



DEDICATED SYSTEMS FOR INDUSTRY

www.ec-systems.pl

OUR STRENGTH IS FACILITATING COOPERATION BETWEEN SCIENCE AND BUSINESS



The mission of EC Systems is building a bridge between laboratory research and products ready to be released to the market. For this purpose, since the very beginning of the company's existence, we have been constantly cooperating with technical universities from around the world. Thanks to this close relationship we can use knowledge and experience of highly skilled engineers, competent not only in the fields of software development and electronics design, but also in mechanical engineering, mechatronics and physics. Additionally, the close relations with scientific centers give us possibility to conduct complex tests and simulations.

Tomasz Barszcz Ph. D.
President of the Board EC Systems



TABLE OF CONTENTS

- 04** Company profile
- 06** Dedicated systems for industry
- 08** Software development
- 10** Industrial electronics design
- 12** Technologies
- 14** Clients, Branches

COMPANY PROFILE

EC Systems is an expert in design and implementation of industrial systems for monitoring, diagnostics, testing and control. For over 15 years our solutions have been used all over the world, in all the key sectors of industry. We have completed a range of various projects, starting from solutions like battery management system for electric vehicles or electronic grenade fuse, through systems for windshield wipers engines end-of-line testing, condition monitoring of wind turbines and reciprocating compressors, systems for remote monitoring of railroad crossings, bus diagnostics, up to systems designed to manage entire power plants.

We offer:

- **Dedicated turnkey systems:** using our internal resources we can prepare the project plan, design the electronics, mechanics, low-level and high-level software with user interface, as well as perform assembly and commissioning,
- **Ready-made products:** software and devices for machine condition monitoring and diagnostics, data acquisition, signal conditioning and ultrasonic non-destructive testing,

- **Specialized services:** machine technical condition assessment, constant remote condition monitoring of machines.

We are **unique due to our independence, references from international corporations**, and:

- **Competences and broad experience** – we implement solutions designed for special purposes: database systems handling high frequency data, certified intrinsically safe systems (ATEX, EN 13980), systems with a high safety integrity level (SIL, DO-178B, DO-254), technologies used by military and police forces.
- **Close cooperation with technical universities from around the world** – we have access to academic know-how and laboratories. We can conduct complex and innovative research, tests and simulations.
- **High quality of products and services** - since the very beginning of the company's existence we have implemented and have been constantly improving a quality management system (ISO 9001:2008).

Over **15 years** on the market



Specialized team of:

- diagnostics engineers
- electronics designers
- software developers

Member of engineering holding of 500 people – **EC Grupa**



Close cooperation with **technical universities** from all over the world



DEDICATED SYSTEMS FOR INDUSTRY

We specialize in development of industrial systems for monitoring, diagnostics, testing and control. We are capable of designing from the basics, implementing and commissioning of a solution tailored to client's needs. We can also expand an existing system, ensuring technological integration and compatibility with already installed infrastructure.

The scope of our work includes:

- Electronics and mechanics
- Low-level software
- High-level software

We have our own, internal, specialized **industrial electronics design department** (analog and digital circuits) and an automated **manufacturing line**. Thanks to these capabilities we are able to design and build prototypes of even most complex and specialized electronic devices.

We develop the **embedded software** managing the electronics, and we have experience with microcontrollers from

various suppliers. Additionally, we have competences in the areas of **real-time systems** and programming the **FPGA** circuits.

We deploy **database systems** and analytical software handling high volume and high frequency data. We implement graphical user interfaces both for standard, desktop operating systems (Windows, Linux), as well as for mobile devices and touchscreens. Specialists working at our software development department have often more than ten years of experience.

We have experience in deploying systems designed for a very special purpose, i.a. intrinsically safe (e.g. mining, petrochemical industry, natural gas transmission), highly reliable (e.g. railway, aviation) and to be used by police and military.

Our main specializations:

- Monitoring systems
- Data acquisition systems
- Diagnostic systems

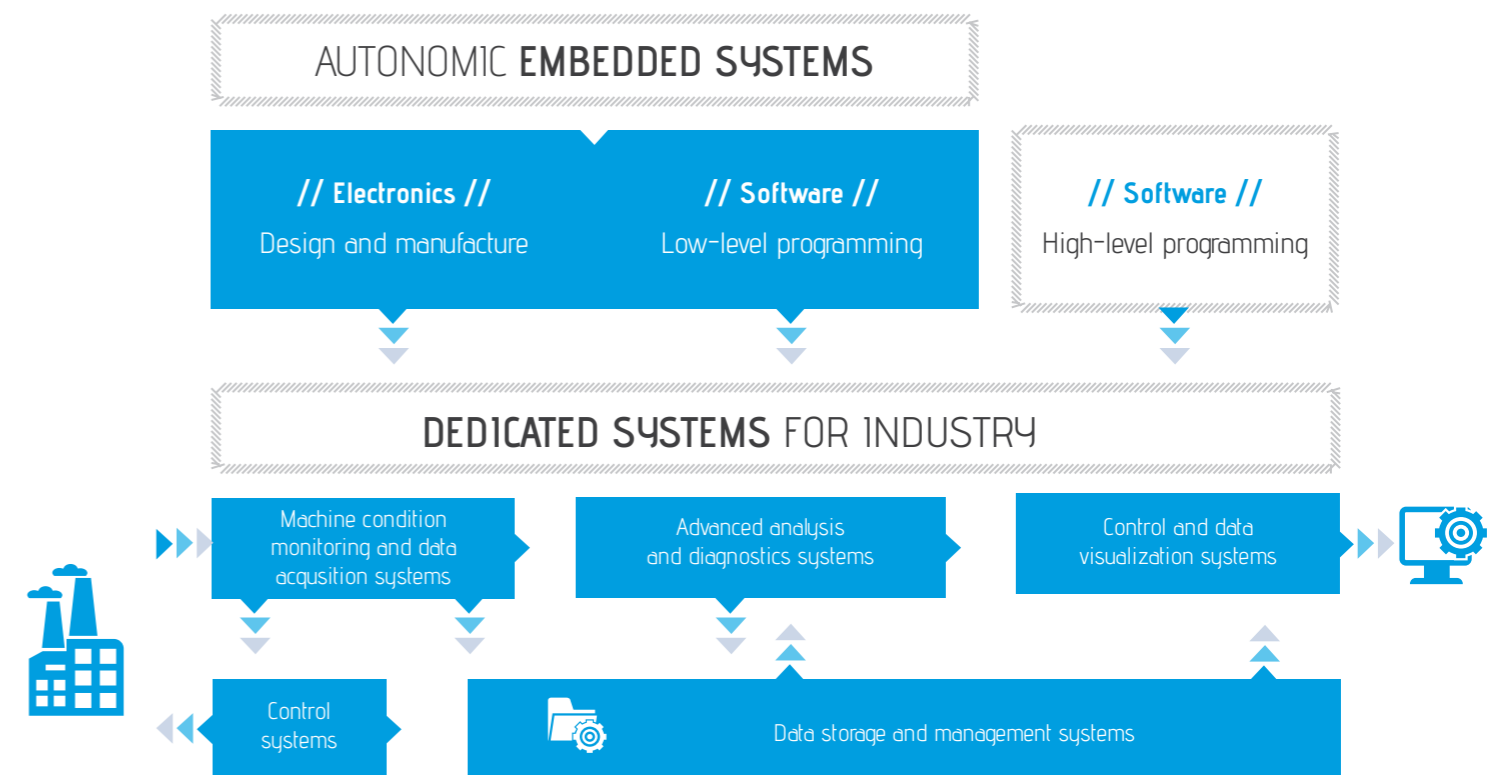
- Control systems
- Testing systems

Our systems are:

- **Reliable** – systems with high safety integrity level **SIL-2, 3, 4/DO-178B/DO-254**,
- **Safe** – certified intrinsically safe systems according to **ATEX** directive,
- **Energy-efficient** – low power consumption systems, including battery-powered,
- **Wireless** – designed for operation in harsh environment (i.e. underground),
- **Designed for special purpose** – systems for laboratories, military and police.

HOW DO YOU BENEFIT BY WORKING WITH US?

- 01** All competences under one roof
- 02** Access to qualified staff
- 03** Experience proven by references
- 04** Lower research and development costs
- 05** More resource flexibility
- 06** Individual approach, friendly contact



SOFTWARE DEVELOPMENT

We specialize in design and development of software for industrial purposes. Besides of ready-made products, we design new systems, tailored to client's individual needs, as well as we develop existing solutions from other vendors.

We have competences in the following areas:

- **development of low-level software to manage embedded systems.** We have experience with microcontrollers from various vendors (i.a. Atmel, TI, Microchip). We have competences in real-time operating systems (i.a. RTX, QNX, RTOS) and FPGA programming (VHDL, Verilog).
- **designing of database systems used for monitoring and handling big amounts of data (Big Data).** We have implemented autonomous systems based on the ARM architecture, as well as enterprise class solutions using Oracle and MSSQL database engines. We have competences in development of platform-independent analytical software using programming

languages such as .NET, C/C++, JAVA, etc.

