

Subject of the demand / Technological requirement:

1. Strengthening of ceramic and glazed porcelain tiles for resistance against abrasion

Areas of use: Glass and ceramics Industry, stone Industry, building Industry

Description of the demand:

Porcelain tiles possess low porosity and high mechanical strength, with particularly good resistance against freezing and staining. Likewise, this type of tile possesses high resistance against abrasion. The open porosity of porcelain tiles is low with maximum water absorption of 0.5%, as determined by standard ISO 13006. Actually, there are closed pores within the body of the porcelain tiles, which cannot be disregarded. This type of porosity has a considerable impact on the tiles mechanical strength and resistance to freezing. Porcelain material has been produced globally since the 1980s. Italy can be recognized as the first country to have produced this material and to have expanded its required technology. This technology was expanded through the invention of a new type of roller furnace, continuous wet mills and strong press machines, which allowed for production of parts with bigger dimensions. For the first time, unglazed porcelain tiles were being sold specifically to industrial centres and other organizations that required surfaces with a high level of resistance. New systems were then utilized for improving the appearance of these products such as the sub process, colour pressed powder and organic-mineral pigments. Glazing of porcelain tiles and production of larger sized tiles have become common practice in recent years and have allowed for these products to be used in new markets, thereby allocating part of the natural stone market to porcelain tiles. The above factors resulted in a significant growth in porcelain products in the 1980s, from a few million cubic meters to approximately 130 million cubic meters in Italy and 20 million cubic meters in Spain. Currently, global production of porcelain tiles is in excess of 400 million cubic meters, 40% of which is allocated to Italy. Growth in use of these products has led to increased research to evaluate the relationship between microstructures, process conditions and mechanical properties.

As scratching of glazed porcelain tiles limits their functionality in many cases and because shiny glazed tiles have low resistance to abrasion, there is a requirement for production of porcelain tiles with shiny glazing, which retain high resistance to abrasion, in order to improve the quality of products and compete against foreign and domestic products. Therefore, this major ceramic and tile company plans to interact and cooperate with the holders of this technology in order to strengthen glazed porcelain tiles against abrasion.

Subject of the demand/ Technological requirement:

2.Design and construction of a permanent pressure and temperature monitoring system inside oil and gas wells

Areas of use: Oil and gas Industry

Description of the demand:

With regards to engineering and managing reservoirs, possessing up to date and accurate real-time information of well parameters such as temperature, pressure and flow rate is the first step in the process of creating smart wells and reservoirs. Thus far, domestic companies have been deprived of such information because of economic sanctions and technology manufacturing companies have been limited because the required technology is highly advanced. Because of this, well engineers have had to rely on estimating well parameters based on superficial information, which has low accuracy and takes a long time to update .In this field, devices that measure pressure and temperature in oil and gas wells are classed as downhole equipment and are composed of four main sections; sensors, electronic boards, battery and outer body. By installing this device, parameters such as temperature, pressure, flow rate and etc. can be measured in real-time, thereby allowing complete and accurate information to be derived from wells. Some of these sensors are installed on the surface (surface sensors) and some are placed within the well (downhole sensors). Downhole sensors must be capable of withstanding high temperatures within the wellbore and must be manufactured in a manner that allows them to function efficiently at temperatures of 200°C and pressures of 200,000 psi. Additionally, these sensors must be functional for a long period of time. Therefore, the materials used in the construction of such equipment must be selected carefully. Another point that should be considered is that information gathered by sensors must be sent to a location that is further away from the surface, a process that requires vast amounts of energy. To this end, solar batteries can be utilized to provide sufficient energy. When the sensor is installed in the downhole to transmit collected information (a process that can be accomplished by different methods such as wireless transmission), this system enters the annulus from the packer via tubing and is placed in a suitable location, a process that requires numerous equipment for its consolidation. In the past, for managing and developing wells and collecting data, tests were performed prior to the beginning of production. Collection of such data could take months or even years thereby causing problems in production. Therefore, to reduce cost and time, permanent monitoring systems were sought in order to record data and send it to the surface. This information is valuable for production and can consequently increase the lifespan of wells. For this reason, such technology is being considered for use within the oil fields of Iran because intelligent extraction will result in increased production in the long term. To this end, the behavior of wells and reservoirs should be analyzed using special software. The most important data for use by the software is information derived within wells, from different layers, which has never been performed in Iran. Therefore, this major oil and gas well drilling company plans to interact and cooperate with the holders of this technology to work in the on the “design and construction of a permanent monitoring system for assessing pressure and temperature within oil and gas wells”.

