



# Nanografi REACTION

Advanced Engineering Solutions and Plant Installation Services



BEYOND  
THE  
FUTURE

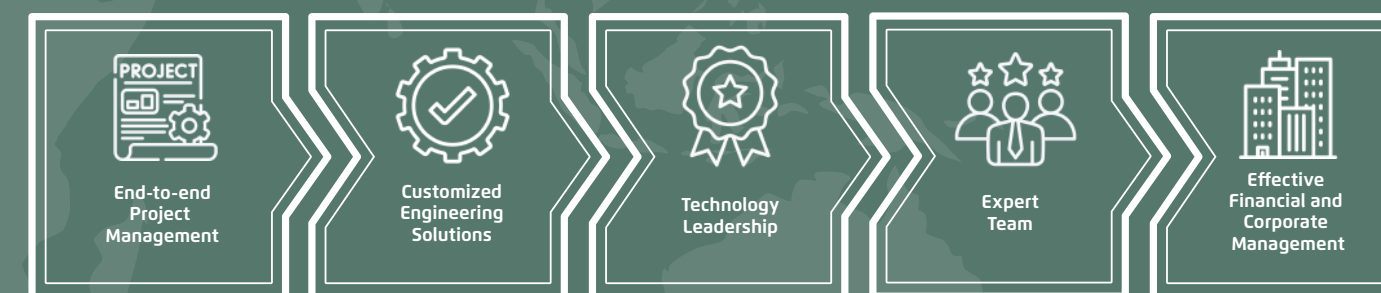
# Innovate with *Nanografi*

**Nanografi Reaction** is a specialized engineering department of **Nanografi**, headquartered in METU Technopolis.

Nanografi Reaction provides **integrated and turnkey high-performance engineering services** with a customer-centric approach supported by Nanografi's comprehensive expertise in the fields of advanced materials, energy, chemicals, healthcare, brand protection, security inks and high-tech engineering solutions.

At Nanografi Reaction, we offer end-to-end engineering services, including **project design, process engineering, safety analyses, technology integration and plant commissioning**, within the framework of international quality standards. Our engineering team, composed of experts in their respective fields, acts not only as implementers but also as solution partners, delivering consultancy for high-tech projects with precision and insight.

Supported by a **robust R&D infrastructure and trust-based partnerships in more than 100 countries**, we continue to expand technological boundaries while upholding **transparent governance and social responsibility**. Through this extensive network and rigorous research capabilities, Nanografi Reaction remains committed to advancing technological frontiers and maintaining the **highest global quality standards**.

