ADLINK
Leading **EDGE COMPUTING**

Complete, Efficient Data Acquisition Leads the
Way to the Factory of the Future

Edge IoT Smart
Manufacturing Solution

Edge Computing Platforms Enabling
Data-to-Decision

www.adlinktech.com

Meet your Factory of the Future

A smarter, more flexible Factory of the Future

As a leading edge computing solution provider, ADLINK continues to target integration of IT, OT, and CT technologies to create highly competitive manufacturing environments, meeting the demanding application requirements of Factories of the Future (FoF).

Keys to the Factory of the Future

Digitized

Increases operating flexibility and production efficiency, and speeds product development.

Intelligent

The intelligent edge platform enables faster, more productive decision making based on real-time data.
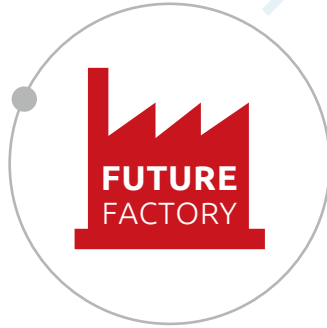

Unmanned

With the development of deep learning and artificial intelligence, the longtime goal of unmanned manufacturing and production is closer than ever.

Flexibility

Productivity

Scalability

Time to Market

▌Table of Contents

FUTURE
FACTORY

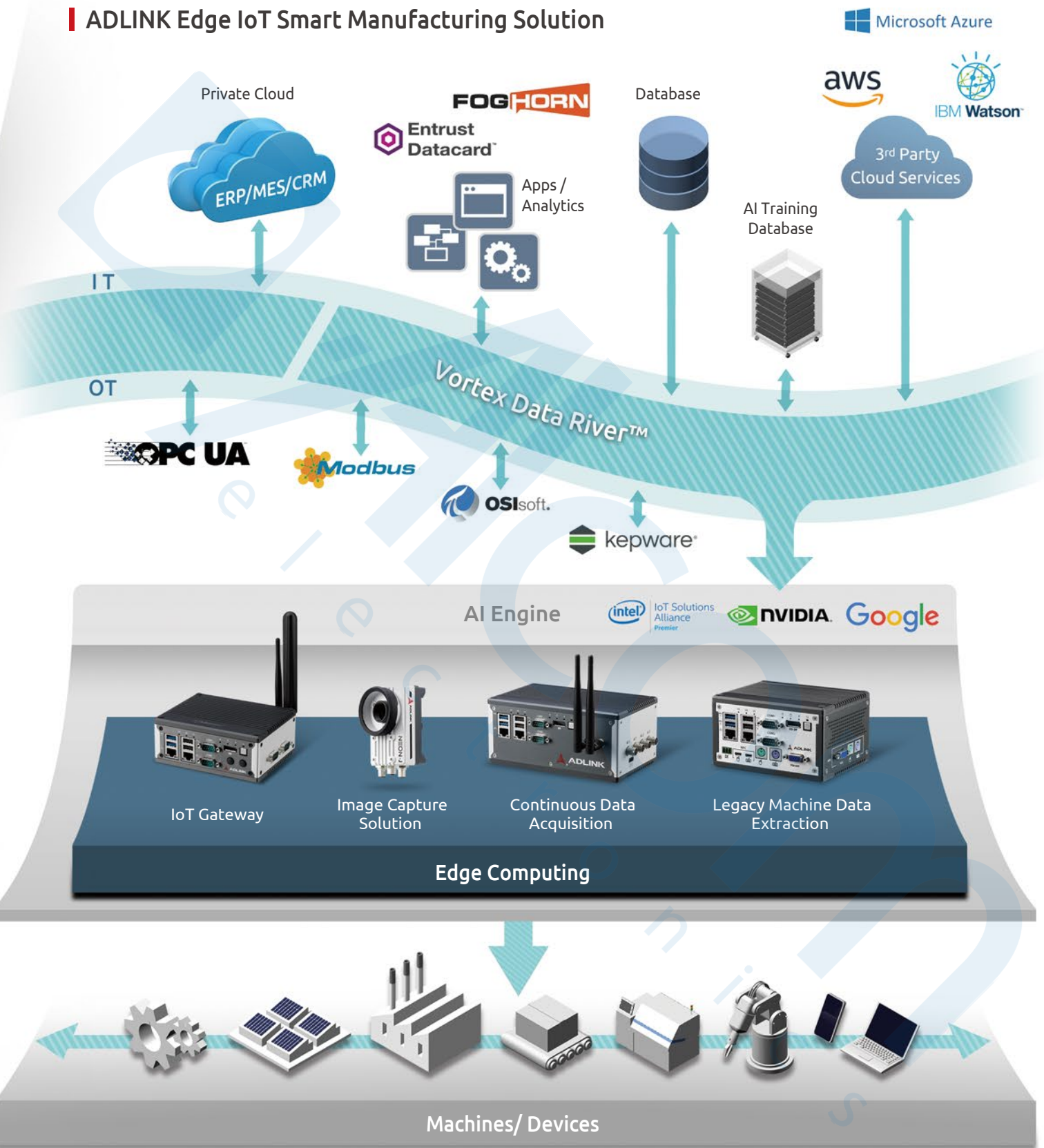# Data-to-Decision

Connecting Factories to Make the Future Happen

ADLINK, with years of experience in production line integration, delivers highly compatible solutions via edge IoT data extraction, supporting universal data acquisition and management to achieve operational superiority.

FUTURE FACTORY

Real-time AI-enabled decision making

Instant data streaming

Intelligent heterogeneous computing

ADLINK Edge IoT Smart Manufacturing Solution

Microsoft Azure

aws

IBM Watson

Private Cloud

ERP/MES/CRM

FOGHORN

Entrust Datacard

Apps / Analytics

Database

3rd Party Cloud Services

AI Training Database

IT

OT

Vortex Data River™

OPC UA

Modbus

OSIsoft.

kepware

AI Engine

intel IoT Solutions Alliance Premier

NVIDIA

Google

IoT Gateway

Image Capture Solution

Continuous Data Acquisition

Legacy Machine Data Extraction

Edge Computing

Machines/ Devices

Edge IoT Smart Manufacturing Solution

ADLINK's Vortex Edge™ solution interconnects devices, personnel, and other factory assets, eliminating boundaries between IT and OT and freeing data for transmission from end to end and point to point.