Subject of the demand/ Technological requirement:

3.Design and construction of a Measurement While Drilling (MWD) system

Areas of use: Oil and gas Industry

Description of the demand:

MWD systems are essential and routine equipment that are used by western companies, whereas domestic companies only use these systems in special circumstances. Failure to purchase and make use of this system has resulted in a significant need to design and manufacture it within the country. The major advantage of the MWD system in excavation is that it provides information on the location and direction of BHA within the well, without interfering with drilling processes. In the simplest form, the MWD system is equipped with sensors that show the inclination, azimuth, and direction of BHA within the well. However, more advanced down hole tools of the MWD system that are known as LWD, are equipped with more sensors, some of which include: sensors that determine the petro physical properties of formations (permeability, porosity, gap distribution etc.) And sensors that determine drilling information (weight of drill bit, WOB, and torque). Some of these sensors are gamma-ray devices and determine the electrical conductivity of formations. These sensors therefore transmit large amounts of data from the mud to the surface. Likewise, the MWD system is equipped with a system that transmits information from the drilling mud to the surface. Transmitted information is then decoded and presented in numerical or chart format. The system that wirelessly transmits the information derived from sensors is known as mud pulse telemetry. Diagram (6) shows a schematic drawing of the MWD system and its components. It is also possible to determine the position of the BHA within the well, without requiring the MWD. This method requires a piece of equipment called a wire line, a technique that relies on running the wire line tool, recording data and pooling the data gathered from the drilling pipe. Usually, gathering information from the position of the BHA using the outdated method of wire line takes 1-2 hours whereas the MWD method takes approximately 4 minutes. Despite the very high costs of the MWD system in comparison to the relatively cheap wire line system, the speed by which the MWD system collects data and saves time makes it much more profitable than its initial costs. In addition, the wire line method has a major limitation in that it cannot be utilized in horizontal wells. This is why drilling companies prefer and require the MWD system. Therefore, manufacturing such a system is the aim of this company.

Subject of the demand/ Technology requirement:

4. Technical knowledge for the production of basalt fibre

Description of the demand:

Basalt fibres (volcanic) have superior strength, heat tolerance, durability and resistance against infrared rays in comparison to glass fibres, making them a suitable replacement for glass fibres. Basalt fibre possesses excellent elastic (high tensile modulus or Young's modulus) properties and they are a perfect substitute for carbon and aramid fibres. The fibres are prepared from completely neutral volcanic rock, which poses no environmental threat and can be easily used in a variety of resins and industrial plastics. This fibre is able to meet the needs of the global reinforced materials markets and advanced composite products and it can be utilized in different branches of industry such as aerospace/aviation, automotive, construction, underground constructions, roads, pipe installation, Corrosion Resistant Equipment, Marine, security and defense, marine constructions, insulation and etc.

Iran has large reserves of unexploited basalt. Many countries have been producing basalt fiber for several years while Iran has been lagging behind in the production of these fibers.

We can witness large resources of basalt in our beloved country, which can be a significant source of wealth for Iran.

Making use of these basalt resources and producing fibers from them does not require heavy investments. The investment cost of building a factory that produces basalt fibers with a production capacity of 20-25 thousand tons per year is estimated to be 15-20 billion Tomans. To this end, this major construction company plans to interact and cooperate with the holders of this technology in order to gain technical knowledge and to produce basalt fibres. The companies aim from gaining this technical knowledge it to produce basalt rebars. Currently, the technology for creating these rebars is available in developed countries while Iran does not yet possess the technology, it does have large basalt reserves. Therefore, by producing this type of rebar and because of the variety in the materials market, construction costs will be reduced.

Subject of the demand/ Technological requirement:

5. Manufacture of a new generation of blocks with acoustic and thermal insulation properties

Description of the demand:

Ever since the new generation of blocks have replaced building clay, it is no longer necessary to insulate such traditional materials, which has led to economic savings and better execution speeds. In general, acoustic and thermal insulated blocks are divided into different types, the most important ones being concrete blocks, chalk blocks and polystyrene blocks.