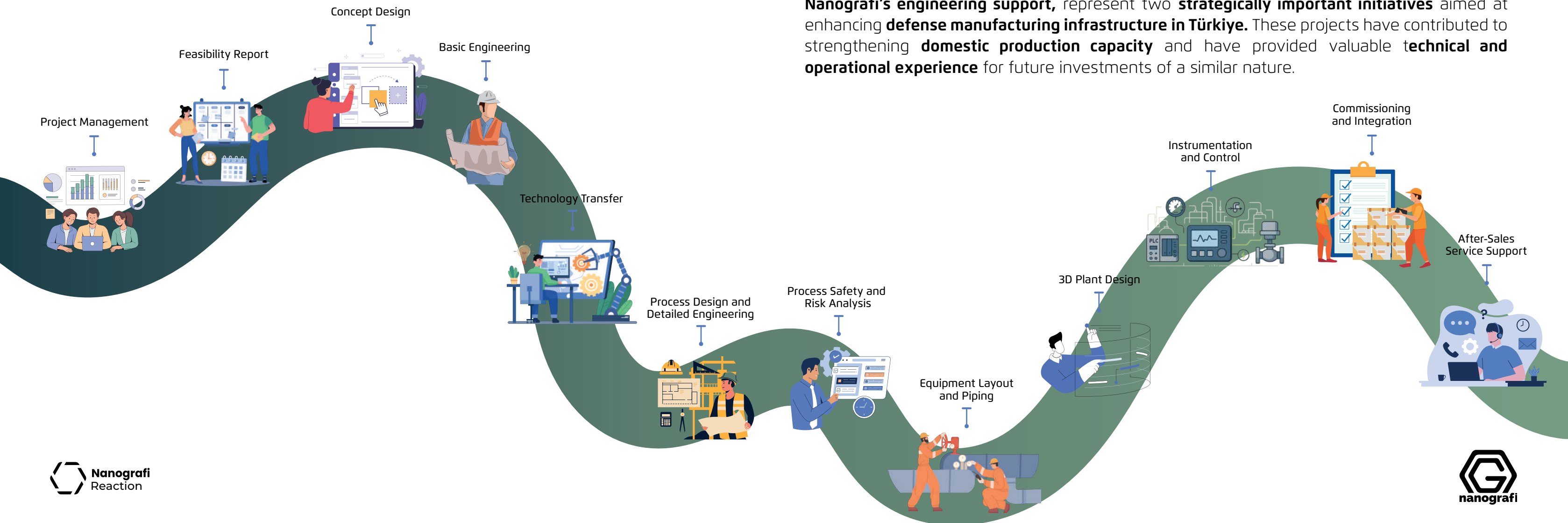




# Advanced *Engineering* Solutions and Services

**Nanografi Reaction**, a department of Nanografi, is a leading technology unit that provides **end-to-end engineering and manufacturing services** based on advanced technologies, serving the **defense sector**. With expertise in **process design, plant construction, safety engineering**, and **advanced technology** integration, it plays an active role in the implementation of **strategic production infrastructures**.

The **GoldForce Integrated Gunpowder Plant** and the **MKE Nitrocellulose Plant**, developed with **Nanografi's engineering support**, represent two **strategically important initiatives** aimed at enhancing **defense manufacturing infrastructure in Türkiye**. These projects have contributed to strengthening **domestic production capacity** and have provided valuable **technical and operational experience** for future investments of a similar nature.



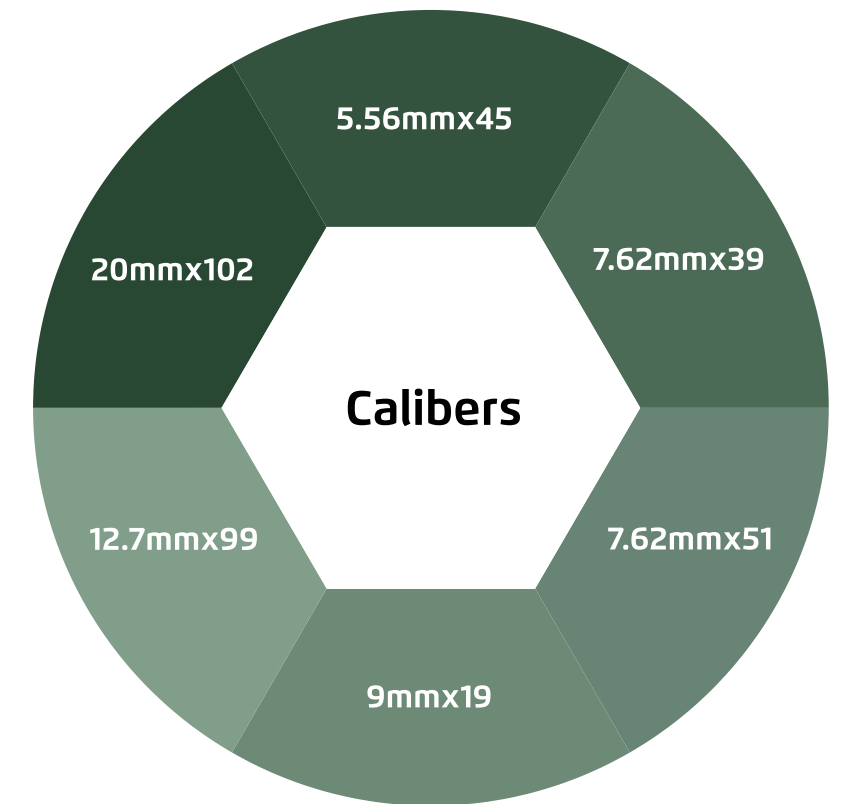
# Spherical Gunpowder Production Plant

Gunpowder is a critical component in the defense industry, valued for its low-smoke profile and its role as a propellant in firearms and ammunition systems. Due to its explosive power and combustion stability, it remains a strategically important material that must be manufactured with high precision using modern production technologies.

Nanografi Reaction has the capability to establish **turnkey gunpowder production facilities adaptable to various capacities**, fully compliant with NATO standards as well as international safety and quality regulations. In addition to building new facilities, the company also aims to enhance production capacity and operational efficiency by modernizing existing infrastructures.

**In collaboration with Nanografi and GoldForce Machinery and Chemicals Inc., two spherical gunpowder production lines** for small-caliber ammunition have been established in the Sungurlu Organized Industrial Zone, and the **construction of the third line** has already begun. Our first line was **2024**, and continues production with high efficiency.