▮ **Actionable real-time data visualization**
▮ **Optimized process and product quality**
▮ **Maximized uptime and reliability**
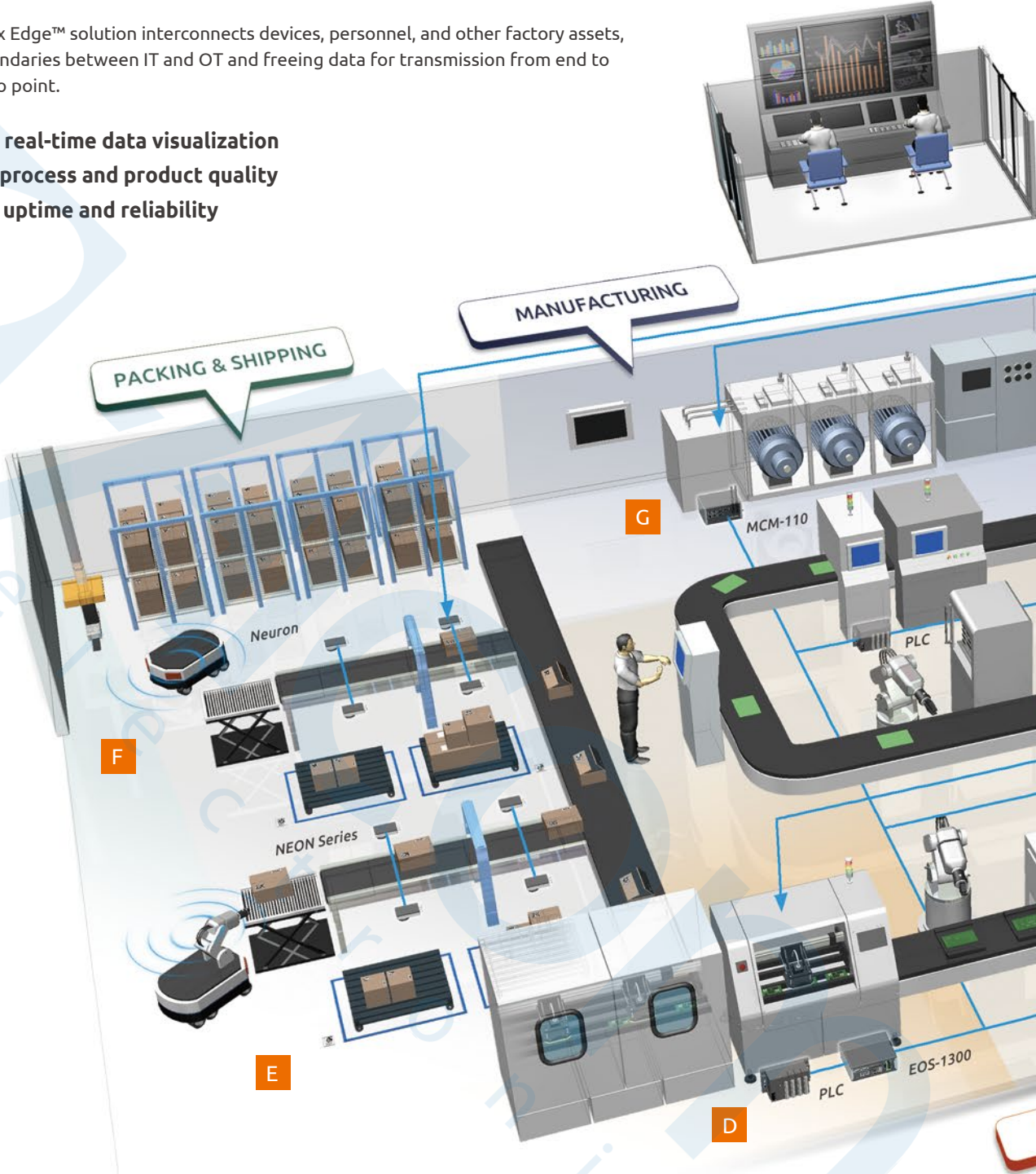
Production Efficiency Optimization
- Production information monitoring
- Availability/uptime management

B

DEX Series

Maximized Processing Efficiency
- Built-in predictive maintenance
- Real-time equipment adjustment

C

MCM Series

Intelligent AOI
- Improves inspection accuracy and quality control
- Deep learning and AI applications

D

EOS/NEON Series

VORTEX EDGE

ERP/MES/CRM

Data River

DEX-200

DEX-200

DEX-100

DEX Modbus I/O Module

MCM-100

INSPECTION

PROCESSING/PRODUCTION

A Application- and Service-based Real-time Connectivity

- Production information chain for end-to-end communication and control
- Connection to third-party cloud services such as ERP and MES
- Data marginalization, accelerated decision making

B

C

FUTURE FACTORY

Vortex Data River™

Intelligent Logistics Management

- Automates and manages logistics status with real time communication between pallets
- Reduced human error-based losses and increased shipment throughput

E

NEON Series

Collaborative Robot Systems

- Simple development & flexible deployment
- End-to-end communicability

F

ROS Starter Kit - Neuron

Condition Monitoring & Predictive Maintenance

- Instant monitoring and alarm
- Equipment life cycle warning

G

MCM Series

Edge IoT Lets Data Flow Freely

▌Modular architecture, vendor agnostic, open source. IoT made simple.

Edge computing meets IoT to provide real-time data connectivity and extraction solutions so you can make the most of your data, IT OT systems, assets, and things for a real ROI. ADLINK IoT offers a true end to-end Edge IoT solution that guarantees your data is available in the correct format to who needs it, where it needs to be, precisely when it needs to be there.

Connect the Unconnected

Vortex Edge™ allows OT leaders to connect assets by tapping into native communication protocols easily to generate and capture data from any asset via pre-validated sensors and pre-configured edge devices.
No programming necessary.

Stream Anywhere

Vortex Edge™ uses peer-to-peer data movement technology to securely move data. Once connected, data can move freely to any cloud, analytic platform, database, or even between devices. Connect once and stream to any person, place, or thing.

Control the Edge

Vortex Edge™ bridges the IT and OT divide with a set of integrated services for end-point monitoring, device management, visualization, analytics, and security which creates intelligent devices that can react to change and the world around them.
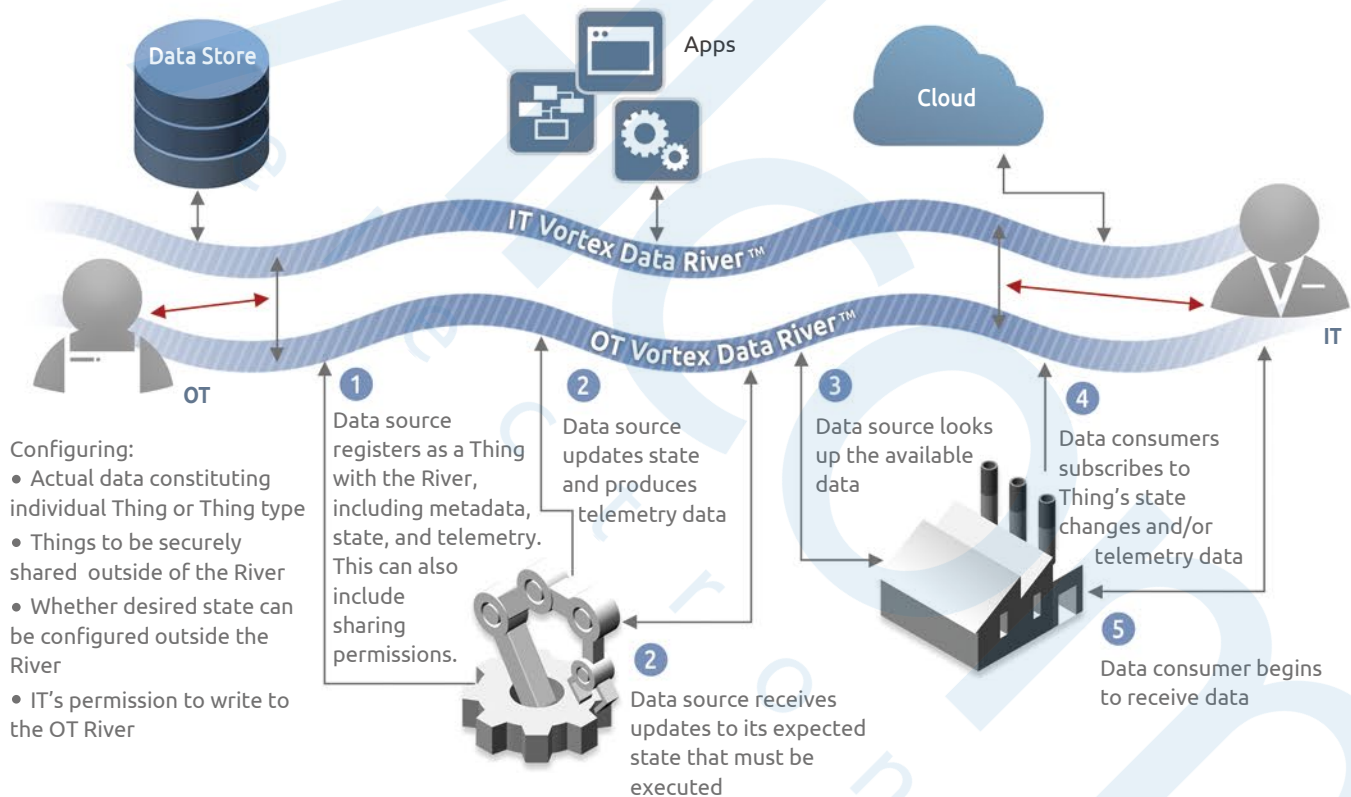
Vortex Data River™

