

# TUNGSRAM™

Innovation is our heritage  
EST. 1896



BRIGHT



SMART



FUTURE

[www.tungsr.com](http://www.tungsr.com)





TUNGSTAM

We are shaping the future of urban living by providing technology-driven, smart, sustainable solutions for large metropolitan areas using lighting as a platform.



**Tungsram, an iconic name, returned to the global market in 2018 as a premium innovative European technology brand following the acquisition of GE Lighting's general lighting business in Europe, Middle East, Africa and Turkey as well as GE's global automotive operation.**

Innovation is our heritage. Originally established in 1896, the company is a brainchild of the 2nd industrial revolution that gave rise to the electrification of the world. From its earliest beginnings through GE's acquisition of the brand in 1989 and to the present day, Tungsram has systematically created new solutions, primarily around its core lighting and telephone technology businesses, as well as medical and radio tubes and television, often leading to exponential sales growth.

Today, faced with the opportunities and challenges of the 4th industrial revolution, Tungsram Group invests into future-safe technologies and dynamically growing global market segments such as smart solutions, smart cities and indoor farming while still strengthening its core lighting business.

Every member of the Tungsram team works to create affordable, sustainable technology-based solutions for the continuously urbanizing world with the strategic goal of eventually creating happiness. A smart, bright future – see how we are seeing it.

A handwritten signature in green ink, appearing to read 'Jörg Bauer', with a stylized flourish at the end.

**Jörg Bauer**  
Chairman-CEO

# Tungram has a 125-year-long track record and unique assets and capabilities

Over 125 years  
of reliable operations

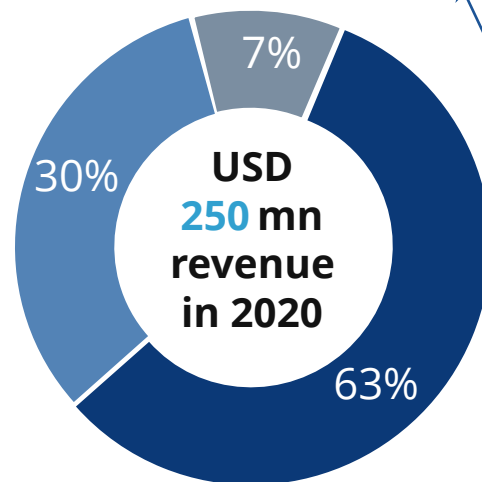
# 1896

World-class innovation  
heritage



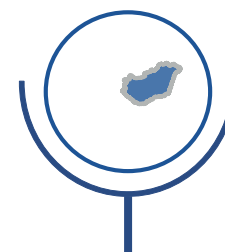
5 plants for  
advanced  
lighting  
technologies  
and components

● General lighting ● Automotive lighting ● Components Advanced Materials



20+ Tungram  
subsidiaries  
globally  
Offers global  
access for  
Hungarian SME's

**4000** employees in  
Hungary and globally



Established sales  
network in

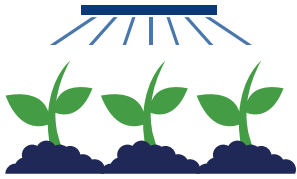
**100+** countries:  
**95+%** export



Ceramics,  
metal, glass,  
plastics  
and tooling  
capabilities

## Our Innovative Businesses

### **Agritech** – indoor farming



Lighting solutions for precision indoor farming. Applying Tungsram's expertise in the field of LED lighting to serve sustainable plant cultivation.

### **Smart City Solutions**



Innovative physical and digital solutions by Tungsram for inhabitants and enterprises of cities to strengthen environmental, social and economic sustainability.

### **PropTech Solutions**



Next-generation property management for increased building value, cost savings on building operation and maintenance, higher work efficiency and heightened employee & visitor satisfaction

### **Open Innovation Center (InnoHub)**



Tungsram's Open Innovation Center allows quick access to future-proof tech for its partners that have the potential to add to the company's abundant tech portfolio.



