



Oil & Gas

Life Sciences

Special Technologies

Special Technologies

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Who we are

GST is a Rome-based engineering firm that specialises in international industrial projects. We use our knowledge and experience of *Industrial Processes* – in the fields of *Oil Refining*, *Pharmaceuticals*, *Renewable Energy*, *Aerospace*, etc. – to develop the range of skills and capabilities that enable us to provide high-quality services, in relation to the various plant design phases and disciplines. Building up on our core **Process Design** expertise, we can now meet the all-round needs of our Customers delivering *Consulting*, *Engineering*, *Procurement* support and *Construction* and *Commissioning* supervision services, as well as complete *Turnkey* solutions for small-scale plants or plant units.

This brochure illustrates the activities we carry out and the services we provide in the **Special Technologies** Sector. For more information please visit our website at www.gstengineering.it and email us at info@gstengineering.it.



What we do

The **Special Technologies Sector** in which we operate (*references*) and in which we have built up our expertise (*competencies*), the **Disciplines** we master and the range of **Services** we provide.

The Special Technologies Sector

“**Special Technologies**” groups the GST activities relating to *Renewable Energy*, *Environmental Protection* and *Aerospace*. The word “*Special*” is a reference to state-of-the-art technologies that require, for each Sector, high-intensity skills and capabilities and ongoing training. *Renewable Energy* and *Environmental Protection* can also be grouped separately under the heading “**Green Tech**”. In particular, the term *Green Tech* may be applied to all the disciplines aimed at monitoring and mitigating the impact of human beings on the environment, with the target of achieving “*Sustainable Development*”.



GST engages in the most widespread **Contract** arrangements (e.g.: *Reimbursable, Lump Sum of Services*, etc.), according to Customer needs and Project characteristics. In the case of small-scale Plants, GST also operates on a *Target Price, LSTK* or *Converted LSTK* basis.

The table below summarizes GST's range of contractual capabilities in the Special Technologies Sector:

Typical Plant Value (1.000 euro = 1k euro)			GST Services
	Large-scale Plant	> 30.000 k€	Consulting, Design, Procurement support and Construction supervision EPC Management TurnKey - LSTK
15.000 k€ <	Medium-scale Plant	< 30.000 k€	
	Small-scale Plant or Plant Unit	< 15.000 k€	

Following are several peculiar aspects, and the relevant GST skills, with respect to each sector.



Renewable Energy

In the **Renewable Energy** sector, in particular, which is expected to develop considerably in the short term, GST has specific expertise in the production of *alcohol fuel*, the use of *biomass* energy and the production of “*solar grade*” polycrystalline silicon: at GST, therefore, we can support Customers with regard to both Processes (e.g.: *single/multiple product units, hydrogenation, fermentation, downstream processes*) and Detailed Design, as well as in the supervision of Construction and Start-up activities.

Environmental Protection

With regard to **Environmental Protection**, thanks to our process experience, we can carry out projects for preventing emissions and treating gas, liquid and solid effluents, in accordance with the Italian *Legislative Decree No. 152/2006*, the *European IPPC Directive* and the international *EPA, OSHA*, etc. standards, based on an assessment of the current situation and of the impact involved by the new investment, and on the definition of mitigation proposals. Moreover, GST can develop the relevant Detailed Design, relying on the assistance, if necessary, of experts from academic institutions, and build the effluent treatment plant under the Customer’s preferred form of contract.

What



Aerospace

Aerospace technology generally covers the manufacturing and operation of any type of aircraft or missile, and of propulsion units and their components, such as fuels and propellants. In particular, cryogenic fuels and propellants (*liquid methane* and *liquid oxygen*) are increasingly used for the new carrier rockets, with a view to cutting back costs and minimizing their environmental impact. GST participates – on behalf of its Customers operating in this sector – in projects concerning the testing and use of cryogenic products, both by conducting tests on board the carriers, and in the conversion, as appropriate, of the relevant ground feeding facilities.



Disciplines

The core activity of GST is **Process Design**, which is closely tied to **Detailed Design** and all the Engineering disciplines needed to build a plant. Following is a brief description of these disciplines and what GST can do for each of them.

