EV/Estimates: EV as of 03 July 2023 divided by NTM estimates (mean of analysts)
EV: Enterprise Value = share price * outstanding shares + total debt + preferred stock + minority interest – cash & short-term investments

Sources: Capital IQ (as of 03 July 2023)

ARTHOS

Public comps – Semiconductor Manufacturing Equipment (SME)

Currency in EUR

Company Name	HQ	Employees	Share Price €	Market Cap € mn	EV € mn	Cash € mn	LTM Sales	LTM Gross Margin	LTM EBITDA Margin	Exp. 5Y EPS Growth	NTM Sales	NTM EBITDA Margin	NTM Multiples EV/Sales	NTM Multiples EV/EBITDA
Advanced Process Corp.	South Korea	537	14.7	221	177	125	353	29%	19%	NM	359	11%	0.5x	4.3x
AIXTRON SE	Germany	974	31.1	3,494	3,171	328	452	42%	22%	17%	619	29%	5.1x	17.8x
Applied Materials, Inc.	United States	33,000	132.4	111,181	112,119	4,619	24,137	46%	31%	8%	21,658	29%	5.2x	17.8x
ASML Holding N.V.	Netherlands	37,704	663.0	261,613	258,933	6,653	24,385	51%	35%	26%	26,536	36%	9.8x	27.4x
Camtek Ltd.	Israel	446	32.6	1,455	1,253	383	291	49%	25%	8%	270	26%	4.6x	18.1x
Circuit Fabology Microelectronics	China	471	10.6	1,282	1,245	41	94	44%	20%	NM	131	25%	9.5x	37.6x
Disco Corporation	Japan	4,258	143.2	15,513	14,482	1,129	1,967	65%	42%	4%	1,691	41%	8.6x	21.0x
EO Technics Co., Ltd.	South Korea	636	77.8	942	845	108	301	33%	21%	NM	302	22%	2.8x	12.9x
FormFactor, Inc.	United States	2,105	31.3	2,418	2,247	217	661	38%	11%	NM	621	16%	3.6x	23.1x
KLA Corporation	United States	14,140	444.3	60,954	63,859	2,660	9,782	60%	43%	7%	8,354	41%	7.6x	18.8x
Lam Research Corporation	United States	18,700	588.9	79,108	78,774	4,991	17,529	45%	33%	2%	12,518	31%	6.3x	20.4x
Lasertec Corporation	Japan	662	136.7	12,327	12,213	193	805	55%	40%	41%	1,370	38%	8.9x	23.7x
MKS Instruments, Inc.	United States	10,450	99.0	6,611	10,542	811	3,313	43%	22%	(5%)	3,480	21%	3.0x	14.2x
NEXTIN, Inc.	South Korea	99	53.0	540	495	47	83	70%	52%	NM	95	52%	5.2x	10.0x
Nordson Corporation	United States	7,200	227.3	12,956	13,822	117	2,362	54%	29%	31%	2,466	30%	5.6x	18.4x
Onto Innovation Inc.	United States	1,636	106.7	5,222	4,706	537	886	53%	28%	NM	759	26%	6.2x	23.5x
Photronics, Inc.	United States	1,828	23.6	1,477	1,378	374	789	38%	37%	NM	834	36%	1.7x	4.6x
PVA TePla AG	Germany	697	19.0	470	433	37	230	28%	14%	34%	255	16%	1.7x	10.8x
SÜSS MicroTec SE	Germany	1,261	24.4	465	424	60	306	36%	13%	20%	350	15%	1.2x	8.1x
Tokyo Electron Limited	Japan	17,204	130.3	61,008	58,011	3,276	15,295	45%	30%	5%	11,102	27%	5.2x	19.5x
Tokyo Seimitsu Co., Ltd.	Japan	2,354	50.2	2,031	1,871	278	1,016	42%	26%	4%	823	23%	2.3x	10.0x
TOWA Corporation	Japan	1,817	16.2	406	404	115	373	35%	23%	NM	322	20%	1.3x	6.4x
Veeco Instruments Inc.	United States	1,221	23.5	1,216	1,252	233	592	40%	12%	NM	622	15%	2.0x	13.7x
Mean								**45%**	**27%**	**14%**		**27%**	**4.7x**	**16.6x**
Median								**44%**	**26%**	**8%**		**26%**	**5.1x**	**17.8x**