Light concrete blocks are one of the best insulators of heat and cold that can be used within buildings. This is due to the porosity that it possesses, specifically because of the high number of tiny air bubbles that are present within it. This property prevents large amounts of energy from being wasted and according to article 19 of the national building regulations; these blocks fully comply with requirements, at the standard thickness. The high level of heat resistance that light concrete blocks possess results in a lower rate of heat transfer within them, which provides several advantages. One of these advantages is the reduction of energy wastage, which is beneficial in winter as it prevents the transfer of heat from the inside to the outside of buildings and in winter as it prevents the transfer of heat from the outside to the inside of buildings. Under the same circumstances, the heat resistance of wall made of light concrete is equivalent to the heat resistance of an ordinary concrete wall with 10 times the thickness.

Because the specific raw materials are readily available and also due to the uniform distribution of air bubbles, light concrete blocks are considered to be a very suitable material for acoustic insulation. An important point worth mentioning is that the porosity and pitted nature of the block is of the closed type, which means only a small amount (approximately 10%) of the moisture that reaches the block will be absorbed. With water absorption being so low, operations such as cementing and ceramic tile work can be carried out on it with ease.

If these blocks, which have great diversity and compliance with building structures within the country, were to be produced, they would not only help to increase the speed of construction but also save large amounts of energy. Therefore, this major construction company plans to interact and cooperate with the holders of this technology in order to produce this new generation of thermal and acoustic insulated blocks.

Subject of the demand/ Technological requirement:

6. Manufacture of new building materials from construction/demolition waste and recycled materials

Description:

In many cases, an increasing population leads to a lack of services such as waste management services. The deficiency in proper waste management that exists in developing countries leads to public health, aesthetic, environmental and economic problems. Therefore, serious action is required for proper waste management. The major components of construction debris are: mortar, sand, cement, concrete, stone, and pieces of plaster, wood, plastics and metals. The derived evaluation shows that on average, 19000 tons of construction waste is generated in Tehran daily and experts believe that up to 70% of these components can be recycled. These recycled materials can be reused following addition of other materials that are of a higher quality. Recycling leads to increased economic efficiency in the long run. The most important factors that justify the recycling of construction debris include: the high costs of raw materials, the cost of transporting waste from production to disposal sites and waste disposal costs. In terms of the environment, less pollution is created and less land is required for use as a depot. Currently in Iran, concrete is being recycled to produce stone granules for production of the base layer of asphalt. Therefore, these stone granules are rarely used for construction materials. By creating construction debris recycling units for different components including concrete recovery, recovery of metals and recovery of plastic materials such as upvc, each of these materials can be utilized separately. Therefore, this major construction company plans to interact and cooperate with the holders of this technology in order to create novel construction materials from construction debris and recycled materials.

Subject of the demand/ Technological requirement:

7. Extraction of water from discharged steam of cooling towers in the power plants steam unit

Description of the demand:

The circulating water for the cooling system of the steam unit enters the wet (or open circuit) cooling towers after absorbing heat, so that this heat can be transferred to the environment. Heat transfer takes place through heat exchange with air. Because of this type of cooling tower, which is required for the interaction of air and water, some of the flowing water in the tower is converted into steam as a result of heat exchange and enters the environment through the outlet of the cooling tower.

Due to the high flow rate of water, a significant amount of water vapor is released into the environment annually and if water can be extracted from this steam, it will result in savings that are very valuable in the current crisis of water resources. Therefore this project will be very valuable economically. According to information from the center for strategic studies, based on the water consumption per capita, Iran is one of the countries in a group that is facing physical water scarcity. This group consists of countries that are facing physical water scarcity by 2025, meaning that even with the highest possible efficiency in water expenditure; these countries will not have enough water to meet their requirements. The hot and dry climate of Iran, along with mismanagement of water resources and the thirst for development in industry and agriculture are the main factors in the water crisis in Iran. It is clear that taking even a small step towards reducing water consumption or producing water will be very valuable. Retrieving and extracting water from steam that is released from the wet cooling towers of power plants or proposing a plan that will reduce the rate of evaporation will result in water saving, environmental benefits and reduction in costs. Therefore, this major power plant company plans to interact and cooperate with the holders of this technology in order to strengthen their efficiency in extraction of water from discharged steam of cooling towers in the power plants steam unit.