- **development of systems for data visualization and presentation.** We create interfaces for desktop PCs based on Windows or Linux, as well as for mobile devices (e.g. Android). We have competences in designing applications suited for touch screens.

We are distinguished by:

- qualified staff with more than 10 years of experience,
- knowledge about specific technologies used in the industry (MOD-BUS, KWP2000),
- ability to work in and integrate with Matlab and Labview environments,
- competences to develop software according to the following standards: SIL-2, 3, 4/DO-178B/DO-254,
- versatility, our systems operate on land, in water and underground.

AMONG OTHERS, OUR PROJECT PORTFOLIO INCLUDES:

- **maintenance and diagnostics center** for railway subsystems,
- **autonomous diagnostic system** for buses,
- **vibration-based condition monitoring system** for wind turbines capable to handle hundreds of machines,
- **control and diagnostic system** for shearer loaders,
- **laboratory system** for exhaust gas analysis.



We **develop new systems**, as well as **integrate** existing

systems coming from **third party vendors**.

INDUSTRIAL ELECTRONICS DESIGN

We have a team of highly qualified professionals, who design and manufacture specialized electronic and mechatronic devices. It is our advantage to have our own, automated manufacturing line for analog and digital circuit assembly. This means, that in case of small and medium production volume we are totally independent from external subcontractors. We also offer electronics contract assembly. In our activity we focus mainly on the industrial market, with emphasis on systems for monitoring, diagnostics and control of machines and devices.

We have unique skills in designing:

- Circuits handling high volume of measurement data,
- Intrinsically safe devices, **ATEX certified**, for operation in an explosive atmosphere,
- Systems for **non-destructive testing** using ultrasounds,
- Devices for military and police, including elements of weaponry.

In the process of designing systems and devices we use the newest CAD/CAM technologies. We prepare simulations of electronic circuits before they are assembled, which helps to eliminate potential errors in advance. When designing enclosures, we prepare 3D models, which take into account ergonomics and user comfort.

For many years the company specializes in using piezoelectric elements in measurement applications (vibration and acoustic emission measurement) and now we are the leader in this area on the European market. Our systems and devices work as elements of bigger systems used in industrial, aviation and research applications. EC Systems continuously invests in research and development related to electronics, automation and industrial condition monitoring.

AMONG OTHERS, OUR PROJECT PORTFOLIO INCLUDES:

- **Battery management system** for electric vehicle,
- **Autonomous sensor** for inclination monitoring of high voltage power lines,
- **Wireless system for pressure monitoring** in powered roof supports used in mines,
- **Ultrasonic non-destructive testing system** for wall reinforcement anchors used i.a. in tunnels, foundations, retaining walls,
- Port quays **monitoring system**.



All our efforts are targeted towards delivery of reliable and **ergonomic products**, which meet our clients' needs.

TECHNOLOGIES



Our products are designed

according to **top quality and safety standards.**

// Electronics //

Analogue circuit

Linear analogue circuit

- DC band up to 2MHz
- Low-pass, high-pass and band-pass filters; active/passive
- Analog signal amplifying in range from 1 to 10000
- Specialized high impedance input circuits, charge amplifier circuits
- Input circuits for precise A/D processing
- D/A processing in band, up to 2,5 MS/s

Digital circuit

Microcontrollers

- Atmel: AT80C51, ATmega, AVR32, ARM7, ARM9
- Analog Devices: ADuC, BlackFin
- Texas Instruments: MSP430, TMS320
- Microchip: PIC 8/16/32 bit, DSPIC
- Freescale/Motorola, STMicroelectronics, NXP

A/D Processing

- 8 to 24 bit
- Frequencies up to 2,5 MHz
- Parallel processing up to 64 channels (24bit/100kHz/channel)

Digital signal processors

- TMS320 (Texas Instruments)
- C6000 (Motorola)

FPGA

- Xilinx (Spartan 3 i 6) + VHDL/Verilog programming

Communication Bus

- ModBus RTU, ModBus TCP
- Hart, Can, GSM/GPRS
- Radio band 433 MHz, 2.4 GHz

PCB

- Number of layers from 1 to 16
- Housings SMD – 0402, QFN, BGA
- Line impedance adjustment
- Differential pairs impedance adjustment
- Group delay optimisation on parallel buses
- Microwave circuits

Electronics manufacturing

- Manual assembly
- Solder paste and glue screen printing
- Automatic assembly
- Solder paste and glue dispense
- Wave soldering
- CNC Treatment
- Climate chamber