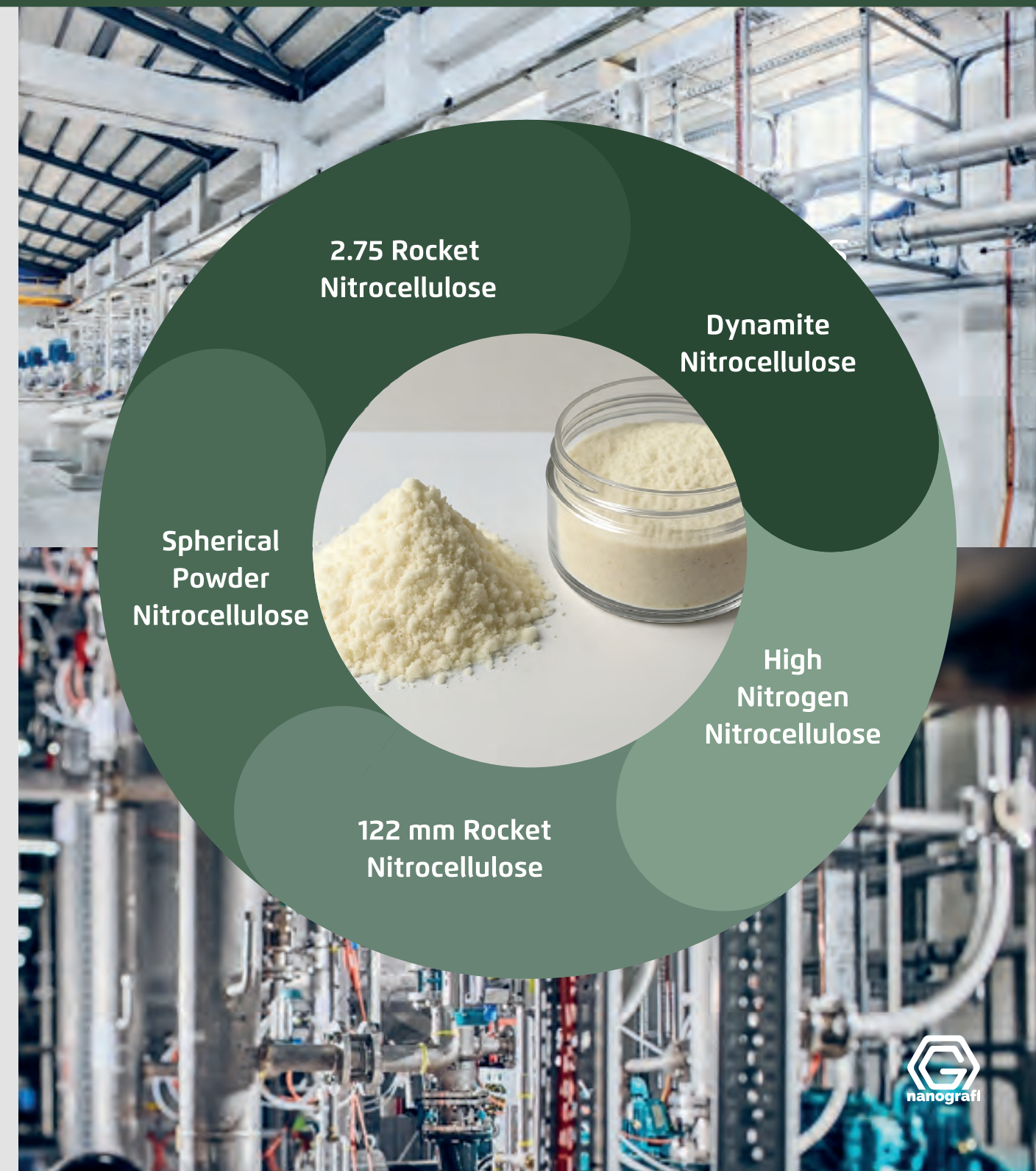
Additionally, the **Global Gunpowder Production Facility** in the region offers a fully digitalized manufacturing environment, supported by an advanced automation infrastructure with more than **2,000 data points** and proprietary software systems. The facility is designed to be **fully customizable** to support gunpowder production in various calibers in compliance with the **MIL-STD-286 C** standard.