Subject of the demand/ Technological requirement:

8. High tech and smart operating tables

Description of demand:

One of the basic supplies of any operating room in all hospitals is the operating table. The patient lies on the operating table for the duration of an operation and so it should be capable of being easily set into different positions to ensure a stable position for the patient and to provide the best line of sight to the organ that are being operated on. Common features of all operating tables are: height adjustment, ease of maneuverability, spongy detachable and washable mattress, slope adjustment, etc. Despite the spectacular developments in hospital operating tables in recent decades, there are also unsolved problems in this field. The purpose of defining this project is to transfer technology and essential equipment in order to manufacture smart beds for operating rooms. The expected features of the beds are as follows: 1- remote control system: observes the patient's condition momentarily and sends certain information to the doctors such as body temperature, heartbeat, oxygen and blood pressure, so the doctor will be able to monitor the patient's vital signs. Moreover it should be able to send warning messages to supervisors whenever change is detected in the patient's condition. 2- Combat the expansion of pollution: using appropriate ventilation is very effective and beneficial for the patient's treatment. Meanwhile it is expected that the smart operating tables would be able to ventilate and sterilize the air inside the room. This is beneficial in all parts of the hospital, especially in specific parts where special ventilation systems are required, such as in operating rooms. The machine should be able to activate the ventilation system as soon as it senses pollution or unpleasant odors and it should function to completely purify the air around the patient's bed by activating the ventilation system in a matter of minutes in order to completely purify the air around the patient, to a level that has been previously set with sensors. This results in complete purification of air that is free from any pollution, thereby preventing disease outbreak, which can arise from aerobes, microbes, allergen substances, mites, spores, fungus and infectious diseases. Therefore this operating table prevents the spread of gasses and other pollutants. 3- Preventing the occurrence of fire: fires can result from liquids running into the leg of the bed and creating a short circuit in the device's electrical systems. It is expected that operating tables would be insulated against liquids to prevent dripping into the leg of the device and making contact with the electrical connectors of the bed. Other purposes of defining the technology transfer project include: anti bedsores system, massage system, warm-up exercises system, muscle stimulation system, a system for maneuvering patients on their side, foot stretch system, the 90-degree rotation bed system, etc. (Tabriz Techno-mart manager).

Subject of the demand/ Technological requirement:

9. Manufacturing a machine for automatic seeding of plants/ trees

Description of demand:

Features and capabilities that the stated technology should possess:

Reduction in financial costs and human resources (from 3 people to 1 person) by eliminating the manpower that is required for carrying water, fertilizer and plants to the site of cultivation. Synchronizing the cultivation of plants, watering and fertilizing, with the least consumption of time. Adjusting the exact amount of water and the type and amount of fertilizer for each plant depending on the herbal species. Standardizing the spacing, depth and amount of fertilizer and water that is required for cultivating each plant using a transplant machine. Manufacturing a device which can be utilized by using a simple connector that allows attachment to the tractor. The ability to adjust the depth and diameter of holes. Manufacturing a cultivation machine that can overcome existing problems, especially with carrying plants, water and fertilizer. The technical operating procedures of the machine should be comprised of several levels as such: 1- digging system should be installed on the tractor chassis and on the other hand, connect to the frog jacks of the tractor. The system should have a driveshaft-gearbox and drill so that the rotation of the drill causes the frog jacks to move in the direction of the ground and dig at the correct dimensions depending on the type of tree. The frog jacks must then return to their original position after digging is complete. 2- In the second level, the transplant system should function in a manner that allows for the plant to be moved in a forward direction, and then transferred into the hole. 3- in third levels, the soil that has gathered around the plant should be collected. 4- The tank and fertilizer directing system should be designed for dry manure or granule. The volume of the fertilizer tank should be sufficient for transplanting numerous plants and the fertilizer should be unloaded beneath the tree in a controlled manner. 5- The tank and watering system should have a sufficient water supply capacity for cultivation of at least 100 plants. Required water should be provided by an electric faucet and transferred to the plant along with fertilizer. 6- The device should possess a grader spade. A hydraulic pump board and command board for controlling different sections must also be taken into consideration (Boomerang innovation services network).