Overcoming critical challenges of end-to-end IoT implementation

Vortex Data River™ is an easily implemented solution enabling vendor-neutral ecosystem constituents to cooperate seamlessly. Translation among devices or between devices and applications leaves IoT architects free to implement best-in-class technologies and solve real-world problems. Vortex Data River™ is based on an industry-standard protocol with significant usage in mission-critical applications, where the secure and timely delivery of data is essential. The peer-to-peer system requires no centralized broker, thereby eliminating the possibility of single point-failure.

The Vortex Data River™ is implemented in the Vortex Edge™ software suite, which builds a set of deployable microservices to communicate with end-points, devices or applications and which publish and/or subscribe to data topics on the Vortex Data River™.

Converging IT and OT

Data Store

Apps

Cloud

IT Vortex Data River™

OT Vortex Data River™

OT

IT

Configuring:
• Actual data constituting individual Thing or Thing type
• Things to be securely shared outside of the River
• Whether desired state can be configured outside the River
• IT's permission to write to the OT River

1 Data source registers as a Thing with the River, including metadata, state, and telemetry. This can also include sharing permissions.

2 Data source updates state and produces telemetry data

3 Data source looks up the available data

4 Data consumers subscribes to Thing's state changes and/or telemetry data

5 Data consumer begins to receive data

2 Data source receives updates to its expected state that must be executed

- Consistent data model simplifies IoT system architecture
- Broad ecosystem streamlines device-application transactions
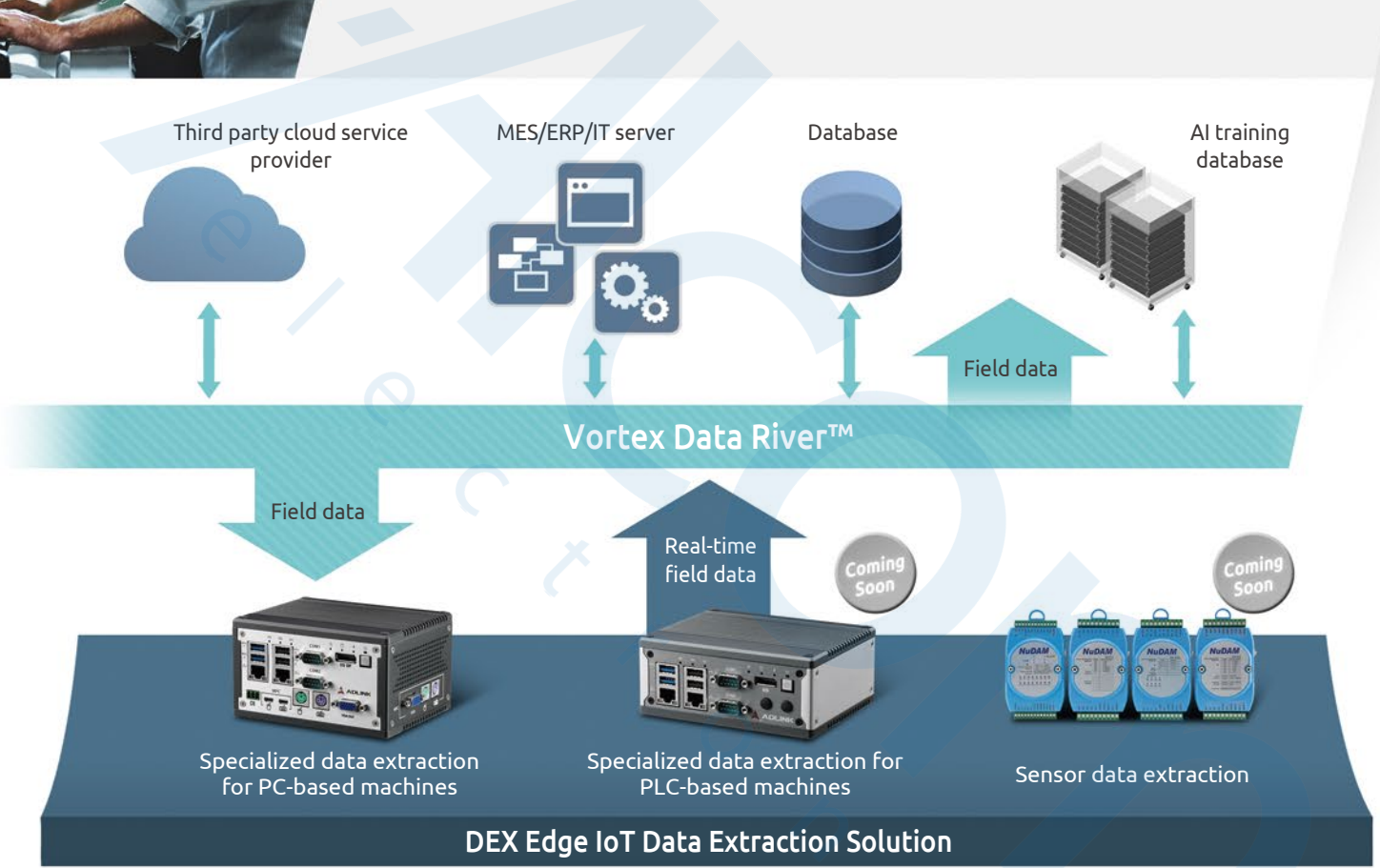- Dynamic auto-discovery of data sources and recipients

- Secure, scalable, fault-tolerant data connectivity
- Based on mature open-industry standard utilities, proven in
- Mission-critical environments

Real-time Collection and Management of Legacy Equipment Data

▌ Data-oriented decision making optimizes overall production efficiency

Smart factory realization can present distinct challenges, including connection of legacy equipment and simplifying system integration for increased flexibility. Accordingly, ADLINK provides the means to integrate OT (equipment) and IT (management) technologies, creating a complete data gathering solution, with highly accurate, non-intrusive operation fast processing of extracted machine data, providing complete operating status information in real time. The Vortex Edge™ platform powers ADLINK's DEX Series to execute full-process data exchange among devices, thoroughly integrating network connection and data transmission/control in existing equipment and systems using MES or SCADA integration.

