

Enso d.o.o.

Automation, Controlling and supervision systems
Industrial automation and Custom made machines



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Activities of company ENSO :

- Design, programming, testing and commissioning of automated production lines.
- Visualization and supervision of production processes, creating reports based on collected data.
- Central monitoring systems for production and infrastructure (temperature, humidity, pressure, level, weight, flow etc.)
- PLCs (Programmable Logical Controller) control systems and solutions for production and process automation.
- Upgrade of machines with new functions, possible increase of production capacities etc.
- Design and technical documentation for automated systems - control and regulation.
- Designing and manufacturing feeder systems (bowl, linear, climbing, step), hoppers, separators
- Web applications development

Projects and references:

	Delivered:	
• Automation and control line for plastics injection and processing of auto door interior (EKB Braunau)	2008	
• Upgrade of PLC automated machines (SELK Kutina)	2008	
• Upgrade of PLC automated machines (ALMOS Kutina)	2009	
• Monitoring of boiler room (DARUVARSKA PIVOVARA, Daruvar)	2009	
• System for weight measurement of ultrasound washing tubs, data processing and Visualization (SELK, Kutina)	2009	
• Automation and visualization of sorting and redistribution of Body shells (AUDI, Neckarsulm)	2009	
• Automation and integration of production Body shells "Mini" in line for production of "BMW X3" (MAGNA, Graz)	2009	
• Automation and integration of production line for production of body shells "PEUGEOT" (MAGNA, Graz)	2009	
• Program for conducting regular maintenance "PROS" (HESPO, Prelog)	2009	
• Supervision and visualization of infrastructure plants, data analysis, messages and alarms (SELK, Kutina)	2010	
• Programmierung und Inbetriebnahme der Karosserierückwandstation "MINI" (MAGNA, Graz)	2010	
• PLC programming, design and production release of a assembling machine for supporting the Temperature regulation device (Elektro kontakt, Zagreb)	2010	
• Programming and commissioning of the "MINI" body rear cover station (MAGNA, Graz)	2010	
• Integration of welding station and optical contact parallel checking stations (Elektro kontakt, Zagreb)	2010	
• Program for conducting regular maintenance "PROS" (Elektro kontakt, Zagreb)	2010	
• Automation and supervision of time intervals of the drying and cooling process (SELK, Kutina)	2010	
• Visualization, data acquisition and processing of the line for "Energy regulation switch" (Elektro kontakt, Zagreb)	2010	
• Connecting soldering machines with automating belts for transport of incoming material (SELK, Kutina)	2010	
• Programming and production release of a windshield reinforcement unit of a body shell "MINI" (MAGNA, Graz)	2010	

