Breakout Session

Small, Performant, Versatile: How Siemens Uses New Intel Atom® x6000E Series Processors to Create the “Swiss Army Knife” of Industrial Computing

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What do you pack in your bag when you decide to go treasure hunting in the jungle?

… lightweight, yet performant equipment…

… that is flexible and adaptable to changing situations…

… that works in heat, supports you day and night and that doesn’t need to be maintained…
What if currently you are in a situation like treasure hunting in the new territories of automation: dig for productivity gold, hunt for greater customer satisfaction, claim new stakes?

- Reduced time-to-market
- Enhanced flexibility
- Optimize maintenance
- New business models
- Documentation of quality
- Security
- Intuitive user interface
- Data transformation into valuable insights
- Increase efficiency
- Improve quality
- Optimized failure search
- Optimize maintenance
Do you expect your automation tools to fully support you on that mission?

What if your industrial PC needs...
- to offer high performance in small space?
- to be at the same time flexible and expandable?
- to be maintenance-free and ensure operation up to 55°C ambient temperature?

Check out the new generation of Nano IPCs*

*Available from Summer 2021
If we say “swiss army knife”, we mean it: Nanobox 227G and Nanopanel 277G are designed to be used flexibly for the challenges of automation.

**Data Gateway**
- Acquisition, logging and evaluation of large amounts of data for the best possible decisions.
- Targeted error localization for machines and plants through process diagnostics.
- Using customer data for dynamic, preventive maintenance.

**Controller**
- Functions can be centrally expanded with ET 200SP modules.
- Integration of third-party software (e.g., image processing).
- Realization of short cycle times.
- Integration of complex algorithms.
- High program and data memory capacity.

**HMI**
- Combine production data from several machines for supervision.
- Exchange process data between systems.
- Production insights based on individual KPI calculations.

**Artificial Intelligence (AI)**
- Automatic assembling of products.
- Robotics learning.
- Visual quality inspection.
- Anomaly detection / Condition monitoring.
- Additive manufacturing.
- Autonomous systems.

**Industrial Edge**
- Processing, analysis and transfer of large amounts of data directly at the plant.
- Centrally controlled distribution of software to devices.
- Rollout of software and security updates.
- High-level language programming to implement new applications such as preventive maintenance.

**IPC Application**
- Add any user software e.g. for quality control, setpoint adjustments, safety documentation etc. additionally to the other applications to create a performant “all in one” system.
2x7G for data gateway, cloud connection and edge applications

Feature set supporting the application

- **Multi-network connection**: High connectivity for up to 3 network segments with 3 TSN capable Gb-LAN interfaces
- **5G ready**: due to flexible integration of 5G M.2 modules
- **Remote management**: allows quick and simple onboarding, updates, startup / shutdown / reset via Ethernet. OOB for monitoring and managing devices that are sleeping or shut down
- **Security hardened**: with TPM 2.0 for security-critical applications, secure boot, boot guard
- **Edge-enabled**: Simatic Industrial Edge preinstalled option
- **AWS/Azure certified**: (227E), planned (227G)

Industrial Edge Model
2x7G for mixed real-time applications

Feature set supporting the application

- **Synchronize machine controls** in closed-loop IoT systems with minimal latency using integrated real-time computing and time-sensitive networking (TSN) supported by Intel® Time Coordinated Computing (TCC), to prioritize real-time and non-real-time applications run in parallel.

- **Increased data integrity** with NVRAM module (remanence memory) and error correction code (ECC).

- Possibility to add 5G m.2 card to enable wireless communication.

- **Minimized downtimes** and reduction of maintenance and service effort with preinstalled diagnosis software.

- **Maintenance free** embedded technology, no fan and no rotating parts, battery-free operation possible.

- Windows 10 LTSC or Simatic Industrial OS (preinstalled option).

- Visualize on up to 3 HD displays.
2x7G for AI applications

Feature set supporting the application

- **Time series inference performance**: increased CPU performance and 3D graphics performance, up to 16 GB DDR4-RAM
- **Additional machine vision inference performance** by adding AI accelerator cards in M.2 format
- **AI and HMI combined**: 2x Display Port for on-site monitoring or engineering
- **Data input** via network (3x GbE) or directly on the device (4x USB 3.0) or by connection I/Os via ET200SP
- **Edge-enabled**: Simatic Industrial Edge preinstalled to connect to cloud or on-premise training resources
- **AWS/Azure compatibility** to connect to cloud training resources

Use Cases

**Process**
- Parameter optimization
- Optimized control
- Automatic optical inspection

**Production**
- Quality prediction
- Transporting goods autonomously
- Anomaly monitor
- Autonomous picking, packaging, palletizing, kitting

**Product**
- Defect detection
- Autonomous quality inspection
- Recognition & place

**People**
- Loading and unloading machines
- Supporting manual processes
- Mounting parts at multiple locations
Example architecture to bring AI to the shopfloor with IPC/Edge

SIMATIC EDGE Box

S7-1518 PLC

Data from PLC
Subset of raw data as required by dashboards

Quality Results
(offline files)

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Defect prediction – die casting process

Anomaly detection for die casting process to reduce costs

Anomaly detection of the process enables early prediction of product quality thereby reducing process costs associated with the defects.

