ML® SYSTEM

45 YEARS OF INNOVATION

POLISH PRODUCER

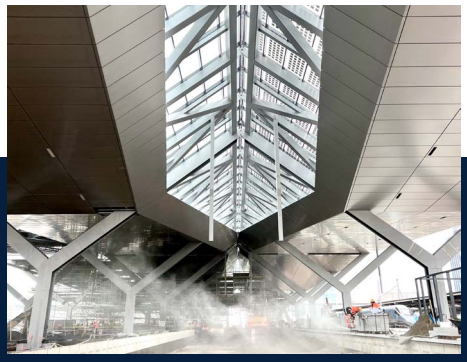
PHOTOVOLTAIC SOLUTIONS FOR PUBLIC TRANSPORTATION

ML System is a highly specialized technology company with its own manufacturing facility and strong R&D facilities equipped with world-class laboratory equipment . The company, which has been in business for 15 years, specializes in traditional and innovative photovoltaic solutions, of which it is both a manufacturer and distributor. Since 2018, it has been listed on the Warsaw Stock Exchange. The company is a local market leader, a key global BIPV manufacturer offering complete solutions with both automatics and mounting systems. In addition to BIPV products, ML System's offerings include traditional photovoltaics, Smart City, Smart Glass, glass for the automotive industry and innovative power-producing glass with coating - Q Glass. The company has 13 patents, while 9 new applications are pending.