• Automation, visualization and control of the washing process in acetone (SELK, Kutina)		2010
• Programming and production release of the unit for preparing and assembling car body roof "MINI" (MAGNA, Graz)		2010
• Oil and water adding regulation for centrifuges on grinding (SELK, Kutina)		2010
• Measurement function upgrade on the line for "Energy regulation switch" (Elektro kontakt, Zagreb)		2010
• Design and construction of a machine for blow-off, drying and cooling – blower and tunnel oven (SELK, Kutina)		2010
• Controlling temperature for "LONG"(SELK, Kutina)		2011
• Visualization, data acquisition and processing of the line 8 for "Energy regulation switch" (Elektro kontakt, Zagreb)		2011
• Design and construction of a machine for electric component pasivation - automated machine (SELK, Kutina)		2011
• Data acquisition and processing and visualization of soldering machines (SELK, Kutina)		2011
• Visualization, data acquisition and processing of the line 4 for "Energy regulation switch" (Elektro kontakt, Zagreb)		2011
• Design and construction of a machine for disposition, drying and cooling – tunnel oven (SELK, Kutina)		2011
• Design and construction of a special board with electrical units for measuring devices (SELK, Kutina)		2011
• Design production release for the "Shaft carrier production line" (BMW, Dingolfing)		2011
• Design and construction of regulated drying system of metallization on electronic components (SELK, Kutina)		2011
• Design production release for the "Shaft carrier production line" (BMW, Dingolfing)		2011
• Automation and visualization of 6 machines for rounding electronic components (SELK, Kutina)		2011
• Programming and production release of oven for annealing steel turbine motor parts (General Electric, Mađarska)		2012
• Programming and commissioning of temperature control in the mushroom chamber (Gljivara Križanić, G. Bogićevci)		2012
• Design and production of electronic component seeding machine (SELK, Kutina)		2012
• Programming and production release of a production line for car engaging battery (TKSE, Hohenstein; BMW, Dingolfing)	2012/13	
• Visualization, data acquisition and processing of the line 2 for "Energy regulation switch" (Elektro kontakt, Zagreb)		2013
• Design and construction prototype machine for cleaning gitters (Epcos Croatia, Kutina)		2013
• Programming and production release of a stations for making carrier shaft for "S" clase (Mercedes, Stuttgart)		2013
• Design and construction machines for separation galvanized elements with permanent magnets (Epcos Croatia, Kutina)	2013/14	
• Design and construction machines for cleaning "gitter" (Epcos Croatia, Kutina)		2014
• Design and construction machines for cevap		2014
• Programming and commissioning of control container for server space for SHELL Nigeria (EMERSON, Zagreb)		2014
• Upgrade control, flow, temperature, wetness and data on machine "LAKI" (SELK, Kutina)		2014
• Programming and production release of a production line for AUDI body (AUDI, Ingolstadt)		2014
• Automation and integration of production cells for PVC filler for AUDI body (AUDI, Ingolstadt)		2014
• Programming and production release of machines for mounting energy switches (Elektro kontakt, Zagreb)		2014
• Programming of the device to verify the correctness of digital switches with 5 tracks (Elektro kontakt, Zagreb)		2015
• Programming and commissioning of the final assembly line of cars (BMW, Dingolfing)		2015
• Programming and optimization of the device to verify the correctness of analog switches (Elektro kontakt, Zagreb)		2015
• Upgrading control motion of the belt and turning drum separator beads (SELK, Kutina)		2015
• Visualization of the output lines via a web server and display it on a large screen (Elektro kontakt, Zagreb)		2015
• Design and manufacture of machines for the passivation of electronic components - coating components in monitored		2015

atmosphere (KEKO Varicon, Žužemberk, Slovenija)	
• Programming and commissioning of control container for server space for SHELL Nigeria (EMERSON, Zagreb)	2015
• Upgrading of two-handed management control to machines for screening (SELK, Kutina)	2015
• Programming and commissioning of control containers of Communications for Finland (EMERSON, Zagreb)	2015
• Design and manufacture of belt conveyors for transport of glass solar panels - Solvis Varaždin (ATINEL, Varaždin)	2015
• Programming and commissioning of an assembly line for marks and decorations (AUDI, Ingolstadt)	2016
• Reconstruction, repair and upgrade of an elasticity meter for spring quality control (AURORA, Čazma)	2016
• Visualization, collecting and processing of data from "line 8" on a energy regulation switch (Elektro kontakt, Zagreb)	2016
• Automation conveyors and CNC milling machine for the purposes of education (RITEH, Rijeka)	2016
• Programming and visualization of final assembly for BMB South Africa (SAR Elektronik, Dingolfing)	2016
• Electrical design and manufacture of EPLAN for the BMW Landshut, project 3D Printing parts (MULTINORM, Cerna)	2016
• Design and manufacture of belt conveyors for transport of glass solar panels - Solvis Varaždin (ATINEL, Varaždin)	2016
• Programming and commissioning station for lateral side of the BMW made of carbon fiber (MULTINORM, Cerna)	2016
• Programming and commissioning of the production line for the hood of the Jaguar in Albersdorf (WIET, Kirchberg-Austrija)	2016
• Programming and commissioning the machine for hydro design - making expansion joints (SPIROFLEX, Ruščica)	2016
• Carbon Cutting Programming and Commissioning for the i-Series Electric Car (BMW, Landshut)	2017
• Reconstruction of material tearing machine and spring testing (ESCO, Bjelovar)	2017
• Design and manufacture electronic component marking machine (TDK Šumperk, Czech Republic)	2018
• Design and manufacture of machines for the exclusion, counting and packaging of electronic components (TDK Croatia, Kutina)	2018
• Design and production of machine for control and packaging of electronic components (TDK Croatia, Kutina)	2018
• Programming and commissioning of the bodywork finishing line at the paint shop (Audi, Ingolstadt)	2018
• Programming and Commissioning of the Completing Line (BMW, Dingolfing)	2018
• Programming and Commissioning of a Robotic Station for Optical Body Gap (BMW, Dingolfing)	2018
• Programming and Commissioning of Body Swivel Brackets (BMW, Dingolfing)	2018
• Design and manufacture of machine for control and packaging of electronic components (KEKO Varicon, Žužemberk, Slovenia)	2018
• Design and development of the gluing machine (TDK Šumperk, Czech Republic)	2019
• Design and production of electronic components rewinding machine (TDK Croatia, Kutina)	2019
• Design and production of a machine for mixing production traps (TDK Šumperk, Czech Republic)	2019
• Design and production of a machine for optical control and packaging of plastic components (Tomplast, Slovenia)	2019
• Design and production of bowl and linear feeder (EGO, Zagreb)	2019
• Programming and commissioning of the assembly line for inverter units for e-vehicles (Valeo Siemens eAutomotive, Veszprem)	2019
• Automation of hand pallet truck, design and manufacture of electrical cabinets (ROMB, Zagreb)	2019
• Circular vibrators for transmission and routing of nuts M6 and M8 (Vedriš, Bjelovar)	2020
• Pneumatic vibrating feeder (AM Pneumatik, Tuzla)	2020
• KOTRA - Machine for ejection of electronic components (TDK, Kutina)	2020
• Drawing of EPlan for Daimler Kamenz	2020
• Design and manufacture of a machine for optical inspection of plastic components (EGO, Zagreb)	2020