Advanced Materials in new industries like aviation, automotive, batteries, healthcare, power



Unique **Company-in-the-box** offering for investors entering the EU with minimal up-front investment enabled by shared Tungsram infrastructure and resources



Expanding Hungarian technology center SMART everything. Close network with Hungarian and global researchers



# The Tungsram Group's International Network

## HUNGARY (HQ)

### ALGERIA (1)

### CANADA (2)

### CHINA

- Beijing (3)
- ChangChun (4)
- Guangzhou (5)
- Shanghai (6)

### CZECH REPUBLIC

- Prague (7)

### EGYPT

- Cairo (8)

### FRANCE

- Boulogne-Billancourt (9)

### GERMANY (10)

### IRELAND (11)

## ITALY

- Agrate Brianza (12)
- Milan (13)

## JAPAN

- Tokyo (14)

## SOUTH KOREA

- Seoul (15)

## NORWAY

- Oslo (16)

## POLAND

- Bielsko-Biala (17)
- Warsaw (18)

## RUSSIA

- Moscow (19)

## SAUDI ARABIA

- Jeddah (20)
- Riyadh (21)

## SPAIN

- Barcelona (22)
- Madrid (23)

## SWEDEN

- Stockholm (24)

## TAIWAN

- Taipei (25)

## TURKEY

- Istanbul (26)

## UKRAINE

- Kiev (27)

## UNITED ARAB

## EMIRATES

- Abu Dhabi (28)
- Dubai (29)

## UNITED KINGDOM

- Rushden (30)
- Towcester (31)

## USA

- East Cleveland (32)

## TUNGSRAM'S PRODUCTS ARE PRESENT WORLDWIDE IN THE COUNTRIES BELOW

Albania  
Andorra  
Argentina  
Armenia  
Australia  
Austria  
Bahrain  
Bangladesh  
Belgium  
Belorussia  
Bolivia  
Bosnia  
and Herzegovina

Brazil  
Bulgaria  
Cameroon  
Chile  
Ciprus  
Columbia  
Croatia  
Denmark  
Estonia  
Finland  
French Polynesia  
Georgia  
Gibraltar