Third party cloud service provider

MES/ERP/IT server

Database

AI training database

Field data

Vortex Data River™

Field data

Real-time field data

Coming Soon

Coming Soon

Specialized data extraction for PC-based machines

Specialized data extraction for PLC-based machines

Sensor data extraction

DEX Edge IoT Data Extraction Solution

Application field

Electronic product

Semiconductor manufacturing design backend

Panel industry

PCB/SMT processing and manufacturing

Non-intrusive System Computing Architecture

DEX Edge IoT integrates OCR technology based on deep learning computing, providing a unique data extraction system with high identification rates via non-intrusive operations. ADLINK uses an exclusive simplified script configuration program, providing easy access for generation of operating interfaces to further upgrade production line smart operation management.
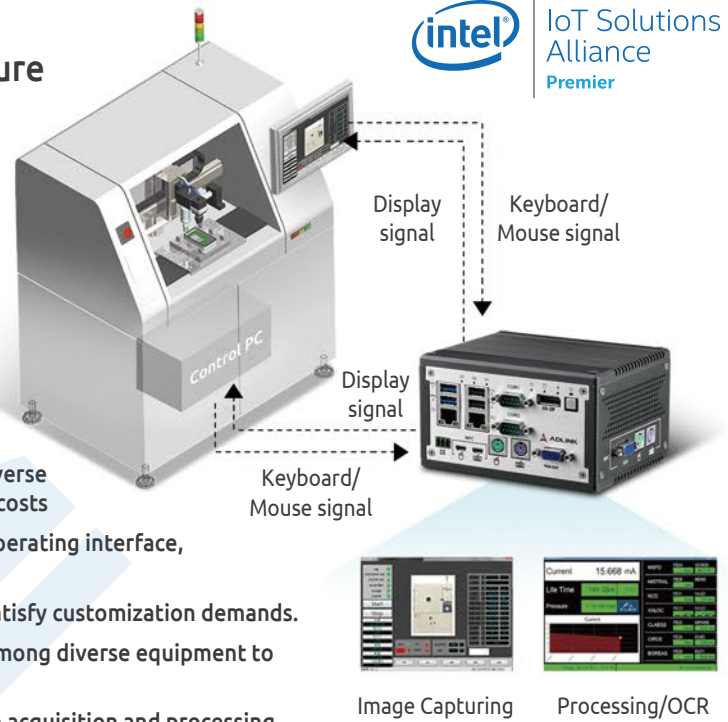
System Advantages

- Non-intrusive operation improves production line stability and increases production capacity.
- VGA interface uniformly transforms different data formats from diverse devices into standard data, expediting deployment and conserving costs
- During data extraction, no visual interference interferes with the operating interface, streamlining the process.
- Supports direct use of script for configuration in order to flexibly satisfy customization demands.
- Connecting to Vortex Data River™ enables real-time data sharing among diverse equipment to create a highly efficient management field.
- OCR based on deep learning algorithm delivers fully optimized data acquisition and processing, accelerating operations for precision data management and analysis

Image Capturing   Processing/OCR

Optoelectronic Application Sample Project

In an exemplary case, a manufacturer wished to implement integrated data acquisition and analysis incurring the lowest cost possible. Success, however, required extraction of data from multiple machine types, an operation that normally consumes massive engineering resources.