Subject of the demand/ Technological requirement:

10. 3D printers for manufacturing gold and jewellery

Description of demand:

Domestically manufactured 3D printers have the disadvantage of being very slow when it comes to making models. For instance, an action that takes 30 hours to complete by an Iranian built machine would be completed in 5 hours by foreign built devices. In addition to running slow, other disadvantages include having high expenses and the inconvenience that the machine suddenly stops at times, resulting in repeat of the process. Ceramic wax cannot be molded in domestic machines, whereas similar samples can be both molded and unmolded. The technology has been developed by reversal engineering or other methods in order to bare the closest similarities to foreign samples. The quality should be to a standard whereby precise and continuous layers are produced with a good level of molding and reduced simulation speed. There are few design limitations because of the requirement for support and omitting the negative slope in models.

Subject of the demand/ Technological requirement:

11. ABS brake modulator

Description of demand:

The ABS brake modulator is a high-tech product. Making investments and deciding on the correct place for investments are problems that are associated with this product. These however can be overcome by providing support. Relevant organizations can act as the second source in Iran and the only source in the province. This means that they can have mass production in Iran. This product is one of the necessities of car security. As one company has the monopoly on the technology of this product and because clients have requested an additional source on many occasions, the involved organization will have the opportunity for mass production in Iran (Khorasan).

Subject of the demand/ Technological requirement:

12. Electric steering wheel

Description of demand:

The electrical steering wheel is a high-tech product. In addition to the accuracy and ease in turning the steering wheel, it also helps to save between 0.3 to 0.5 liters of fuel and omits bioenvironmental contaminants such as hydraulic oil. It hasn't been used in Iran until now and it should be tested by applying the technology used by professional companies. The related organizations can have mass production in Iran as the second source and the only source in the province. Electric steering wheels have been installed on cars since 1995 and technology companies have undertaken vast investigation and investment. Making a direct investment or setting a working capital for cars that are present in Iran is a major concern for investors. (Khorasan).

Subject of the demand/ Technological requirement:

13. Monoclonal antibodies

Description of demand:

These materials will be coated on diagnostic medical kits and they will aid in diagnosing disease following reaction with blood samples. Because of the specific structure of monoclonal antibodies, which are comprised of a combination of 2-light and heavy-protein chains, production of this material is very expensive and difficult. These chains are coded by separate genes. Monoclonal antibodies are one of the most important biologic materials. This kind of antibody is produced by a single clone of lanfosit B cells that recognize only one epitope in the antigen and link with it. It is common to use monoclonal antibodies to identify the origin of a virus (Rozhan Azma manufacturing research).

Subject of the demand/ Technological requirement:

14. Fire resistant electrical board

Description of demand:

Most fires in factories and industrial centers are caused by a short circuit in power boards or electric systems. Therefore, the industrial sector is seeking a technology by which it can manufacture a fire resistant electrical board (Tabriz Techno-mart manager).

Subject of the demand/ Technological requirement:

15. Metal Flexible Hose Manufacturing

Description of demand:

Metal hoses are an indispensable part of modern technology with its high demands on piping systems for a wide variety temperatures, flexibility and temperature resistance.

Applications:

- *Industrial applications*
- *Aerospace*
- *Rail traffic*
- *Automotive*
- *Solar and boiler industry*
- *Heating – ventilation – air conditioning*
- *Gas production*
- *Food industry*
- *Vacuum applications*
- *Steel industry*

Subject of the demand/ Technological requirement:

16. MUD PUMP MANUFACTURING

Description of demand:

The chain driven sprocket from the power source is attached to the pinion shaft and causes it to turn the smaller gear. The pinion drives the large gear i.e. bull gear. The bull gear is attached to the crank shaft, crankshaft turns to give back and forth motion to the connecting rods. The connecting rods are connected to pistons through cross heads. The piston moves to and fro for performing suction and discharge.

Subject of the demand/ Technological requirement:

17. Manufacture of automatic identification tags in the form of labels to place on goods;

18. Technical knowledge for manufacturing radiology film by the dry film processing method;

19. Gate Valve Manufacturing.