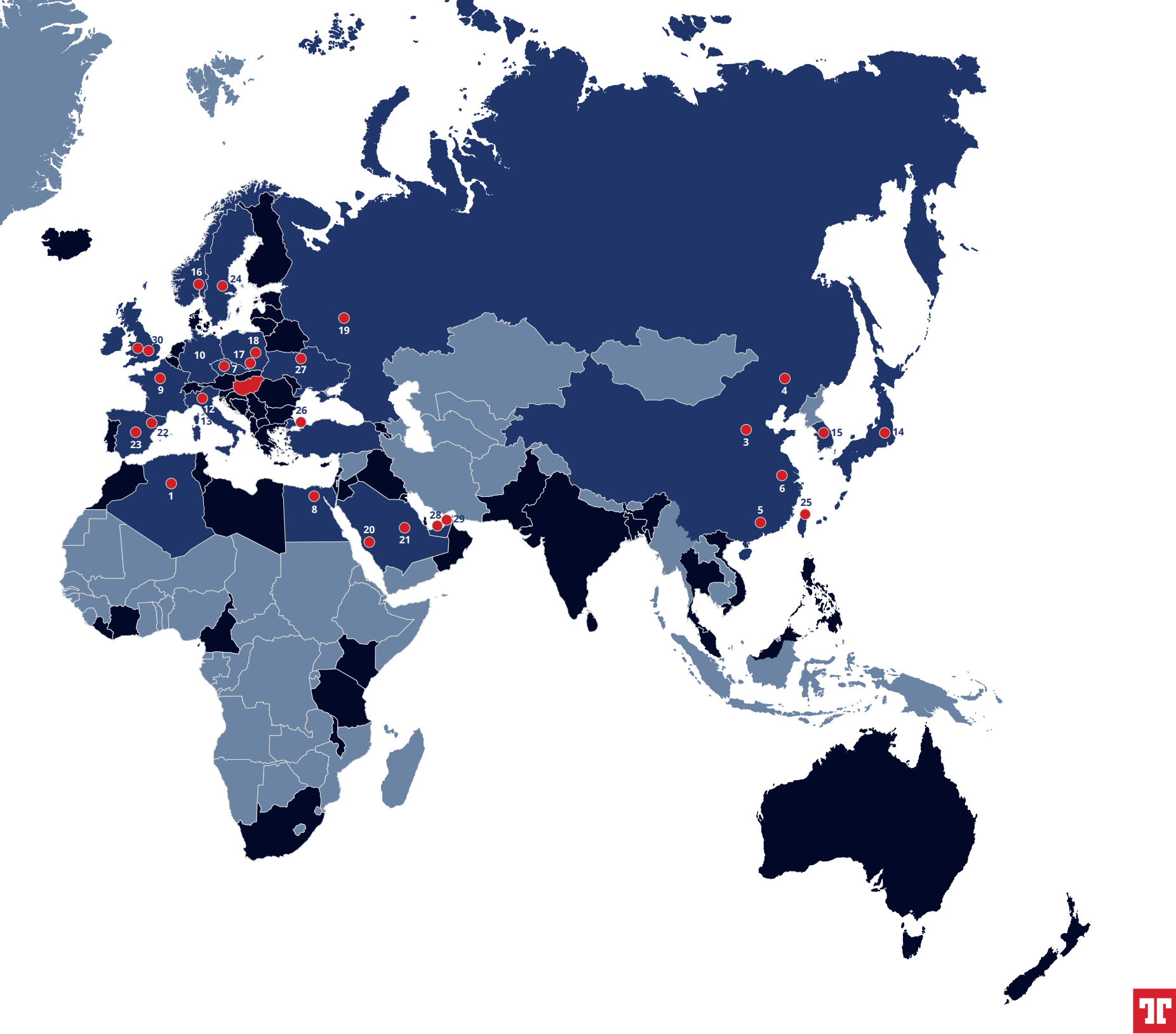
Greece  
Hong Kong  
Iceland  
India  
Iraq  
Israel  
Ivory Coast  
Jordanania  
Kenya  
Kyrgyzstan  
Kuwait  
Latvia  
Lebanon

Liberia  
Libya  
Liechtenstein  
Lithuania  
Luxemburg  
Macedonia  
Malawi  
Malaysia  
Malta  
Mauritius  
Mexico  
Moldova  
Monaco

Montenegro  
Morocco  
Netherlands  
New Caledonia  
New Zealand  
Oman  
Pakistan  
Paraguay  
Philippines  
Portugal  
Qatar  
Romania  
San Marino

Serbia  
Singapore  
Slovakia  
Slovenia  
South Africa  
Sri Lanka  
Switzerland  
Tanzania  
Thailand  
Tunisia  
Uruguay  
Vietnam





# Innovation is our heritage



1896

Established as United Electric Ltd.



1909

Tungsram brand registered



1921

Lipót Aschner founds the world-famous research lab and makes the brand a world market factor



1931

Imre Bródy, a researcher at Tungsram develops Krypton lamps



Tungram is an abbreviation of the English word Tungsten and its Hungarian/German counterpart Wolfram. Our company boasts over 100 years of experience developing and producing tungsten material and products. The list of decisive Hungarian contributions to the evolution of the lighting industry is illustrious. Aladár Pász invented and patented the non-sag tungsten in 1917, paving the way for the mass production and utilization of tungsten coils and cathodes in the lighting and other industries. Tungram employees Sándor Just and Ferenc Harmann developed the helix and double helix incandescent coils. Pál Túry, Tivadar Millner

and Imre Tarján invented the sodium-silica-potassium-aluminum doped tungsten. Their invention, called the "GK"-type Tungsten and patented in 1928, helped propel Hungarian tungsten wire and coil manufacturing to the top echelon of manufacturers worldwide. Tungram was the 3rd company in the world to start the development and manufacturing of electron tubes in 1917. In 1932, Tungram was the first to build a screen-grid Tetrode and continued the development of vacuum/electron tubes and magnetrons in the following decades. We are proud to say that innovation is in our bloodstream!