What





Process Design

On the basis of its background in **Process Design**, GST can develop complete *Process Packages* for any type of Unit, in the Renewable Energy, Environmental Protection and Aerospace Sectors, including the relevant utilities, generally integrating Customers' specific know-how. A Process Package should be considered as an integrated set of documents, ready to be utilized as a basis for developing the **Detailed Design**.

Engineering Disciplines

GST can also rely on a number of highly-qualified specialists in the various **Engineering Disciplines** (*Civil Works, Pressure Vessels, Piping, Machinery, Heaters and Boilers, Electrical, Instrumentation and Automation, Telecommunications*). The *multidisciplinary* nature of all the sectors in which GST operates – as well as the ongoing market trend that requires *Contractors* to deliver all-round services, regardless of their size – necessitates the capacity to engage in increasingly broader fields and state-of-the-art specialist sectors.



Services

At GST we offer a broad range of **Services**, which can be grouped into two main families: **Consulting Services** and **EPC Services**. In particular, GST operates as a **Consultant** in **Process Management** and **Project Management**, to identify and meet its Customers' business needs, by means of competitively priced professional services. With regard to EPC Services, at GST we have the know how to cover every phase in the implementation of an industrial Plant, targeting both the **Construction of New Plants** (*Grassroot or Expansion*) and the **Upgrading of Existing Plants** (*Revamping*). Thanks to our background, GST can provide special expertise in the Special Technologies Sector, by managing the relevant technical aspects, assisting Customers from the R&D phase through the entire Project development, up to the preparation of suitable "*issued for construction*" documents. A detailed description of GST's *Consulting Services* and *EPC Services* for the Special Technologies sector is given below. Furthermore, several examples of *Consulting Service Packages*, in respect of which GST's experience may be found to be very useful and valuable, are also shown, as an example of GST's know-how in the Special Technologies sector.

What



Consulting Services

GST **Consulting Services** may be generally divided into **Technical Consulting** and **Project Management** Services and several **Consulting Service Packages** tailored to the Special Technology sector.

Technical Consulting and Project Management

Technical Consulting and **Project Management** are the services typically provided by an Engineering Firm, to support Customers across the spectrum of Project development Phases and Disciplines. In order to be effective, Consulting Services must be accurate and based on specific expertise and skills, as well as timely and tailored to the Customer's needs. GST's streamlined and flexible structure is particularly suited to delivering these services.



Conceptual Design

Conceptual Design is the initial critical phase of any Project, when the outcomes of the R&D activities must be converted into a Preliminary Design of the future plant, and when each decision may significantly affect the possible implementation of the Project. GST has the appropriate resources and the experience to assist the Customer's R&D Department, during all and any step in this phase.

Feasibility Study

The **Feasibility Study** is the decision-making tool for establishing whether and how to proceed with an investment. The Feasibility Study includes a number of steps, such as *Technical Analysis*, *Market Analysis*, project *Cost Estimate*, an analysis of the financial resources and a *ROI (Return On Investment)* report. In the Special Technologies Sector, GST can assist its Customers in defining the investment scenario and thoroughly investigating the relevant technical and commercial aspects, as well as performing a detailed analysis for each step.



Technological Risk Analysis

Technological Risk Analysis are also part of our Consulting services: GST can conduct this kind of analysis based on the most appropriate assessment procedure for the specific process and the relevant implementation phase [e.g.: *PHA* during the Feasibility Studies, *HAZOP* and *SIL (Safety Integrity Level)* during the design phase, etc.].

Project Management Consulting

GST, in Special Technologies sector, can operate as a **Project Management Consultant** to identify and meet a Customer's business needs, by cooperating in the selection of the most suitable state-of-the-art technology and providing competitively priced professional services.



Consulting Service Packages

In addition to the above mentioned Consulting Services, GST also provides several **Consulting Service Packages** – based on GST's invaluable experience in the Special Technologies Sector – which represent an all-round answer to certain specific project problems.

Conceptual Design for Fund Appropriation

Sometimes, Customers need to prepare a **Conceptual Design** for the possible implementation of new production facilities, or the expansion of the existing ones, containing a concise description of the scope and benefits of the Project, to be presented to the Top Management, in connection with the annual budget. GST is available to support the Customer in preparing both the technical report and illustrating the reasons for the investment, also developing, if required, a profitability analysis complete with an overall Project schedule and a $\pm 30\%$ cost estimate. As a next step, GST may support the Customer in preparing a Preliminary Project (*Basic Design*), together with a $\pm 10\%$ cost estimate for Project approval and the go ahead for construction.