Customer pain(s)
- Metal casting process usually presents high defect rate (2-4%)
- Due to unknown process parameters and conditions anomaly cannot be easily identified or predicted
- Further processing of defected parts are extremely costly (70+% processing costs)

Our approach
- Identify key process parameters affecting the throughput of die casting machine
- Reduce process costs by detecting and thus ejecting defective parts out of the production process
- Build and deploy machine learning model on edge to make real-time anomaly detection and defects prediction, feedback the result to PLC to prevent further production of defected parts

Customer value
- Early state quality prediction to avoid further process costs of defected products
- Optimize process and decrease defect rate
- Gain better visibility over process parameters and process anomalies
New from Summer 2021: SIMATIC IPC227G/277G
Fit for multiple use cases – individually or combined

**Value proposition**

- Increased compute performance and 3D graphics performance for parallel operation of control or HMI tasks on one device
- High connectivity for additional network segments with improved manageability and multi-monitor visualization
- Optimized for new automation concepts due to flexible integration of Wifi-, 5G- and AI-accelerator modules
- Minimized downtimes and reduction of service efforts because of robust, maintenance-free design with no rotating parts and diagnosis software
- Allows the quick and simple onboarding, updates, startup / shutdown / reset via Ethernet. OOB for monitoring and managing devices that are sleeping, shut down, or unresponsive.
- Improved for security-critical applications

**Key features**

**Performance**
- Latest Intel 2/4C-Atom processor
- Up to 16 GB DDR4-RAM
- Real-time computing with TCC and TSN

**Connectivity**
- 3x GbE ports, 2x Display Port, 4x USB 3.0

**Expandability**
- Externally changeable SSD, 2x M.2 module slots

**Diagnosis and Security**
- Diagnosis of board and components
- Secure Boot, Boot Guard, TPM2.0 option
- NVRAM Module (Remanence)
- Error correction (ECC)

**Operating System & software**
- Simatic Industrial OS
- Industrial Edge Runtime

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New from Summer 2021: SIMATIC IPC327G/377G

Multiple use cases - for cost-optimized applications

Value proposition

- Updated performance with cost-efficient features to run additional or more complex tasks (HMI, control, gateway functionality) in existing machine concepts
- High connectivity to new and legacy interfaces supported for cost-optimized plant setup
- Optimized for new digitalization concepts because of flexible integration of Wi-Fi, 5G and AI-accelerator modules
- Security by restricted BIOS settings especially for boot process
- Minimized downtimes and reduction of service efforts because of robust, maintenance-free design with no rotating parts, run-in tested and with diagnosis software

Key features

- **Performance**
  - Latest Intel Atom® processor with 2 GHz, burst to 2.7 GHz
  - Doubled to 16 GB DDR4-RAM

- **Connectivity**
  - 2x GbE ports (+1 reserved), 2x Display Port, 4x USB 3.0, 6x COM
  - Panel PC up to 22” single touch display

- **Expandability**
  - New: 2x M.2 module slots

- **Diagnosis and Security**
  - Diagnosis of board and components
  - Secure Boot

- **Operating System**
  - New: Windows 10 IOT Enterprise 2019
New dimensions of automation are out there – we offer reliable tools when you decide to leave the beaten track
Disclaimers

Performance varies by use, configuration and other factors. Learn more at www.Intel.com/PerformanceIndex. Performance results are based on testing as of dates shown in configurations and may not reflect all publicly available updates. See backup for configuration details. No product or component can be absolutely secure. Intel technologies may require enabled hardware, software or service activation.

Source: Intel. Claims based on a)SPEC CPU 2006 metric estimates based on Pre-Si projections and b) 3DMark11 estimates based on Pre-Si projections, using Intel® Pentium® J4205 as prior generation.

Configurations:
Performance results are based on projections as of September 1, 2020
Processor: Intel® Pentium® J6425 PL1=10W TDP, 4C4T Turbo up to 3.0 GHz
Graphics: Intel Graphics Gen 11 gfx
Memory: 16GB LPDDR4-3200
OS: Windows 10 Pro
Compiler version: IC18

Processor: Intel® Pentium® J4205 PL1=10W TDP, 4C4T Turbo up to 2.6 GHz
Graphics: Intel Graphics Gen 9 gfx
Memory: 16GB LPDDR4-2400
OS: Windows 10 Pro
Compiler version: IC18

Performance numbers are Pre-Si projections and are subject to change. Results reported may need to be revised as additional testing is conducted. The results depend on the specific platform configurations and workloads utilized in the testing, and may not be applicable to any particular users components, computer systems or workloads. The results are not necessarily representative of other benchmarks.

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Thank you for watching!