1946

Zoltán Bay, the technology officer of the company founds radar astronomy through a world famous experiment



1989

GE purchases the majority of Tungram shares, later 100%



2018

Tungram Group is founded



2019

Acquiring ArchiFM, a leading FM software company



# LIGHTING



## **TUNGSRAM LIGHTING SOLUTIONS - WE ARE HERE TO SHINE Claiming the Global Spotlight**

- Offering solutions for the entire lighting project from installation to financing
  - Product portfolio covers all areas of indoor and outdoor lighting
  - Traditional lamps, LED luminaries of premium European quality
    - Prototype and serial production capabilities



## General Lighting Segments



### Our vision for a brighter tomorrow

Powered by a lighting-industry track record spanning more than 120 years, Tungsram has consciously developed new solutions in its core area of lighting technology since its foundation in 1896. We compete on the world market as a premium European brand, which designs, develops and manufactures products for the needs of today and tomorrow. The lighting product portfolio covers all areas of indoor and outdoor lighting, from private homes to schools, public and office buildings, gas stations, sports arenas, highways and car parks. We offer a comprehensive range of light sources from traditional technologies such as HID, LFL, CFL, Halogen and specialty lamps both for indoor and outdoor installation. From traditional technologies to state-of-the-art LED products, we incorporate energy optimization and system intelligence into our portfolio.

”

*We produce cutting-edge products for all existing light applications by making use of our fully automated production lines and certified quality assurance systems.*

### Unwavering Commitment to Quality

Tungsram's world-class corporate quality policy is the guarantee that its LED luminaires and lamps represent premium European quality as opposed to the wavering quality of non-branded products inundating global markets. Our quality management systems, supplier and manufacturing quality controls, coupled with the most stringent international certifications are proof of Tungsram's uncompromising commitment to quality.

## LED there be light

The future will be lit by LED. Traditional lighting solutions are set to be fully replaced by LEDs and our aim at Tungsram is to smooth the transition for our customers. Our colleagues have been dedicating their efforts and expertise to the development and installation of LED technologies for nearly two decades. Our retrofit and retrofit-type indoor and outdoor product families make it possible for our clients to enjoy the advantages of this new technology without extra investment. From future-proof modular solutions to innovative new formats, we deliver high quality LED indoor and outdoor solutions at an affordable price. The latest LED lighting solutions provide an ideal upgrade path for public bodies looking to reduce energy costs and environmental impact while attaining striking aesthetic improvements to landscapes and cityscapes.