EXAMPLES OF PREVIOUS IMPLEMENTATIONS OF ML SYSTEM FOR PUBLIC TRANSPORT

Double glazing in a hydrogen bus

Autosan Bus



BIPV modules with NoFrost self-snowing and illumination

Modernized West Railway Station, Warsaw, Poland

BIPV modules on the roof and facade of the station

Bus Station, Sanok, Poland

BIPV modules on the roof, photovoltaic ventilated facade, photovoltaic shutters

Local Bus Station, Rzeszów, Poland

Bus shelters with PV modules

Rzeszów, Poland

PV modules on bus shelters

Bratislava, Slovakia

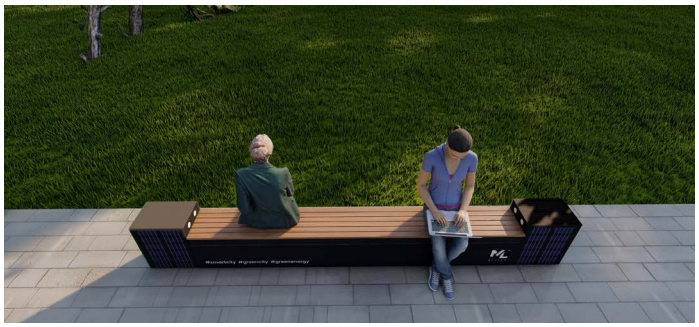
SOLUTIONS FOR PUBLIC TRANSPORTATION

SMART TECHNOLOGIES AND DESIGN CARING FOR PASSENGER COMFORT

DISPLAY GLASS

E-DISPLAY

SMART BUS SHELTER

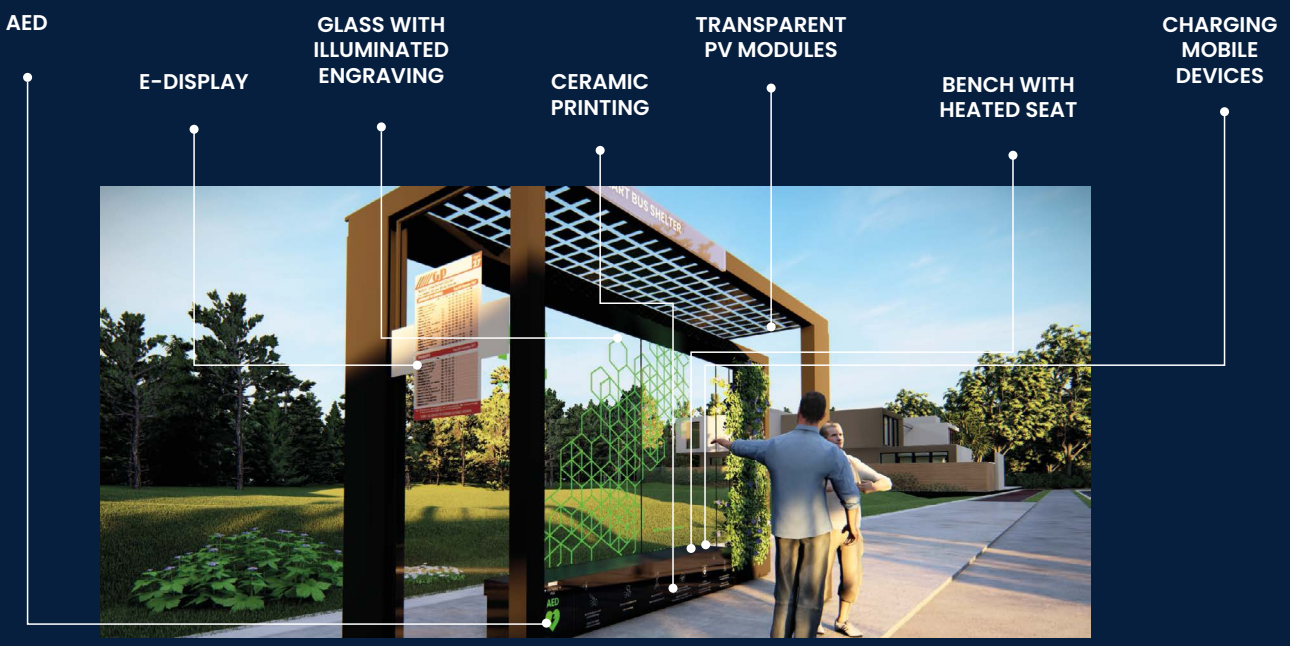


SMART BENCH

HQ GLASS

Q GLASS

SMART BUS SHELTER



FUNCTIONALITIES

- HEATING
- LIGHTING
- GREEN ENERGY FROM THE SUN
- INTEGRATION WITH BMS
- CHARGING MOBILE DEVICES
- AED

ML System offers a fully customizable, intelligent bus shelter. Made of aluminum, the lightweight and durable structure of the bus shelter fits perfectly into the modern architecture of cities, and the high-quality glass used in the bus shelter guarantees safety and allows the implementation of many technological solutions. Technologies and functionalities that can be implemented in the bus stop can be flexibly adjusted to the needs and capabilities of the site. The use of free green energy produced from glass-glass photovoltaic modules used as a bus stop canopy significantly reduces the cost of electricity bills and CO_2 emissions. ML System bus stop is an ecological and aesthetic solution that responds to the concept of sustainable development.

SMART CITY FOR SMART FUTURE


Photovoltaic bus shelter, Rzeszów, Poland


Illuminated engraving on the bus shelter, Smart Expo 2021, Warsaw, Poland


Visualization of bus stop with illuminated engraving and ceramic print

SMART BENCH

FUNCTIONALITIES

HEATED SEAT

LED LIGHTING

CERAMIC PRINTING

PV MODULES

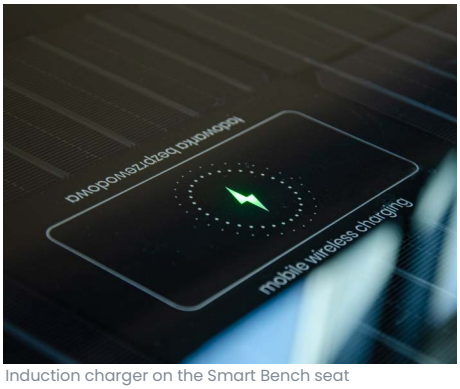
CHARGING MOBILE DEVICES

OFF GRID ON GRID

The photovoltaic bench is an innovative and ecological solution that responds to the need to implement ecological solutions in urban public space. The PV bench is a combination of a number of amenities that significantly increase the comfort of its users. The smart bench is equipped with the function of charging mobile devices (both via USB and inductive charging), heated seat, LED lighting and self-snowing function, all powered by free energy, produced thanks to photovoltaic modules implemented in the bench's cover.