The large number of legacy devices supported no open API or log files and ran a practically obsolete OS, making them incompatible with current IoT architecture. ADLINK's full connectivity solution provided non-intrusive, low-risk data acquisition via OCR technology through HMI. Production remained stable throughout integration of OT (equipment) and IT (management) information, achieving true Smart enterprise architecture. Full digital automation of the operation was achieved with minimal labor and material costs, dramatically boosting competitive advantage.
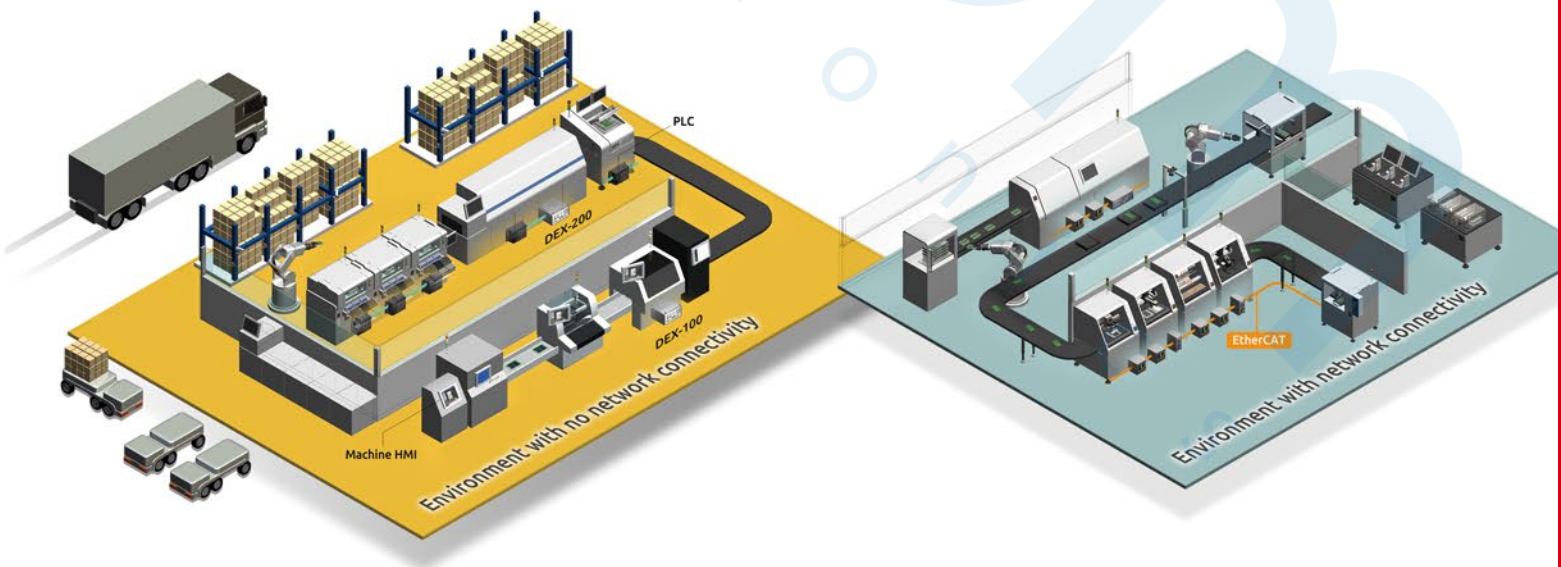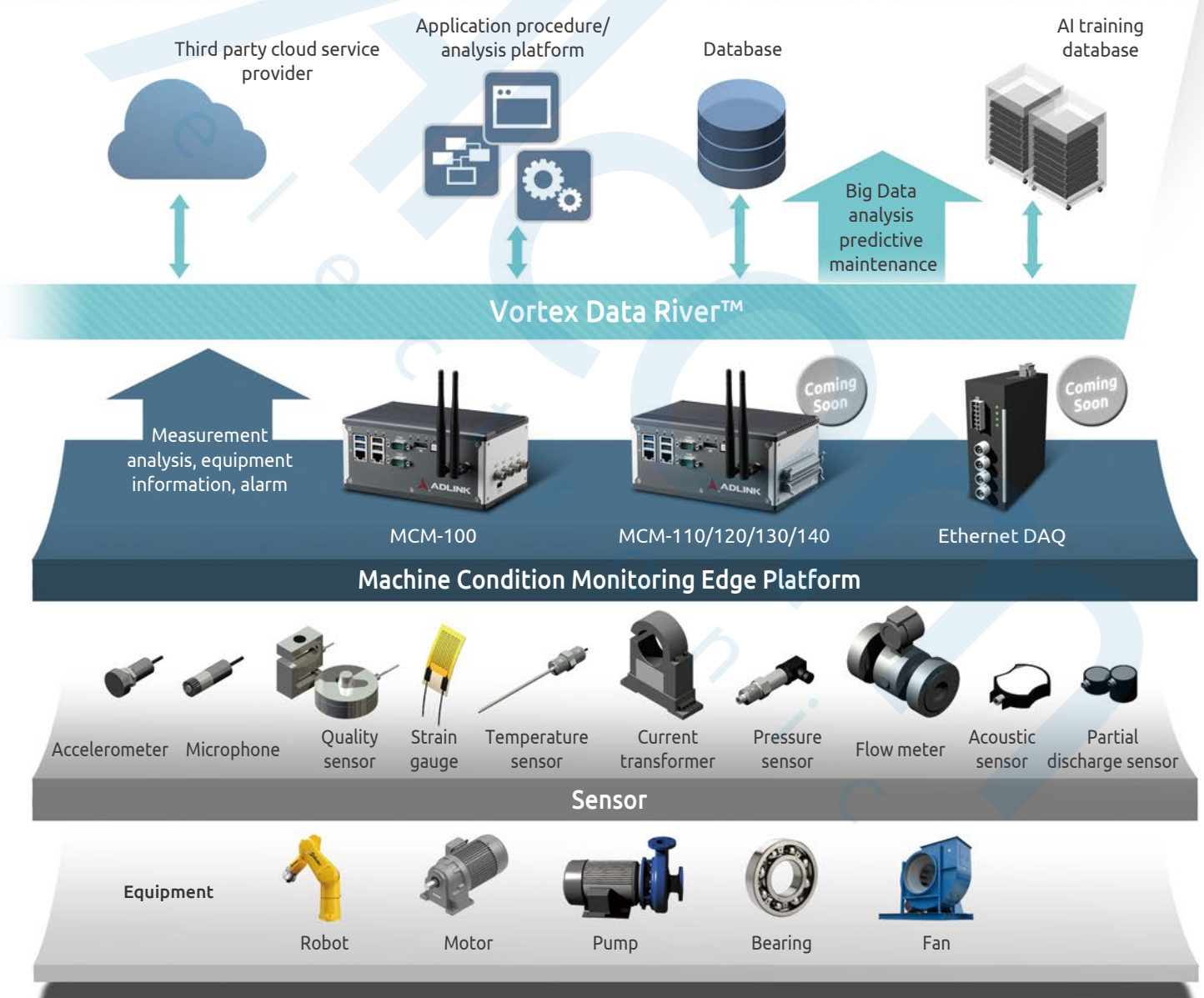
# Equipment Condition Monitoring and Predictive Maintenance
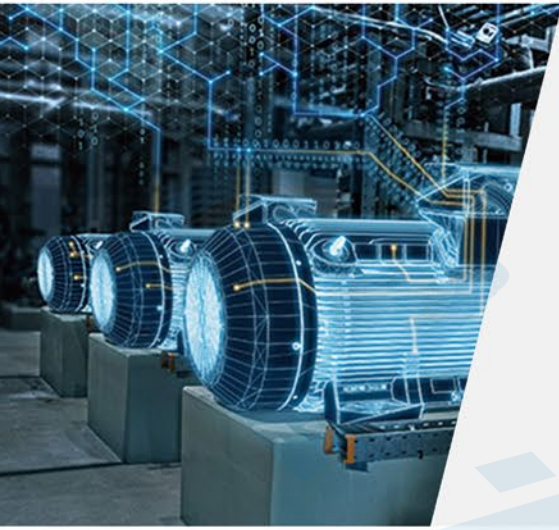
▌Edge computing accelerates real-time decision making and supports proactive maintenance

With implementation of Industry 4.0, vibration analysis algorithms supported by cloud server architecture enable easy prediction of potential problems to adopt preventive action. As well, equipment maintenance or replacement can be executed preemptively, significantly enhancing efficiency. ADLINK's innovative equipment status monitoring edge computing platform delivers complete and comprehensive data acquisition, analysis, and upload. The real-time analytics can be sent to the data center, by upload to the cloud and fast connection to the ERP/MES upper layer application system. Effective dynamic preventive maintenance strategies can be generated according to machine operation status in real-time, improving equipment reliability.

Third party cloud service provider

Application procedure/ analysis platform

Database

AI training database

Big Data analysis predictive maintenance

Vortex Data River™

Measurement analysis, equipment information, alarm

Coming Soon

Coming Soon

MCM-100

MCM-110/120/130/140

Ethernet DAQ

Machine Condition Monitoring Edge Platform

Accelerometer | Microphone | Quality sensor | Strain gauge | Temperature sensor | Current transformer | Pressure sensor | Flow meter | Acoustic sensor | Partial discharge sensor