### Tungsram lights in the Budapest night: public lighting modernization project

**7000** new Tungsram luminaries  
to be installed in 15 districts in Budapest

City's energy consumption to decline by  
**1.7 GWh per year**

Annual electricity bill savings to  
amount to EUR **200,000**

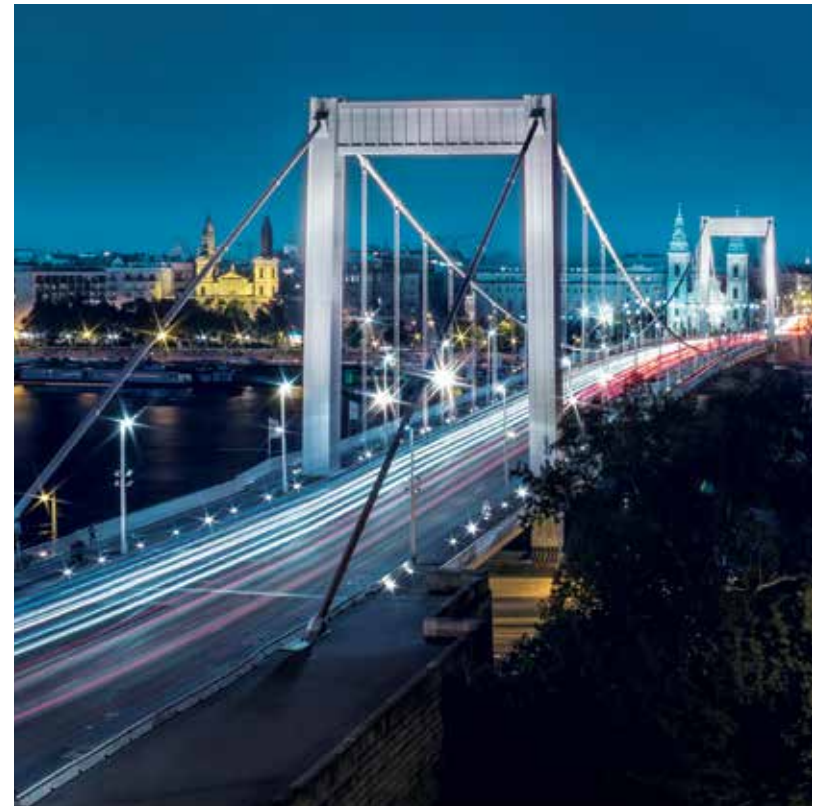
Cost savings to repay price of luminaries  
in less than **10 years**

#### Key benefits of our LED product range

■ Up to 50-70% energy saving ■ Longer life and reduced maintenance ■ Better light control, less light pollution ■ Smart connectivity ■ High quality assured by laboratory ■ Increased sense of comfort and security

”

*Driving forward the design and development of state-of-the art LED products, securing Tungsram's position as a leading global brand.*



# Tungsram Solutions - More than just lighting

## Working with our customers from the first step of the way

As part of Tungsram's new mindset, we reach far beyond delivering a product in a box. The Tungsram Lighting Solutions concept renders the company capable of becoming a professional partner in developments and investments made by both public and private entities in Hungary and all around the world. Tungsram can execute lighting projects starting from initial site inspection to production, acquisition, financing and execution. Our

colleagues working in the project office coordinate construction work and material movements with the help of a state-of-the-art project management software, which warrants transparency and access to all relevant information. The company's wide-ranging product portfolio allows us to manage several lighting-related investment areas, such as indoor and outdoor lighting, SMART sensors or indoor LED technology used for crop production, in a single package. Tungsram's project management capabilities coupled with a full-scale supply chain guarantee unparalleled efficiency.



”

*Instead of shipping a box with a product we sell a complete solution package.*



### As part of the Tungsram Lighting Solutions concept, we offer:

■ Site survey ■ Lighting design ■ Traditional, LED and smart products (indoor and outdoor fixtures, industrial fixture, Agritech lamps) ■ Installation ■ Smart services ■ Field maintenance ■ Audit services ■ Financing ■ Waste management



# AUTOMOTIVE



## **TUNGSRAM GLOBAL AUTOMOTIVE LIGHTING**

- Standard and premium product lines feature absolute performance and unique technologies
  - Design, production and supply chain headquartered in Budapest
  - Zero defect, low DPM quality



## Trusted partner of the global automotive industry

Tungsrām's automotive division has been meeting the highest-quality standards for passenger cars and utility vehicles for more than half a century. Listed among the top three car lamp manufacturers globally, we are an established supplier of OEMs (Original Equipment Manufacturers) and a decisive player in aftermarket sales in major markets worldwide. We have long committed ourselves to improving visibility and road safety while also enhancing convenience and style. Our custom-tailored solutions are testament to Tungsrām's commitment to product leadership and technology innovation. Reliability and quality top our agenda and Tungsrām's wide range of premium lamps, operating on 12V or 24V, offer superior performance, ensuring maximized visibility, boosting safety and reducing the risk of road accidents. All this has been internationally tested: our quality system is IATF 16949 approved. Tungsrām is on the approval list of many of the world's leading car manufacturers.