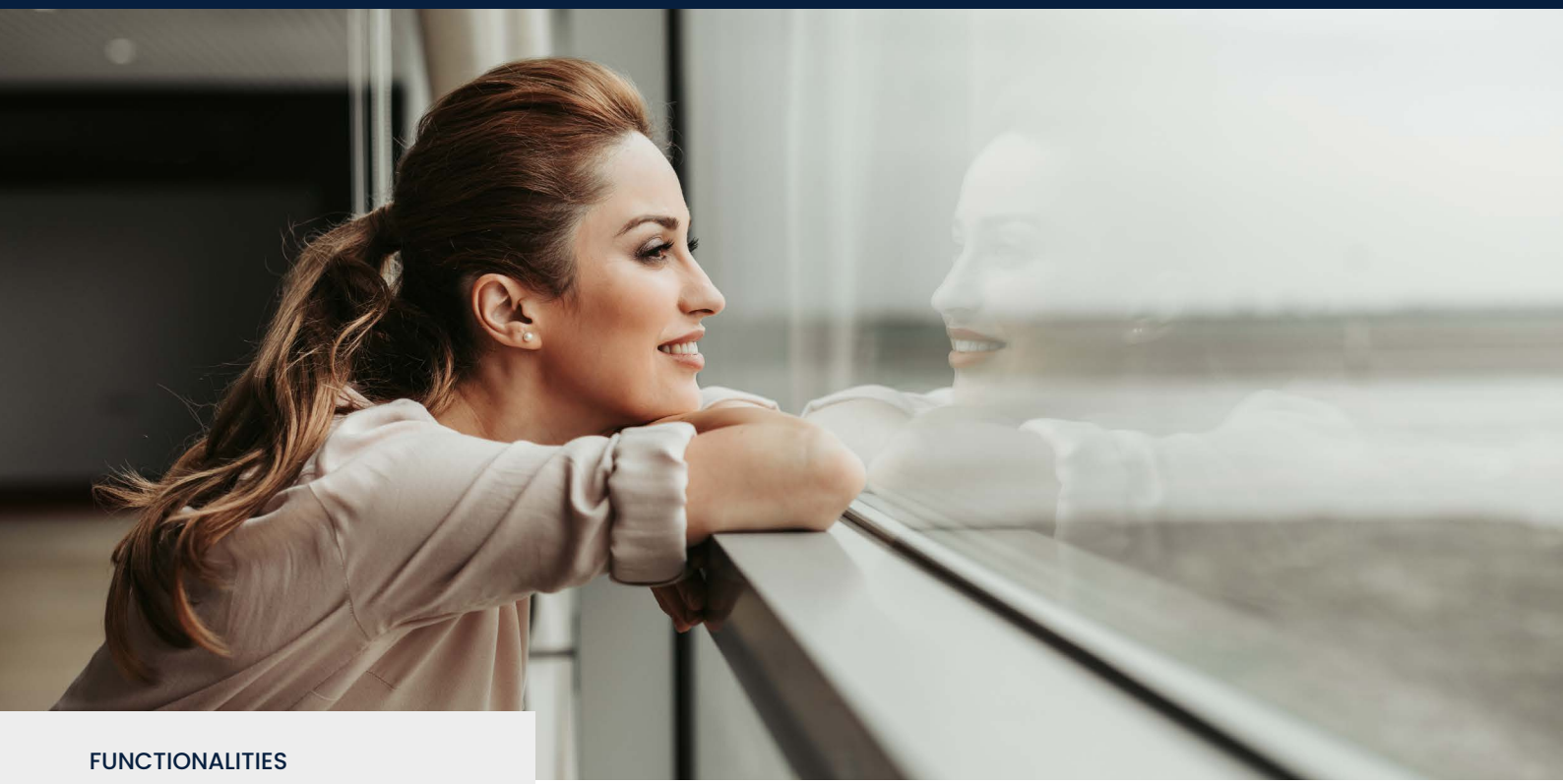
Visualization of a photovoltaic intelligent bench

Cermanic print and LED backlight for the PV bench



Induction charger on the Smart Bench seat

SMART GLASS



FUNCTIONALITIES

HEATING FUNCTION

VARIABLE TRANSPARENCY

FREE ENERGY

INFORMATION FUNCTION

POSSIBILITY PERSONALIZATION

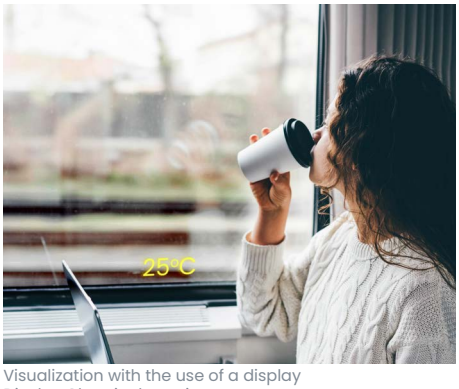
DESIGN AND AESTHETICS

The Smart Glass product line is intelligent glazing that improves the comfort of its users. They can be single-function products or combined in glazing sets can become multifunctional products: sound-absorbing, with very good thermal insulation, variable transparency, heating function. They can also provide information functions, thanks to the implementation of variable displays. Smart Glass products, due to their technological capabilities and the option of personalization, are the ideal solution for all means of public transport, public places, but also find application in the home, office or workplace. The Smart Glass product line includes:

- **E-Display** - glazing with electronic, color variable, content display (text/image) and remote management capability
- **Display Glass** - a glazing set with a variable content display implemented in an insulating glass unit, with heating capability
- **Q Glass** - transparent glass with quantum coating that generates electricity from the sun
- **HQ Glass** - heating glass
- **V+ Glass** - heating glass with variable translucency

Visualization of the E-Display at the bus stop

Heated glass in a railway car



Visualization with the use of a display
Display Glass in the train car

BIPV- ML System solutions for sustainable construction

BIPV - ACTIVE BUILDING MATERIALS THAT GENERATE GREEN ELECTRICITY

The main assumptions of the Long-Term Building Renovation Strategy until 2050

21%
buildings brought to the energy-saving standard

66%
buildings brought to the passive standard

7,5 mln
planned thermo-modernization projects

BIPV (eng. Building Integrated Photovoltaics) are comprehensive building-integrated photovoltaics solutions that are a substitute for traditional building materials used in roofing, skylights, facades, balustrades, or sunshades. The BIPV elements produced by ML System can be used not only as a structural element, but primarily as a source of electricity obtained from the sun. BIPV products, being in line with ecological, modern and sustainable construction, are an ideal complement to the architecture of newly constructed buildings, as well as a great solution dedicated to the modernization of existing, energy inefficient public and private buildings, making the technology an important response to the new green building standards in Europe.

Photovoltaic ventilated facade, PV shutters, BIPV modules
Local Bus Station, Rzeszów, Poland

BIPV modules with NoFrost function on the roof
Transfer Center, Pszczyna, Poland

Comprehensive BIPV installation
Railway Station West in Warsaw

BIPV solutions from ML System not only reduce the cost of electricity used in a building, but also frame its thermal insulation and provide an attractive visual addition to its structure, thereby increasing the prestige of the building. BIPV, thanks to its aesthetics and ability to generate electricity from the sun, is applicable to both new and existing buildings, while at the same time being the only building material on the market that guarantees a return on the investment (compared to non-refundable traditional building solutions).

PHOTOVOLTAIC ROOFS CARPORT

Regional Development Agency S.A., Rzeszów, Poland

FUNCTIONALITIES

- NOFROST
- FREE ENERGY
- RESISTANCE ON TERMS ATMOSPHERIC
- STABILITY CONSTRUCTION
- CHARGING OF ELECTRICAL VEHICLES
- ILLUMINATED ENGRAVER

A photovoltaic parking canopy is a practical and environmentally friendly solution that is ideal for both new property construction and existing buildings and public spaces. In addition to providing protection from weather conditions such as sunlight, rain or snow, the carport integrated with photovoltaic modules generates environmentally friendly free electricity to power the building or electric vehicles, allowing a significant reduction in electricity bills. Photovoltaic modules installed in canopies, in accordance with building standards, are resistant to snow load, but can also be additionally equipped with a self-snowing function (NoFrost).

WSPiA, Rzeszów, Poland

Headquarters of PKN Orlen, Płock, Poland

ML System headquarters, Zaczernie, Poland

PHOTOVOLTAIC FACADES

Norwegian Petroleum Directorate, Stavanger, Norway

FUNCTIONALITIES

IMPROVEMENT HEAT PARAMETERS

STABLE CONSTRUCTION

VENTILATION ELEVATION

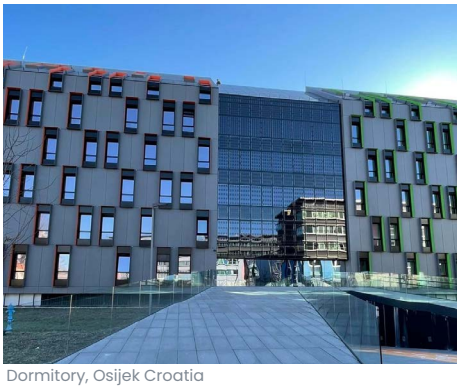
REDUCTION WEIGHT ELEVATION

IMPROVEMENT PARAMETERS INSULATION

FREE ENERGY

Photovoltaic facades are an ideal solution for replacing a traditional curtain wall with a photovoltaic structure integrated into the building. In this way, we are able to obtain free energy from solar radiation, while enhancing visual appeal. In addition to the combination of unique design and aesthetics, BIPV facades have numerous additional features that directly benefit both the performance of the building and the environment.