Abbreviations:

HQ: Headquarter; NTM: Next twelve months; EPS: Earnings per share; NTM multiples - EV/Estimates: EV as of 03 July 2023 divided by NTM estimates (mean of analysts)

EV: Enterprise Value = share price * outstanding shares + total debt + preferred stock + minority interest – cash & short-term investments

Public comps – Optoelectronics

Currency in EUR

Company Name	HQ	Employees	Share Price €	Market Cap € mn	EV € mn	Cash € mn	LTM Sales	LTM Gross Margin	LTM EBITDA Margin	Exp. 5Y EPS Growth	NTM Sales	NTM EBITDA Margin	NTM Multiples EV/Sales	NTM Multiples EV/EBITDA
ams-OSRAM AG	Austria	22,000	6.6	1,723	3,677	882	4,500	29%	17%	30%	3,696	27%	1.0x	3.7x
Everlight Electronics Co., Ltd.	Taiwan	4,312	1.5	674	536	164	569	29%	15%	NM	567	19%	0.9x	4.9x
Focuslight Technologies Inc	China	797	13.6	1,228	1,036	213	75	49%	13%	NM	93	26%	11.1x	42.1x
GalaxyCore Inc.	China	1,443	2.0	4,993	5,647	553	678	22%	2%	29%	911	19%	6.2x	32.6x
Hamamatsu Photonics K.K.	Japan	5,491	44.5	6,893	6,204	841	1,523	55%	34%	NM	1,492	32%	4.2x	12.9x
Himax Technologies, Inc.	Taiwan	2,200	6.2	1,078	1,254	206	951	35%	14%	NM	986	11%	1.3x	11.7x
Jiangxi Lianchuang Opto-Electronic	China	5,042	4.7	2,133	2,206	195	387	16%	1%	NM	470	7%	4.7x	65.2x
LG Innotek Co., Ltd.	South Korea	9,846	215.3	5,094	6,305	459	14,128	11%	10%	(0%)	14,798	9%	0.4x	4.6x
Lumentum Holdings Inc.	United States	6,815	52.0	3,570	4,236	1,534	1,674	43%	18%	8%	1,413	19%	3.0x	15.8x
OFILM Group Co., Ltd.	China	12,555	0.7	2,304	3,017	417	1,733	(10%)	(23%)	NM	2,097	3%	1.4x	48.5x
Radiant Opto-Electronics	Taiwan	733	3.2	1,503	674	1,188	1,616	20%	15%	NM	1,502	14%	0.4x	3.2x
ROHM Co., Ltd.	Japan	23,754	85.7	8,406	6,594	2,280	3,516	38%	29%	13%	3,415	30%	1.9x	6.4x
Samsung Electro-Mechanics	South Korea	11,949	100.5	7,592	7,616	1,165	6,233	22%	20%	12%	6,413	21%	1.2x	5.7x
Sanan Optoelectronics Co.,Ltd	China	14,883	2.2	10,781	10,985	1,095	1,745	12%	24%	NM	1,945	39%	5.6x	14.3x
SMART Global Holdings, Inc.	United States	3,600	26.6	1,330	1,782	375	1,603	25%	9%	(4%)	1,473	12%	1.2x	10.0x
Sunny Optical Technology	China	26,610	9.1	9,982	8,483	2,459	4,504	20%	13%	16%	4,575	15%	1.9x	12.5x
Universal Display Corporation	United States	444	132.0	6,249	5,687	595	549	77%	49%	15%	551	43%	10.3x	24.0x
Mean								**29%**	**15%**	**13%**		**20%**	**3.3x**	**18.7x**
Median								**25%**	**15%**	**13%**		**19%**	**1.9x**	**12.5x**

Abbreviations:

HQ: Headquarter; NTM: Next twelve months; EPS: Earnings per share; NTM multiples - EV/Estimates: EV as of 03 July 2023 divided by NTM estimates (mean of analysts)

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Sources: Capital IQ (as of 03 July 2023)

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