Nearly **250** million bulbs produced  
a year at 3 sites in Hungary

Commercial presence in more than  
**100** markets worldwide

Delivering world-class quality for over **60** years

## Premium product portfolio based on special designs

Tungsrām's premium automotive range offering includes: Megalight Ultra +150, Megalight Ultra +130, Megalight Ultra +120, Megalight Ultra +90, Megalight Plus 50, Sportlight Extreme, Sportlight Ultra 4200K, Sportlight, Extra Life, Heavy Star, Rally. Our premium lamps have additional benefits in terms of life, color, vibration resistance and wattage. Extra life lamps have enhanced life, Megalight Plus and Ultra lamps possess increased luminance, Sportlight halogen lamps give intense blue-white light.

”

*Committed to constant development to improve visibility, road safety, performance and energy efficiency.*



# AGRITECH



## **PRECISION INDOOR FARMING - LIGHTING AND BEYOND** **Farming at the crossroad of agriculture and IoT**

- Light optimized for growth
- Simple installation and compatibility with popular fixtures
  - Better yield, flavor and nutritional value
  - 95% less water compared to open field farming
- Cultivated organic vegetables, no soil or water contamination with pesticides

## Farming in the digital age

As the world looks to tackle the double challenge of rising population numbers and finite arable land, the need for agricultural innovation has never been higher. Tungsram's Agritech Division rises to the challenge with a portfolio of lighting and smart solutions, focusing closely on indoor plant growing and vertical farming. With our highly optimized light sources, the yield of indoor gardens – both regular and vertical orientations – can be optimized in an age when humanity needs more food products grown closer to urban areas, produced in a more efficient way and year-round.

”

*Tungsram's Agritech Division is the ultimate go-to for science-based agriculture independent of experience and intuition.*

World population expected to exceed

**9 bn** by 2050

Need for food production set to increase by **70%**

**80%** of the world's arable land already in use

Food products travel **2500** km from field to fork



## Give the plant what the plant needs

The mission of Tungsram Agritech is to apply its expertise - acquired over decades - in the field of LED lighting to serve sustainable plant cultivation. Traditional lighting emits one broad spectrum and the unused light is wasted energy. In comparison, LED lighting possesses high luminous efficacy, predefined spectral light output, controllable light intensity, effective heat management, uniform illumination and durability. Tungsram Agritech toplight and interlight products are designed for installations in new or already established greenhouses and vertical farms. Our lighting solutions offer tailored spectrum distribution and intensity to ensure the most intensive growth and accumulation of nutrients in each growth phase. As Industry 4.0 ushers in the era of hyperspectral analysis of plant processes, environment sensors monitoring the conditions of the ecosystem and optimal setups based on big data, Tungsram Agritech offers the ability to give the plant what the plant needs.



# SMART CITY



## TUNGSRAM'S SMART SOLUTIONS CONCEPT

As a technology solution integrator, Tungsram delivers solutions in close cooperation with key strategic partners. The backbone of smart solutions are various sensors that provide data, result in cost saving, energy efficiency, better decision making and a more interactive, convenient environment. Tungsram's solutions offer the following unique value propositions:

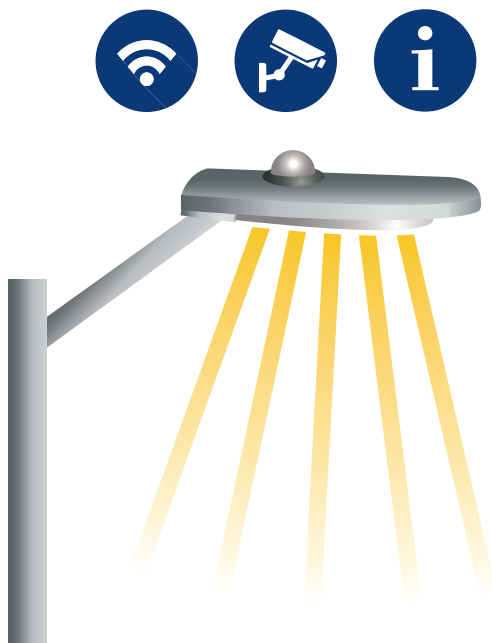
- **Lighting as an IoT** infrastructure and reference architecture: Smart City Operating System with GIS
  - Capability to build a whole **ecosystem of modular solutions**
    - **Customizable solution** for local needs
    - Entirely **scalable** from small blocks to city level

”

*Tungsum's Smart Solutions are built to augment, future proof and enhance your building or city*

## Metropolises in a new light

Due to their dense placement, outdoor lamps can be utilized as the centers of IoT infrastructure and act as gateways; equipped with sensors they can transmit data to broadband and are ideally placed to monitor streets and help with e-mobility strategies. At Tungsum, we take a holistic view of the cities of tomorrow, allowing our partners to choose from a wide portfolio of solutions, including indoor and outdoor positioning and navigation, smart parking system, facility and asset management, smart public transportation information service, building automatics, ambient sensor network, IoT dashboards and 3D BIM modeling.



**68%** of the world's population to live in urban areas by 2050

Global Smart City spending in 2020 projected to reach

**USD 34.4 billion**

There are expected to be more than

**64 billion** IoT devices worldwide by 2025

The main revenue driver for **54%** of corporate IoT projects is cost savings

## Urban innovations for the 21st century

Building on our lighting industry expertise of more than 120 years, the Smart Solutions division is a testament to Tungsum's commitment to the future. Smart Solutions aim to tackle the challenges of urban environments in the digital age. Tungsum as a technology solution integrator builds on its core lighting competencies to offer sustainable and cost-effective strategies to turn the questions of the present into the answers of tomorrow. Anchored in the belief that a smartly built and connected environment will fundamentally alter the way people live, work and communicate, while ultimately improving their wellbeing, productivity and health, the Smart Solutions unit is engaged in working out solutions aimed at cost saving, energy efficiency and better living standards for inhabitants of urbanized areas.



# ADVANCED MATERIALS AND SERVICES



## **Integrated supplier of complex projects**

- Manufacturing of ceramics, tungsten and molybdenum, metal, plastic and glass components
- Services portfolio includes aviation-engine part repair, contract manufacturing, power repairs, engineering solutions, surface mount and welding technologies
- Advanced manufacturing for healthcare, machinery, defense and aviation industries



## Components production

Tungfram's components factory was established to manufacture and supply lighting fixtures, lamps and integrated solutions. Aiming to satisfy all our production needs, the glass, ceramics, metal and wire manufacturing processes are optimized for the daily production of millions of parts. The factory specializes in the production of high durability ceramics, offers world-class sintering techniques and manufactures various coils, cathodes, wires as well as glass and plastic parts for diverse industrial applications.

## Machinery solutions

The Tungfram machinery plant is equipped with top-tier CNC-controlled automatic lathes, machining centers, traditional and special machines, allowing us to meet the most exclusive customer requirements and the highest industry standards. We have long-term experience in machining special materials such as Hastelloy X, RENE 41, NIMONIC, Tungsten ( $W > 99.95$ ), along with common materials including stainless steel, carbon steel, forged steel, plastic, aluminum, copper. At Tungfram, we are capable of executing complex manufacturing tasks from design and construction to assembly and automation.