Customer R&D Support

GST has the expertise to assist Customers during the development of a new product or a new process, in the implementation of a pilot plant, for selecting the most suitable plant size, providing preliminary cost estimates and, generally speaking, supporting the Customer's scientific know how throughout the Project's implementation, with appropriate technical assistance and Project Management services. GST can also assist Customers in preparing *Industrial Patent Registration Applications*, by providing a suitable description of the invention, defining the relevant claims and selecting the most appropriate patent office.



Contract Management

A Customer, after having awarded a contract for implementing a Project, may require assistance in order to better review a Contractor's activities. Assessment and support activities, in fact, are necessary not only in case of reimbursable type Contracts (e.g.: the Contractor may request a refund for any items not actually due, etc.), but for LSTK Contracts as well (e.g.: the Contractor may issue a number of Variation Order Requests, which then need to be evaluated and discussed). GST can step in, with its experienced staff, to support the Customer and protect its interests.

What





Permits

Permit applications can often cause quite a headache, involving, as they do, in succession, the preparation and updating of an *Environmental Impact Analysis*, the preparation of the building permit application, with the relevant support documents, the application for commissioning the plant, with the relevant permits from the fire fighting authorities, etc. GST can conveniently prepare any type of document requested by the competent Authorities and support Customers in all aspect of permit application management.

Appraisal of Local Vendors and Subcontractors

In some cases, a Customer may need to carry out an assessment and preselection of local Vendors or Subcontractors, at short notice, before issuing a Request for Proposals for the supply of materials or construction activities. GST can perform fast and accurate assessments thanks to its qualified and experienced staff.



Process Control

From the Basic Design phase, and throughout the implementation of a Project, it is important to outline a *Preliminary Control System Architecture* and select the most suitable state-of-the-art technology, as well as to evaluate the possibility of utilizing special technical options, such as the *Fieldbus* or *Wireless* technology. It is therefore necessary to manage the various process control steps, from the preparation of the requests for proposals for the supply of *PCS*, to the preparation and implementation of the *FAT* and *SAT* procedures, also based on the S/W management and the access control policy. GST has the qualified resources to assist Customers throughout the Process Control cycle.

What



Staff Training

GST can also provide qualified services for Training Staff members, Supervisors and plant Engineers, by means of classroom sessions and training simulation programmes, ensuring improved self-confidence when interfacing with Plant facilities, in connection with both normal operations and emergencies situations. State-of-the-art dynamic simulators provide an effective and reliable reproduction of process plant performance, taking into account all the equipment and relevant control systems, and simulating the operations and response of the process variables when the input data are changed: however, staff should be accurately trained in order to take full advantage of the capabilities of these systems.



Quality Assurance

At GST we make it a point of assisting our Customers, with specialized staff, in respect of all types of Project, irrespective of size, to prepare the *Project Quality Plan*, conduct the audits and manage any non-conformities. Also, GST is prepared to provide the services for directly performing - or managing the performance by others of - the necessary Plant Qualification activities. The Project Quality Plan is always tailored to the specific Validation requirements of each project.

What



EPC Services

Design and Engineering

In the Special Technologies sector, GST can develop an all-round **Process Design** Package, based on the specific and different know-how that are distinctive of this type of Plant. GST can also develop complete **Detailed Design** packages enabling the Site staff to efficiently carry out all the requisite activities, avoiding delays and potentially costly rectification on site. In particular, GST is capable of developing Detailed Engineering activities, based on the Customer's – or its own – General Design Specifications, tailored to the Project characteristics. We need to highlight, in this respect, that our engineering activities are always developed based on the *"Intrinsic Safe Design"* approach, which involves strict compliance with the European (e.g.: *ATEX, PED, EN 61511*) and international standards, or with the best engineering practices, in the latter case, whenever the available standards are not up-to-date and in step with the most state-of-the-art technologies, as in the fastest-growing sectors.