Sensor

Equipment

Robot | Motor | Pump | Bearing | Fan

Simple, Speedy Deployment

Unlike conventional combination-based solutions, ADLINK's MCM-100 adopts an integrated design, providing complete data acquisition, highly accurate real-time analysis and data upload, along with connection to information database, for complete equipment status monitoring and analysis. Deployment in the environment is significantly streamlined, reducing development time.
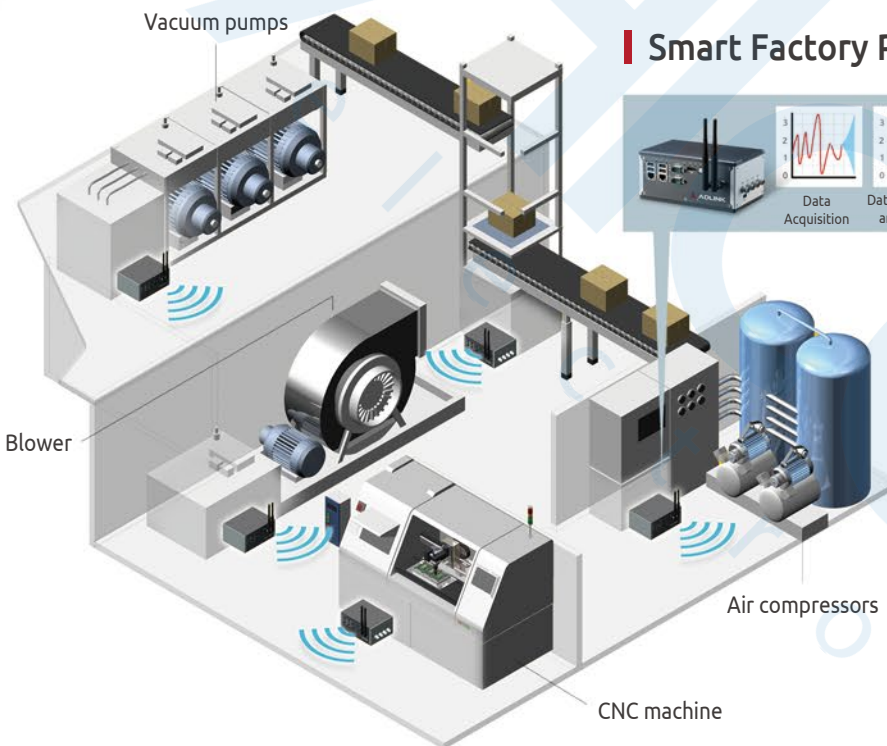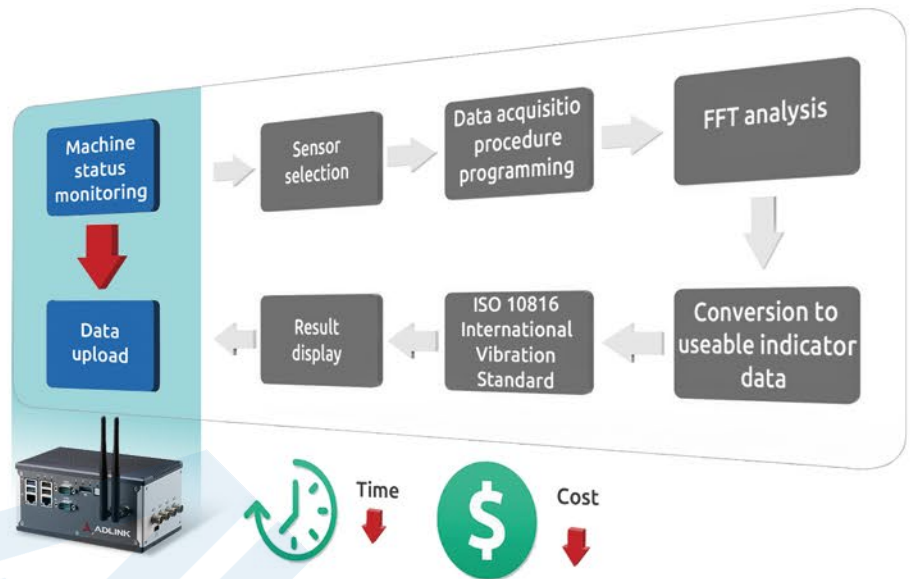
Smart Factory Predictive Maintenance
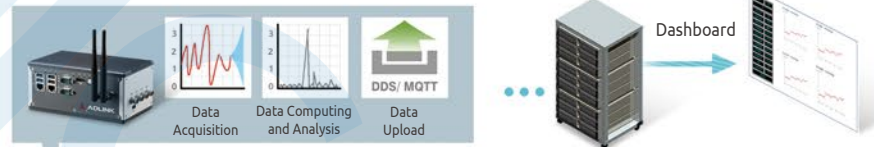
- Factory/Equipment management
- Alarm notification
- Historical data
- Viewable at mobile end

Lifting equipment, vacuum pumps, air compressors and other rotating machines are critical in a wide variety of manufacturing and processing operations. Any suspension of production due to machine error can represent prohibitive losses in revenue.

ADLINK's Smart equipment status monitoring solution improves dramatically on conventional manual monitoring methods, supporting 24-hour online monitoring and malfunction prediction such that precise control of equipment status can be achieved and real-time feedback maintenance provided.

Complete single-operation data acquisition, analysis and upload

Data acquisition, execution of domain algorithm, use of data analysis, direct conversion of machine status, use of trend analysis, warning alert and upload.

Seamless OT/IT end-to-end connection

Capable of connecting to Vortex Edge™ architecture, no programming is required to achieve fast connection with third party cloud platforms. Vortex Data Rive™ live data streaming architecture enables deployment of multiple scenes more easily.

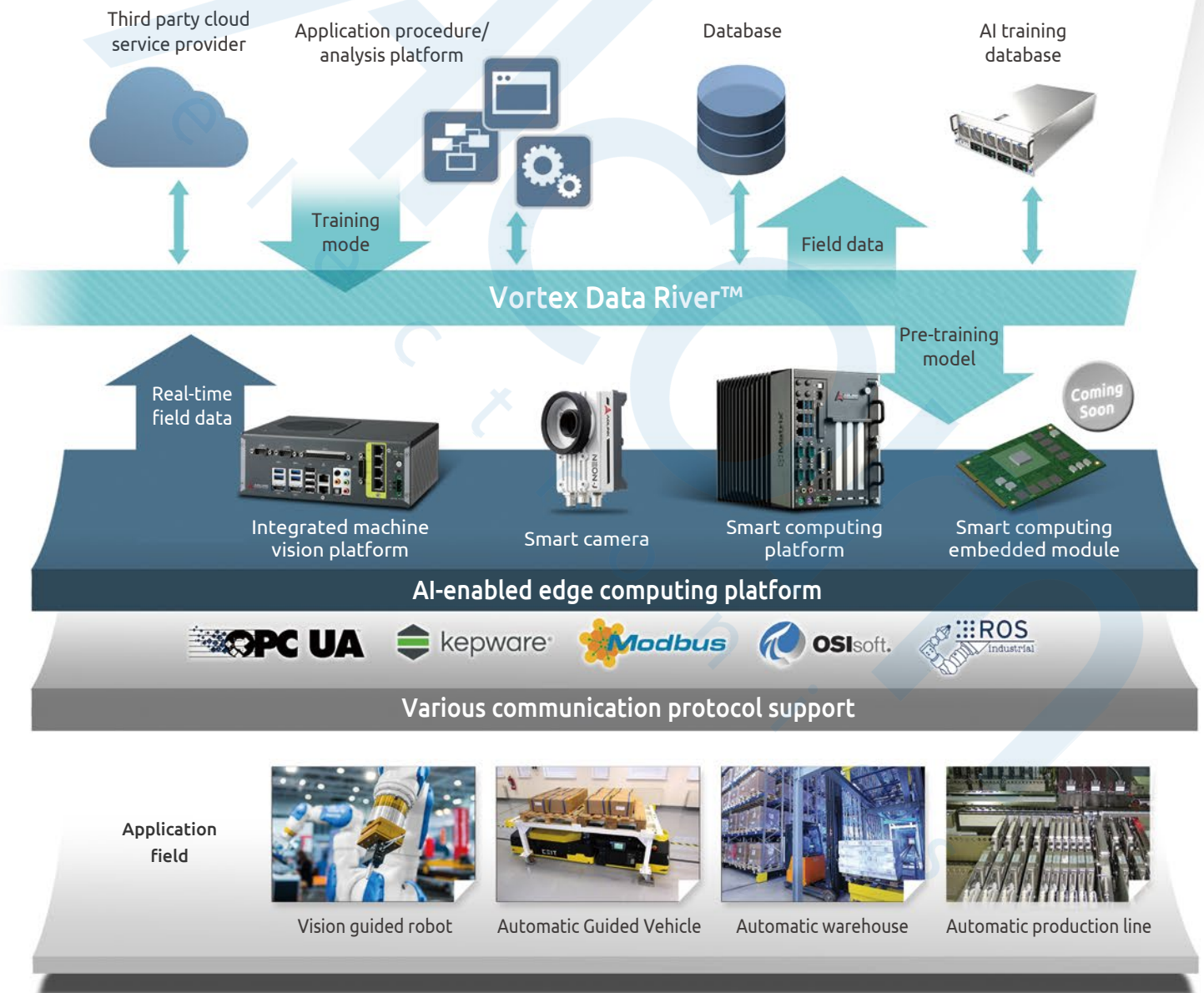### Remote equipment overview information dashboard

Providing equipment monitoring acquiring machine information, status, and alarm information in real time, with download of historical data records and equipment maintenance information fully supported.