• Designing and manufacturing of a vibrating feeder system for hooks, (Pneo Kolman, Sveti Ivan Zelina)	2020
• Design and manufacture of a machine for optical control of components (EGO, Zagreb)	2021
• Design and manufacture of the vibratory feeder system, (PROEL Automatizacija, Zagreb)	2021
• Design and manufacture of a grinding machine (Končar D&ST, Zagreb)	2021
• 3D print of the ship model 1200, (FSB, Zagreb)	2021
• Development of a system of vibrofeeders for plastic housings, (Experio, Slavonski Brod)	2021
• Development of a vibrating feeder system for metal parts, (SCAI Adapter, Brod, Bosnia and Herzegovina)	2021
• Design and manufacture of a machine for drying electronic components, (TDK Croatia, Kutina)	2021
• Development of a vibrating feeder system for rubber parts, (Experio, Slavonski Brod)	2021
• Design and manufacture of a machine for dispensing and packing springs, (Esco, Bjelovar)	2021
• Programming and commissioning of the battery packaging line, (BMW, Dingolfing, Germany)	2021
• Production of vibrofeeder for fibers, (DIATEH, Lučko)	2022
• Manufacturing of vibrating feeders for needles, (GITEH, Kamnik, Slovenia)	2022
• Design and manufacture of gluing machine, 2 pcs (TDK Šumperk, Czech Republic)	2022
• Design and manufacture of a machine for mixing production pastes (TDK Croatia, Kutina)	2022
• Production of vibrosystem for stators and rotors, (Experio, Slavonski Brod)	2022
• Design and manufacture of a machine for optical control of teeth segments, (Metalprodukt, Odra)	2022
• Production of bowl feeder for copper pieces, (ASEMO, Vrbovec)	2022
• Upgrade of the Gluing station machine with measuring equipment (TDK Šumperk, Czech Republic)	2022
• Production of linear vibrators for stators and rotors (Experio, Slavonski Brod)	2022
• Production of vibratory feeders for metal elements (BOST Industrial SRL, Sibiu, Romania)	2022
• Production of vibrofeeder for plastic elements (Experio, Slavonski Brod)	2023
• Production of bowl feeders with hoppers for metal rings and step feeders for plastics (Strojotehnika, Zagreb)	2023
• Design and manufacture of a machine for gluing and stacking PTC heaters (TDK Šumperk, Czech Republic)	2023
• Designing and making a machine for dosing individual balls and springs to the tube (ESCO, Bjelovar)	2023
• Programming and commissioning of the battery assembly line for e-vehicles (BMW, Leipzig, Germany)	2023
• Programming and commissioning of the package logistics line (Element Logic, Frankfurt, Germany)	2023
• Retrofit of the line for packing bottles into carriers (DW Reusable, Hum na Sutli)	2023
• Design and production of feeder system for GFP elements (SENSATA, Sofia, Bulgaria)	2024
• Design and manufacture of a machine for applying the declaration to bags (PROEL automatizacija, Zagreb)	2024
• Retrofit lines for bending iron columns for bumpers (Fracasso, Rijeka)	2024
• Production of a feeder system for metal covers, plastic spacers and springs (BOST Industrial SRL, Sibiu, Romania)	2024
• Design and manufacture of reel rewinding machine (TDK Croatia, Kutina)	2024
• Manufacturing of vibrators for giraffe neck clamps (EGO, Zagreb)	2024
• Production of vibratory feeders for blisters (GUMACO SA, Perroy, Switzerland)	2024
• Designing and manufacturing devices for measuring spring force (Končar, Zagreb)	2024
• Designing and manufacturing of a machine for testing solderability by immersion (TDK Croatia, Kutina)	2024
• Production of vibration feeders for axles (EGO, Zagreb)	2024