Procurement

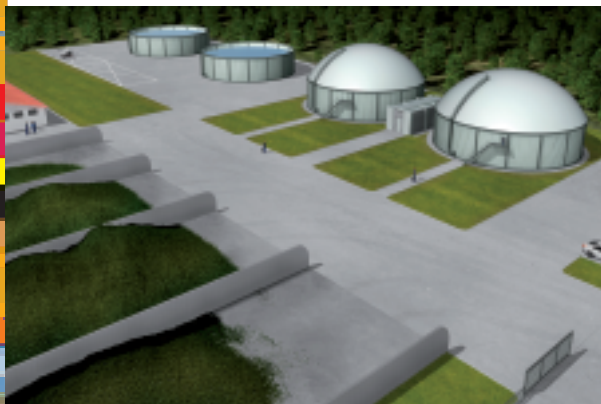
In the Special Technologies sector, GST can provide all-round **Procurement** services on the basis of the **Integrated Materials Management** principle, i.e.: from the preparation and issuing of the request for proposal to the arrival of the materials at the Site. In particular, the *Expediting* and *Inspection* activities are carried out by qualified specialists, as part of the supervision and monitoring of the entire production phase, with a view to ensuring compliance with the delivery schedules and design specifications. Procurement activities may be carried out – in conjunction with the Engineering activities – on a *turnkey* basis, with the integrated management of all the Plant equipment and materials.

What



Construction, Commissioning and Start-up

GST can assist in both preparing the requisite construction subcontracting documents and in the supervision and coordination of Field activities, including the approval of the progress reports by the Subcontractors and auditing the relevant invoices. GST can also provide support services for plant preparation, test-run procedures, validation of the test run reports, troubleshooting and instrument data reconciliation. In the case of small-medium scale Plants, GST can deliver all-round management services, from **Pre-Commissioning** to **Commissioning** and **Start-up**. These services, in the case of *small/medium* size plants can be delivered - in conjunction with the development of the Engineering activities - on the basis of a turnkey type Contract.



EPC Services for Revamping Projects

Thanks to our background, at GST we can provide special expertise in this special type of Project, by managing the relevant technical aspects and preparing suitable construction documents. Revamping Projects require an accurate planning of the Plant shutdown, both in terms of date and duration, as well as a special design approach, in order to maximize the works that can be carried out before the shut-down. GST's experience can be useful to optimize the overall schedule and minimize loss of production. We ensure a special focus on safety, in particular as regards equipment layout definition, analysis of peaks of manpower, the necessity of work round the clock and in confined spaces, etc.

What



How we do it

The basis of the GST organization, how we organize our resources and the techniques we apply to tackle problems in the Special Technologies sector.

Project Organization

GST is a *Customer-Oriented Company* built on an in-depth knowledge of the industry in which it operates. Special Technology Projects – which require a different, albeit equally sophisticated, know-how – are also best tackled according to a **Task Force** approach, due to its flexibility and to the fact that it ensures a fast exchange of information. However, the **Project Organization** is constantly monitored and tailored to the Project characteristics: for example, in the Special Technologies sector, GST often applies the “**Integrated Management**” method, according to which the expert responsible for preparing the equipment specifications and the request for proposal also supervises the later stages of the procurement process, from issuing the relevant order to shipment to the site.



Quality Management System

Quality Assurance is an inherent component of GST's operating procedures. At the beginning of every project, in fact, we define a dedicated and detailed Project Implementation and Control Plan, covering both the design and the implementation phases, to avoid any major changes further along the line, as a result of any misunderstandings in the Project's targets. The development of this implementation plan also facilitates the involvement, from the start, of the *Customer's Production Department*, in respect of the definition of the *User Requirements* and general *Project Specifications*.

How

Planning

GST develops both general and detailed **Project Schedules**, on the basis of *Project Milestones*, and the succession and length of activities, and monitors Project progress and development by means of a dedicated software, based on network charts and the *Critical Path* method.

Estimating and Cost Control

GST can prepare preliminary or detailed **Cost Estimates**, according to the status of the Project; we also prepare Project budgets and perform **Cost Control** activities, throughout the Project's life cycle, evaluating the forecasted cost of the Plant and identifying any corrective actions.

Project
NetSociety - Rome

Design
Aton - Rome

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