AI-enabled Machine Vision

Automation machine
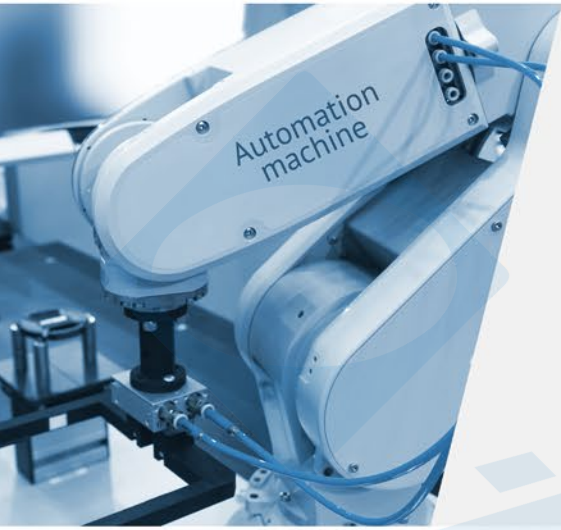
▍ Intelligent edge computing supercharges smart manufacturing

AI implementation in edge computing enables easy implementation of normally difficult production tasks such as customized quality inspection, detection of minute irregularities in textured surfaces, and labeling recognition for irregularly stacked cargo. Machine learning, cognitive services, image processing analysis, and other complex information management tasks can be performed at the edge to make adjustments in real time, Production equipment, unmanned vehicles, and complex robotics benefit from the increased stability, reduced latency, and enhanced efficiency provided in FoF operations, with accuracy increased through continuous training and significantly reduced development time.

Third party cloud service provider

Application procedure/ analysis platform

Database

AI training database

Training mode

Field data

Vortex Data River™

Pre-training model

Real-time field data

Coming Soon

Integrated machine vision platform

Smart camera

Smart computing platform

Smart computing embedded module

AI-enabled edge computing platform

OPC UA   kepware   Modbus   OSIsoft.   ROS industrial

Various communication protocol support

Application field

Vision guided robot

Automatic Guided Vehicle

Automatic warehouse

Automatic production line

The Real Machine Vision Solution

ADLINK provides a variety of machine vision platforms, featuring highly integrated edge computing, built-in deep learning modules, motion control function, and real-time connectivity. Implementation of the open architecture ROS2 standard supports thorough communication with robots from various manufacturers or AGV and equipment to realize the FotF ideal. The OPC UA communication protocol enables seamless communication among automation equipment, connecting and streaming image data through Vortex Data River™ to the cloud and, after analytics, the AI training server, empowering data-to-decision results. Adjustment of reaction ultimately improves accuracy of machine vision detection and optimizes production.

Open Architecture Supports a wide variety of popular AI platforms	**Supports a wide variety of AI-enabled machine vision utilities**	**Supports ROS2** Easy connection to robotic arms, AGV, and other equipment of different brands with ease
Automation Expert Superior expertise in automation, one-stop solutions, and fast line setup	**Edge Computing Capability**	**Supports OPC-UA** Equipment communication for PLC, I/O and movement control

Real-time Smart Decision Making, Realization of Smart Logistics

Al-enhanced edge computing is benefiting industry-leaders in manufacturing and e-commerce, empowering unmanned warehouse-, vehicle-, and drone-based operations. Having reshaped the profit model of the logistics industry, the technology has far surpassed the limits of conventional labor-driven environments and significantly increasing product picking accuracy. Smart shelves excel at the challenges of diverse product shipping, and edge machine vision platforms utilizing barcode, QR, and OCR, are able to ID and locate products much more accurately in real time. Upon encountering errors, notifications are issued instantly and directly to responsible personnel, product data is communicated in real time with no delays, and smart forecasting prevents continuous error and significantly increases logistics, picking accuracy, and shipping performance.

Connection of real-time data

Selection Guide

Machine Condition Monitoring Edge Platform

MCM-100	

System Specification	
Processor	Intel Atom® x7-E3950 processor
Video	1x DisplayPort
Memory	DDR3L 1066 SODIMM 2 GB
Storage	Factory installed 128 GB mSATA SSD
Ethernet	2x GbE LAN (Intel® I210-IT)
Serial Port	2x COM (2 x RS-232/422/485)
USB	2x USB 2.0 + 2x USB 3.0
Mini PCIe	2x Mini PCIe card slots
Wireless Kit (option)	Wi-Fi/4G LTE wireless kit
Power Supply	6 ~ 36 VDC, Optional 40W AC/DC adapter
Mechanical	
Dimensions	183 (W) x 110 (D) x 83.85 (H) mm
Construction	Full Aluminum Alloy
Mounting	DIN-rail/wall mountable
Environmental	
Operating Temperature	0 to 55°C (32 to 131°F)
Storage Temperature	-20 to 70°C (-4 to 158°F)
Humidity	approx. 95% @ 40°C (non-condensing)
Vibration	Operating 5 Grms, 5-500 Hz, 3 axes w/ mSATA SSD
ESD	Contact +/-4 KV, Air +/-8 KV
Shock	Operating 100 G, half sine 11 ms duration w/ mSATA SSD
EMC	CE & FCC Class B (EN61000-6-4/EN61000-6-2)

Vibration Measurement I/O Specification	
Channels	4CH
Resolution	24-Bit
Max. Sampling Rate	128 kS/s
Input Range	±10V
Input Mode	Diff/P-Diff
Input Coupling	AC/DC
IEPE Excitation Current	0 or 2mA (IEPE compliance: 24V)
Over-Voltage Protection	±60V
DC accuracy - Offset Error	Typical: ±0.15mV, Max. ±0.3mV
DC accuracy - Gain Error	Typical: ±0.15%, Max. ±0.3%
System Noise	50 µVrms
-3dB Bandwidth	0.49 * sampling rate
AC Cutoff	0.4Hz (-3dB), 2.4Hz (-0.1dB)
Flatness	±0.01 dB (20 Hz to 1 kHz)
CMRR	60 dB (20 Hz to 1 kHz)
Crosstalk	-100 dB
Dynamic Range	100 dB
SFDR	104 dB
THD/THD+N	94 dB/-91 dB
Trigger Source	Analog or digital, software selectable
Trigger Mode	Post, delay, middle, pre-trigger, re-trigger
Auto-Calibration	Yes
DIO	2 programmable function I/O
Software Support	
Operating System	Windows® 10 IoT Enterprise/ Windows®10 IoT Core

DEX Modbus I/O

	Digital I/O Module		Analog I/O Module	
	ND-6150	**ND-6160**	**ND-6117**	**ND-6124**
Channels	16	8	8	4
ASCII command & Modbus RTU	●	●	●	●
Communication speed	from 1200 to 115.2K			
Data flow control	●	●	●	●
Watch dog timer	●	●	●	●
Isolation protection	●	●	●	●