# Nitrocellulose Production Plant

Nitrocellulose is a critical material for today's defense industry and is produced through **advanced automation processes** to meet the high quality and safety requirements of modern defense technologies. Our facilities are equipped with state-of-the-art technology capable of manufacturing **Grade C Type 1 nitrocellulose** in full compliance with the **MIL-DTL-244-C** standard for military applications.

In this context, Nanografi Reaction establishes **scalable nitrocellulose production facilities** in various capacities and not only builds new plants but also modernizes existing ones to ensure **high capacity and efficiency**. Through this approach, we offer a reliable and sustainable production infrastructure designed to meet the increasing demands of the defense sector.





# Nitroglycerin

Nitroglycerin is a critical component in the defense industry, used in modern ammunition technologies and various propulsion systems due to its **high energy density and controlled reaction characteristics**. Its role as a **key ingredient in double-base formulations for both spherical gunpowder and extruded powder production** further underscores its strategic importance. Because nitroglycerin is extremely sensitive and highly reactive, its production requires **fully automated, closed-loop, and high-security** process infrastructures where traceability, process control, and safety mechanisms are integrated into a unified system.

Nanografi is currently carrying out the engineering and planning phases for the establishment of a dedicated nitroglycerin production facility. Upon the completion of these stages, the plant is planned to be commissioned in early 2026, with **production operations beginning within the same year**.

The facility will be designed in accordance with international safety standards and environmental requirements, ensuring the **safe, sustainable, and standards-compliant** production of nitroglycerin for defense applications. Through this program, Nanografi aims to provide the defense sector with a **long-term, strategic production capability**, supporting double-base solutions required for both spherical and cylindrical propellant manufacturing.





# Nitroguanidine Production Plant

Nitroguanidine is an energetic material that serves as a **key functional component in triple-base propellant formulations**, owing to its **exceptionally low flame temperature, high thermal stability, and well-controlled combustion behavior**. Its chemically stable structure and broad applicability position nitroguanidine as a **strategic intermediate** within modern ammunition and propellant technologies.

Nanografi has initiated a **comprehensive R&D-driven development program** to address both national and international demand for nitroguanidine. The program encompasses systematic laboratory-scale studies, including **chemical synthesis optimization, process safety assessments, purity enhancement**, and **performance validation** to establish a robust and scalable production methodology.

**In accordance with the defined roadmap:**

- The **nitroguanidine pilot production facility** is scheduled to be commissioned in **2026**,
- In **2027**, based on validated R&D outputs and process-maturation activities, the **scale-up phase** will be completed and transition **to full industrial-scale production** will be achieved.

The production infrastructure will be engineered in compliance with **international safety regulations, environmental requirements**, and **advanced quality-assurance protocols**, incorporating modern traceability and process-control systems across all operational stages. Nitroguanidine production is also governed by the requirements outlined in the **MIL-N-494A** military specification. Nanografi's expert engineering team oversees the end-to-end program using an integrated methodology covering **R&D, pilot-scale validation, and industrial-scale deployment**.



# Extruded Powder Production Plant

Extruded propellants are an advanced class of smokeless powders used in modern ammunition and specialized propulsion systems, distinguished by their **high thermal stability, controlled burn performance, and reliable ballistic characteristics**. Typically manufactured in single- or multi-perforated cylindrical grain forms, this type of propellant is widely preferred across standardized ammunition platforms in various calibers.

In line with the growing needs of the defense industry, Nanografi has initiated investments in the **turnkey design, installation, and commissioning of extruded propellant production facilities**. Within this scope, we are developing an integrated solution model that brings together **process design, quality management, automation integration, operational training, and facility operation consultancy**.

Our extruded propellant facilities are structured in compliance with **international safety standards, environmental requirements, and NATO compatibility criteria**, and are supported by modern traceability and quality-control infrastructures. This approach ensures that production processes are carried out safely, consistently, and sustainably, while facility personnel are enrolled in a comprehensive training program delivered by our expert team, covering operational competencies, safety protocols, and product classifications.







# Modular Charge System

The **Modular Propellant Charge System** is an advanced propellant approach that enhances **firing accuracy, safety**, and logistical efficiency in modern artillery ammunition. As Nanografi, we have initiated investments to address global demands in this field by undertaking the **turnkey design, installation, and commissioning** of modular propellant production facilities.

Our solutions extend far beyond facility installation and include an **integrated service model covering process engineering, quality management, automation integration, operational training, and facility operation consultancy**. Designed in full compliance with **NATO standards**, international safety regulations, and environmental requirements, our facilities utilize **modern automation infrastructure** that enhances **traceability**, reinforces **quality control processes**, and ensures a high level of **operational safety**. Through comprehensive training on production operations, safety procedures, and module-based classifications, our expert team ensures **efficient and sustainable facility operation**.