• Retrofit bending machines for sheet metal (Limarija Baranček, Lipovljani)	2024
• Design and construction of a semi-automatic contact soldering machine (TDK Croatia, Kutina)	2024
• Construction of a vibratory feeder for "FCI Lock" (GRUNDFOS, Indija, Serbia)	2024
• Development of a web app. for insulation measurement with data processing (EXPERIO, Sl. Brod / KNAUF Insulation, Škofja Loka, Slovenia)	2024
• Development of a web app. for galvanizing current measurement with data processing (TDK Croatia, Kutina)	2024
• Design and construction of a machine for stacking insulation (EXPERIO, Sl. Brod / KNAUF Insulation, Škofja Loka, Slovenia)	2025
• Construction of a vibratory feeder for sheet metal pieces (ESCO, Bjelovar)	2025
• Construction of a vibratory feeder for screws (EGO, Zagreb)	2025
• Conversion of a vibratory feeder into a counter for packing screws and dowels (Obrt Sanader, Zagreb)	2025
• PLC programming in the Welding Technology Center BMW Dingolfing (SAR Electronic, Dingolfing, Germany)	2025
• Programming and commissioning End of Line BMW Landshut (SAR Electronic, Dingolfing, Germany)	2025
• Design and manufacture of a bulk material feeder (PTO Ćurin, Hvar)	2025
• Design and manufacture of a machine for grinding metal extrusions (Končar D&ST, Zagreb)	2025
• Design and manufacture of a copper ring vibratory feeder system (Asemo, Vrbovec)	2025
• Design and manufacture of machines for optical inspection of metal pieces (ESCO Fofonjka, Bjelovar)	2025
• Design and manufacture of a packaging machine and web application for monitoring the packaging machine (TDK Croatia, Kutina)	2025
• Manufacture of conveyors (EGO, Zagreb)	2025

Equipment and tools:

Use of devices , equipment and tools world famous producers:

- **Automation and management:** Siemens, PILZ, Advantech, Festo, Lenze, Omron, Moeller ...
- **Sensors:** Sick, Leutze, Omron, Baumer, Eurotherm, Pepperl+Fuchs ...
- **Frequency converters and drives:** SEW, Danfoss, Lenze, Mitsubishi, Siemens ...
- **Robotics:** Kuka, ABB, Epson, Adept, Motoman, Fanuc
- **Vision systems:** Cognex, Datalogic, Basler, Adaptive Vision, SensoPart ...

Visualization and SCADA programs:

- WinCC, WinCCflexible, ProTool, DAQFactory, Zenon, InTouch ...

Web applicatons

- **Back end:** ASP.NET Core (Web API, NVC), C#, MS SQL, My SQL
- **Front end:** HTML, CSS, JavaScript, React

Tel/Fax: +385 43 445 189
enso@enso.hr
MB:2228475; OIB:18578064641
www.enso.hr

Change log: Danijel Horvat dipl.ing.mech.
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V15 Marko Bratković dipl.ing.el
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V16 Marko Bratković dipl.ing.el
03.09.2024.

V17 Đuro Juretić dipl.ing.el
05.12.2024.

V18 Marko Bratković dipl.ing.el
04.02.2025.

V19 Marko Bratković dipl.ing.el
03.06.2025.