Standards

- ATEX, RoHS, IEC 61508, ISO 14 000, Ministry of the Interior license

Design software

- Altium Designer
- AutoCad

// Software //

Industrial computers

Architectures

- X86
- ARM Cortex-A (Ti Sitara AM3359, Freescale i.MX51)
- ARM Cortex-M (Cortex-M3 and M4)

Real-time systems

- Windows Embedded
- RTX
- QNX
- RTOS

Skills

- OS installation and configuration on customized HW platform
- Knowledge of tools for: developing, programming and debugging
- Ability to develop applications without OS (bare-metal programming)

Programming languages

.NET

- User interfaces: WinForms, WPF, XBAP, ASP.NET, Steema, DevExpress, Telerik
- Communication: WCF, .NET Remoting, TCP/IP, Web Services
- Communication protocols: MODBUS, OPC UA, KWP2000, SAEJ1939
- Tests: NUnit, MSTests, MSBuild, NAnt, CruiseControl
- Databases: ADO.NET, SQLite, NHibernate, Entity Framework
- Other: Add-ins and Extensibility, Matlab Compiler Runtime, XPath, XSLT, XSD

C/C++

- User interfaces: WinForms, Stingray Grid, BCG, National Instruments Tools
- Communication: TCP/IP, RS232, RS422, RS485, RPC, OPC
- Communication protocols: MODBUS, ADAM (ADVANTECH)
- Databases: PI, iHistorian

Java SE / EE / ME / FX

- User interfaces: GWT, SmartGWT, Android enabled
- Frameworks: Eclipse, Netbeans, Spring, REST, JMS
- Communication: TCP/IP, RS232, RS422, RS485
- Databases: Hibernate, JDBC, JavaDBF

Databases

Engines

- MS SQL Server 2005-2012
- OracleDB 10g, 11g
- MySQL
- SQLite

Skills

- Database server management
- Database designing (OLTP i OLAP)
- SQL Queries optimisation
- Programming in languages: T-SQL, SQLCLR, PL/SQL
- Librarians in languages C#, C++, Java

Operating systems

- Windows XP/Vista/7/8; Windows Server 2003/2008; Linux/Unix/Solaris

Other

- Languages: HTML5; Software: Matlab, Labview, DasyLab

WE WORK FOR CLIENTS LOCATED WORLDWIDE

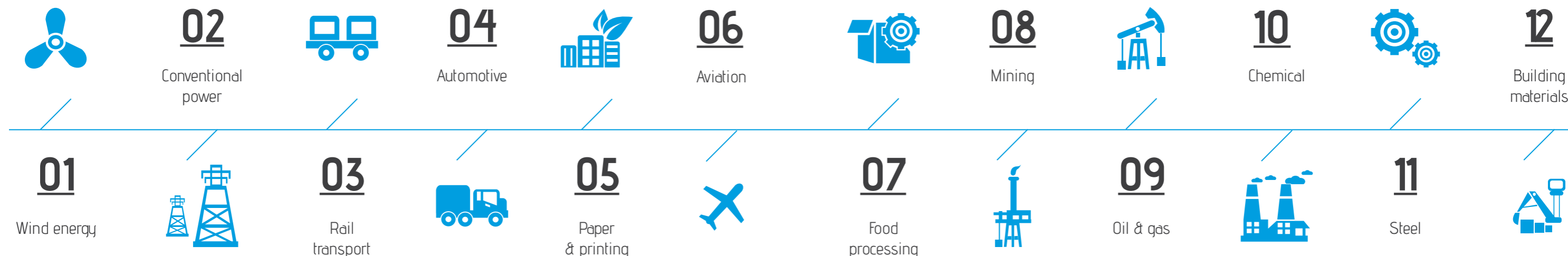
Clients

- Alstom Power
- Bombardier
- Energobaltic
- Famur
- FEV
- Grupa Azoty
- LMS
- MTU Aero Engines
- RR Donelley
- Solaris Bus & Coach
- Thales
- Valeo

University partners:

- University of Science and Technology
- Cetim
- Danmarks Tekniske Universitet
- Fraunhofer-Institut für Produktionstechnik und Automatisierung IPA
- Grenoble INP
- INP Toulouse
- INSA de Lyon
- Air Force Institute of Technology
- Warsaw University of Technology
- Wrocław University of Technology
- The University of Sheffield
- UTC - Université de Technologie de Compiègne

WE OFFER SOLUTIONS FOR VARIOUS INDUSTRIES





EC Systems Sp z oo
Lublanska 34
31-476 Krakow

Tel:
+48 (12) 627-77-40

Sales:
+48 (12) 627-77-23

info@ec-systems.pl
www.ec-systems.pl



Follow us on LinkedIn:
www.linkedin.com/company/ec-systems