Data Extraction Edge Platform

DEX-100

System	
Processor	Quad-Core Intel Atom® processor E3950
Operating system	Windows 10 IoT Enterprise 64
RAM	DDR3L 1066 4GB/8GB
Storage	128GB SSD

I/O Interface	
	2x GbE LAN (Intel® I210-IT)
	2x COM (2x RS-232/422/485)
	2x USB 2.0 + 2x USB 3.0 + 2x Micro USB-Type B
	2x PS/2 input+2x PS/2 output
	2x isolated DI
	Display port

Power Supply	
DC Input	12-36 VDC
AC Input	Optional 40 W AC-DC adapter
LED indicator	Power/storage/WDT

Mechanical	
Dimension	140 (W) x 110 (D) x 80 (H) mm / 5.5(W) x 4.3 (D) x 3.1(H) inch
Weight	< 1kg
Construction	Full Aluminum Alloy
Mounting	Wall mount, DIN-rail

Communications	
Communication protocol	DDS (Distributed Data Service), REST API(Xml and JSON)
Field bus support	Modbus TCP/Modbus RTU

- **Data extraction via Optical Character Recognition (OCR)**
  - Up to 500 tags
  - Up to 30 extraction pages
- **Script Generation**
  - Over 50 script commands supported
  - Online and offline scripting supported
    (with offline reducing machine interference)
  - Pre-configured script loading for script deployment
- **Data extraction and user full machine control modes**
- **switchable by user via hard or soft control**
- **Event notification of machine alarm/warnings**
- **Data extraction summary page supports up to 500 rows of data**
- **Local Log File retained for up to 120 days**

DEX-200

System	
Processor	Intel Atom® x5-E3930 dual core processor
Operating system	Windows 10 IoT Enterprise 64
RAM	DDR3L 1066 2GB
Storage	64 GB SSD

I/O Interface	
Ethernet	2x Intel® GbE LAN
Serial Port	2x COM (RS-232/422/485, BIOS Selectable)
USB	2x USB 2.0 + 2x USB 3.0
Video	1x DisplayPort 1.2 (Support DP++)
DIO	2x isolated DI

Expansion	
Mini PCIe	2 x Full-size Mini PCIe slots
USIM	1x USIM slot for 3G/4G LTE communication

Power Supply	
DC Input	6-36 VDC
AC Input	Optional 40 W AC-DC adapter
LED indicator	x Pwr ready, 1x Storage, 1x WDT

Storage Device	
mSATA	1x full-size Mini PCIe slot
SATA III	1 x 2.5" SATA by storage kit (Optional)
Micro SD	1x Micro SD card slot (Up to 32 GB)

Mechanical	
Dimension	140 (W) x 110 (D) x 58 (H) mm
Weight	< 1kg
Construction	Full Aluminum Alloy
Mounting	Wall mounting, DIN-Rail

Software Support	
Data extraction method	PLC memory mapping
Mapping tool	PLC Mapping tool with Cheat engine
Maximum Extraction ROIs	1000 tags
Supported PLC	See supporting list
Data keep in local for Runtime	Yes, up to 30 days
Data Format	.CSV, Txt
Communication protocol and Interface	DDS (Distributed Data Service), REST API(xml and JSON), *MQTT
Field bus communication	Modbus TCP and Modbus RTU

Selection Guide

Smart Camera Selection Guide

	NEON-1021/NEON-1021-M	NEON-1020	NEON-1040
Smart Camera			
Processing & Memory			
Processor	Intel® Atom™ E3845 Processor, Quad Core @ 1.91 GHz		
Display	VGA output, max. 2048 x 1152 at 60 Hz		
RAM	4 GB DDR3L		
Storage	16 to 32 GB solid state drive		
Advanced Processing	LUT, shading correction, ROI, Muti-ROI, binning	ROI, LUT, shading correction	
Sensor			
Image Sensor	e2v EV76C570	CMOSIS CMV2000	CMOSIS CMV4000
Resolution	1600 x 1200	2048 x 1088	2048 x 2048
Sensor Size	1/1.8"	2/3"	1"
Format	Monochrome	Monochrome	Monochrome
Pixel Size	4.5	5.5	
Frame Rate (fps)	60	120	60
Shutter	Global		
Trigger Mode	External trigger, software trigger, free run		
I/O Interface			
Trigger Input	1x Opto-isolated trigger input		
Digital Output	4x sink type output, max sink 100mA sink voltage max 30V$_{DC}$		
Digital Input	4x TTL level input		
PWM Lighting Control — Drive Method	Constant current 500mA		
PWM Lighting Control — Applicable Light Units	24 V$_{DC}$ illuminators		
PWM Lighting Control — Dimming Resolution	1000:1		
Ethernet	1 x GbE		
Serial Communication	1 x RS-232 (TX and RX only)		
USB	1 x USB 2.0		
Mechanical			
Dimensions	68.5mm W x 110mm D x 52.7 mm H / 2.70" W x 4.33" D x 2.08" H		
Lens mount C mount	C mount		
Connectors	1 x M12 8-pin (Female), 1xM12 17-pin (Male), 1x M12 12-pin (Male)		
Software Support			
Operating System	Windows 7, Windows Embedded Standard 7		
Software Compatibility	MVTec Merlic, HALCON, Stemmer CVB, Cognex Vision Pro, Euresys Open eVision, Matrox MIL, Teledyne Dalsa Sherlock		
Environmental & Electricalions			
Power Consumption	24 V$_{DC}$ +/-10%, 13W (Typical)		
Operating Temperature	0°C to 50°C (32°F to 122°F)		
Vibration	Operating, 5 Grms, 5-500 Hz, 3 axes		
Certification	IP67, CE, FCC Class A		

*NEON-1021-M Series includes built-in MVtec MERLIC machine vision software

*Specific supported Linux version information available upon request

Embedded Vision Systems Selection Guide

Embedded Vision Systems	EOS-1300
CPU	Intel® Core™i7-6700 / Intel® Core™ i5-6500 / Intel® Core™ i3-6100 / Intel® Celeron® G3900
Chipset	Intel® H110
Operating System	Windows 7/10 64 bit
System Memory	Up to 32 GB DDR4 at 2133MHz
Video	2 display ports with resolution up to 4096 x 2160
Audio	7.1 channel audio via 5 jacks and S/PDIF output
Ethernet	2x GbE port
USB	4x USB 2.0 and 4x USB 3.0 ports (internal 1x USB 2.0)
COM Ports	1x RS-232/422/485 and 1x RS-232
Keyboard/Mouse	USB type
Camera Interface	4CH Gigabit PoE IEEE 802.3af compliant, total max. power output 32W
Digital I/O	12x isolated DI; 2x Encoder input; 16x isolated DO
Trigger I/O	4x Trigger I/O (Configurable)
Weight	3 kg(6.6 lbs)
Mounting	Wall and DIN rail mounting (optional)
Power Supply	DC 24V, ATX mode
Operating Temp.	0˚C to +55˚C (32˚F to 131˚F)
Humidity	0% to 90%
Dimensions	232W x 180.8D x 82.8H mm (9.1 x 7.1 x 3.2 in)
Power Consumption	Up to 165W
Storage	1x 2.5" SATA interface
Random Vibration	Operating 0.5 Grms, 5-500 Hz, 3 axes w/ HDD
Safety Compliance	CE/FCC, UL, RoHS