# Automation

## Systems of *Industry*

Nanografi develops advanced automation systems powered by Industry 4.0 technologies, offering high-efficiency and precision for various industrial applications.

Applications include firearms and ammunition assembly lines, ballistics component handling and inspection, explosive material processing automation, precious metal packaging and banderoling, chemical plant process control, battery and energy system production lines, and integrated quality control systems.





**CASE 1:** Established by **Nanografi**

# GoldForce

*Energetic*  
*Materials Plant*



**Nanografi is leading the establishment of the Integrated Gunpowder Plant, one of the largest facilities of its kind worldwide, located in the Sungurlu Industrial Zone.**

Spanning over 1630 acres, this plant is engineered to fulfill both domestic and global market demands, with its production capabilities projected to generate significant revenue. This strategic initiative positions the plant as a key player in the international defence manufacturing landscape.



## Defining <sup>the</sup> Scope of the *Integrated* *Energetic Materials Plant*

**GoldForce Energetic Materials Plant** is noted for being one of the quite rare plants in the world to produce **Spherical Gunpowder, Nitrocellulose and Nitroglycerin concurrently with its advanced waste management system and high-technology infrastructure.**

The successful completion of the Spherical Gunpowder, Nitrocellulose, and Nitroglycerin production units has been finalized. Subsequently, Phase 2 has been initiated, covering the production of Extruded Powder, Nitroguanidine, and the Modular Charge System.





## CASE 2: Established by Nanografi



# MKE's Nitrocellulose Plant

Nitrocellulose is a crucial material in today's defence manufacturing landscape, serving as a vital component that must be produced with advanced automation processes.

Understanding the critical importance of Nitrocellulose, **Mechanical and Chemical Industry Corporation (MKE)**, a subsidiary of the Republic of Türkiye Ministry of National Defence, has initiated a substantial project with Nanografi:

**"The installation of a state-of-the-art Nitrocellulose Plant in Türkiye."**

# Strengthening Türkiye's Defence *Manufacturing* Capabilities

This project marks a significant milestone in the advancement of the country's defence manufacturing capabilities, aiming to meet the growing demands of the defence industry.

This new nitrocellulose gunpowder plant, is designed in accordance with **cutting-edge automation systems** and equipped with the latest technology, ensuring high quality production and efficiency. Nanografi Reaction is also adding value to the defence industry by offering a **long-term maintenance and repair commitment** for the plant.

# Achievements and Impact

The establishment of the **GoldForce Integrated Gunpowder Plant** and **MKE's Nitrocellulose Gunpowder Plant** represents significant achievements in advancing defence manufacturing capabilities. These collaborations have elevated domestic production in Türkiye and set new technological benchmarks for future plants with **Nanografi's** expertise.



## Project Management Services

Our project management professionals oversee every aspect of your project—from planning and scheduling to resource allocation and quality assurance—ensuring timely and on-budget completion.



## Conceptual Engineering

We transform your idea your initial ideas into comprehensive plans, evaluating technical feasibility, budget requirements, and overall project goals. This high-level engineering foundation sets a clear direction for the subsequent project phases.



## Detailed Engineering

Our detailed engineering services solidify the project scope through meticulous design and documentation. We provide clear specifications, drawings, and data sheets to facilitate efficient procurement, construction, and operation.



## Front-End Engineering Design (FEED)

In FEED, we refine project requirements, define the scope more precisely, and estimate costs. Our approach helps identify potential challenges early on, leading to more accurate budgeting and smoother execution phases.



## Procurement and Logistics Management

We manage the entire supply chain process—from vendor selection and materials sourcing to delivery tracking and inventory management. By coordinating procurement and logistics, we help keep projects on schedule and within budget.



## Commissioning and Technical Support

Our dedicated commissioning team ensures that all systems and equipment function as intended once installed. We provide ongoing technical support, troubleshooting, and performance optimization to guarantee a smooth operational launch.



## Risk Analysis & Process Safety

Safety is a core priority in every project we undertake. Our risk analysis and process safety services include comprehensive hazard assessments, regulatory compliance checks, and the implementation of robust safety systems. We assist clients in identifying and mitigating risks, ensuring potential issues are addressed before they escalate.



# THANK YOU



BEYOND  
THE  
FUTURE