”

*Seeking to explore new businesses based on the unique assets and complex capabilities of our 5 factories located in the heart of Europe.*

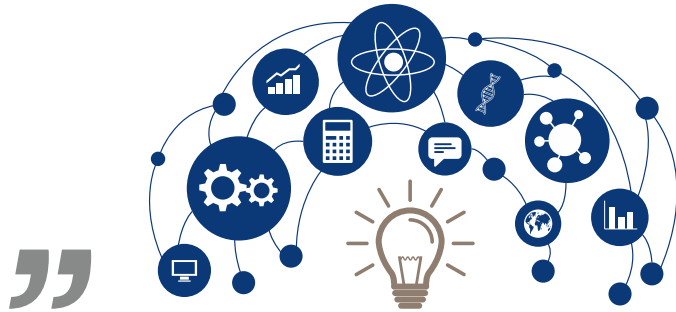


## Trusted partner of GE Power and GE Aviation

Tungfram has been working together with GE Power for many years and we signed a long term service agreement with GE Aviation in 2019. As an MRO provider, we offer financial stability, solid working capital management to take on and manage large MRO-related inventories as well as access to low cost, skilled labor.

### Tungfram Group key capabilities

- Sheet metal
- Machining
- Electromechanical assembly and precision welding
- Injection moulding
- Wire drawing for medical market



”

*We provide answers to the challenges of the 4th industrial revolution by capitalizing on talent and knowledge-based R&D*

## **Innovation is in our DNA**

We are ready to exploit opportunities in data science, artificial intelligence and mobile communications with the flexibility of a startup to ensure a stable position for our company in the global elite. Our Open Innovation Center allows quick access to future-proof tech for our partners that have the potential to add to the company's abundant tech portfolio. Tungsram joined forces with Hungarian legal and IT startup iLex to launch the [ilexmarketplace.tungsram.com](http://ilexmarketplace.tungsram.com) website with the aim of building an innovation ecosystem and help Hungarian firms access the global market via our manufacturing and lab capacities and global distribution network. As a member of EIT Digital, Europe's hallmark innovation club, Tungsram strives to identify new partners and young talent, implement novel industrial solutions and best practices.

## **Tungsram CSR - Caring today for tomorrow**

As an iconic global brand, we are devoted to establishing and maintaining a responsible and sustainable culture both within the company and outside. The goal of Tungsram's sustainability strategy is to be an unavoidable actor in our areas of expertise by using innovative and sustainable technologies that lay the new foundations of our world. We are driven by the confidence that the lower energy use and CO<sub>2</sub> footprint of our solutions and products contribute to building an environmentally conscious world without depleting our natural resources. Our participation in 100 volunteer programs a year, the FitTungsram program that promotes the health of our employees and the Future Talents program designed to boost the language skills and business acumen of secondary school students are proof of our commitment to enhancing the welfare of persons, organizations and communities associated with Tungsram.



”

*We are dedicated to sustainable excellence.*

# COMPANY IN A BOX

Starting a business involves meticulous planning, making key financial decisions and completing a series of legal activities. Tungsram is there to help partners plan, prepare and manage their business. Being an integrator of operations and manufacturing with headquarters in the heart of Europe, we offer a wide range of services and facilities to all types of businesses from start-ups to enterprises seeking to expand their activities or market presence. The scale of our contribution and support is all encompassing, ranging from laboratory equipment or services, to academic partnerships, financial, IT, HR, legal advisory, to involvement in R&D projects or access to a global distribution network covering more than 100 countries. For those seeking a less complex service package, we offer a training center and co-working space.



”

*Our partners can build on our expertise and facilities every step of the way.*

## THE BENEFITS OF OUR SERVICES

- Help in setting up a company
- Quick start of operations
- Scalable operation with minimal upfront investment
- Usage of Tungsram's sourcing capabilities
- Support in HR, IT, legal and finance areas
- Possibility of manpower rental at one of the most attractive cost levels within the EU
- Access to growth-stage public funds
- Warehouse and logistics in the center of EMEA

# TUNGSRAM<sup>TM</sup>

**Tungsrám Group**

77. Váci út, Budapest 1044 Hungary

More information:  
[tungsrám.com](http://tungsrám.com)

LinkedIn: Tungsrám Group  
Facebook: Tungsrám Group  
Twitter: @tungsrám\_group