Servitech, Tarnów, Poland



Dormitory, Osijek Croatia

KPT, Kielce, Poland

PHOTOVOLTAIC BLINDS

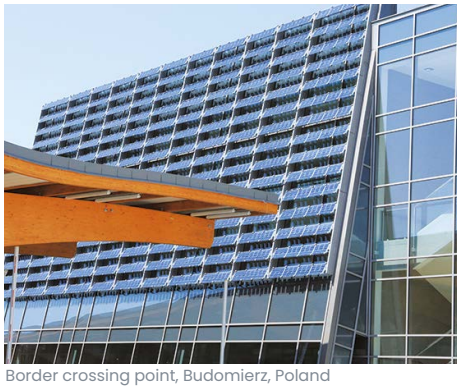
Metalpol Sp. z o.o., Mielec, Poland

FUNCTIONALITIES

- REDUCTION OVERHEATING OF ROOMS
- POSSIBILITY REMOTE CONTROLS
- EASY MAINTENANCE
- STABILITY CONSTRUCTION
- FREE ENERGY
- MODERN DESIGN

Photovoltaic Sunshades (ML LAMELA) is a complete ML System product including aluminum substructure and photovoltaic glass. Fixed or adjustable sun protection system can replace classic aluminum shades with safe photovoltaic laminated glass integrated with silicon cells. Photovoltaic modules are placed on an aluminum structure that allows mounting directly to the building wall or to mullion and transom facades. Photovoltaic blinds can be mounted in a mobile version, which allows the angle of the glass element to be adjusted. BIPV louvers can solve the problem of overheating in buildings by providing a sunshade while generating electricity from solar radiation

Jagiellonian University, Krakow, Poland



Border crossing point, Budomierz, Poland

COMMERCIAL GALLERY, Oława, Poland

PHOTOVOLTAIC SKYLIGHTS

National Archives, Rzeszów, Poland

FUNCTIONALITIES

FREE ENERGY

NoFrost

ILLUMINATION INTERIOR

THERMAL INSULATION

EASY MAINTENANCE

STABLE CONSTRUCTION

The primary function of skylights placed in the roof glazing of buildings is to provide interior lighting. As in the case of double-, or triple-glazing for facades, glass for skylights can also be integrated with photovoltaic cells, so that free electricity is generated while allowing light into the room. ML System offers skylight solutions in the form of double or triple glazing units, in which the outer pane is laminated safety glass with photovoltaic cells.

Natiolarenan3, Stockholm, Sweden

WFOŚiGW, Łódź, Poland

The Hague Tower, Haga, Netherlands

ADDITIONAL SERVICES

ML System also offers attractive additional services that comprehensively complement the offered products and solutions

ML SCADA - a proprietary system for managing buildings and elements of small architecture

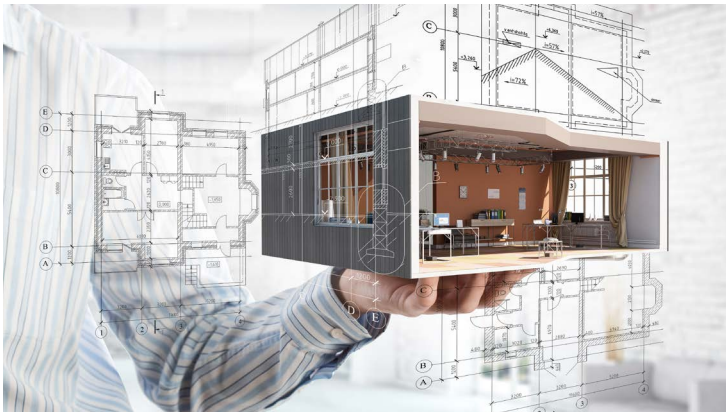
Provision of professional 3D visualization using BIM objects of the products ML System

Production of components for PV installations - modules, inverters, switchgears, structures

Installation and service of the installation - full technical support at each stage of cooperation

Inventory and dimensioning of objects and professional 3D imaging of buildings, machinery, installations and terrain, using a 3D laser scanner

Professional visual and thermographic inspections of photovoltaic installations and facilities, using modern multi-rotor drones



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ML System
Zaczernie 190 G, 36-062 Zaczernie

tel: +48 17 77 88 266
e-mail: biuro@mlsystem.pl