▶ *Large-Scale Granulation Pilot Plant*

Fertilizer Technology Program

IFDC

Developing Agriculture from the Ground Up

For more information, contact:
Telephone: +1 (256) 381-6600
Email: general@ifdc.org
Website: www.ifdc.org

IFDC

Developing Agriculture from the Ground Up

The International Fertilizer Development Center (IFDC) is a nonprofit public international organization established in 1974 to help developing countries increase food security through the development and dissemination of fertilizers and application practices that meet the needs of farmers worldwide. IFDC's specialized laboratory and pilot plant facilities, expertise, and experience give the organization a comparative advantage in solving the problems confronting the fertilizer industry, particularly through engineering and technology development.

▶ *Medium-Scale Granulator*

IFDC has three fully continuous pilot-scale granulation plants with varying capacities, two phosphoric acid units (one bench-scale and one pilot-scale) and a bulk blending unit. In addition, IFDC has fully continuous compaction/granulation, batch operations for briquetting, pelletizing, and tableting, as well as a coating laboratory. To complement the research activities, IFDC has analytical laboratories for chemical characterizations and a laboratory to determine physical properties of fertilizer materials.

Technical Services

Pre-Investment Analyses

IFDC uses a variety of techniques and financial analyses to provide clients with an unbiased, understandable, and technically competent analysis of a new venture.

▶ *Small-Scale Granulation Pilot Plant*

Fertilizer Technology Program Activities

- **Design, technical assistance during construction, and startup management of fertilizer production units.**
- **General and specialized technical training programs.**
- **Fertilizer development research.**
- **Fertilizer production for greenhouse and field evaluations.**
- **Product and raw material quality research and development.**
- **Equipment testing and evaluation.**
- **Commercial facility assessment.**

Bench-Scale Laboratory Processing

IFDC houses bench-scale, research, and analytical laboratories for systematic and thorough evaluation of fertilizers and fertilizer raw materials. Capabilities include:

- Wet process phosphoric acid production.
- Production of single or multi-nutrient products.
- Physical and chemical characterization of raw materials and products.
- Preparation of other specialized fertilizers by tableting, briquetting, and pelletizing.
- Coating of fertilizer products.

Pilot Plant Processing

Some engineering properties can only be determined in larger scale continuous production. IFDC pilot plant facilities include units for production of wet process phosphoric acid, production of single or multi-nutrient products, compaction/granulation, and blending. These pilot plants have proven indispensable in researching, developing, and improving new products and processes, conducting process and equipment problem-solving, and training.

Process Design

IFDC process design packages provide the foundation for basic and detail engineering, equipment procurement, and the construction phases of fertilizer plant projects. IFDC laboratories and pilot plants are often used to provide the data needed to prepare process design packages. Such packages, which contain the required material balances, piping and instrumentation diagrams, and equipment data sheets, are then used by the client to secure proposals and bids from engineering and construction firms for full implementation of the project.

▶ *Medium-Scale Dryer*

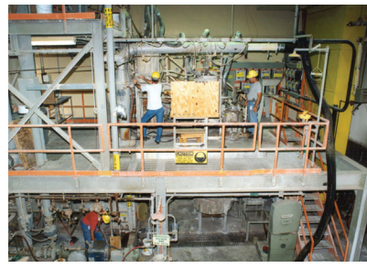
Project Management

In full-scale fertilizer plant development projects, IFDC involvement often begins with assisting a client in preparing bid invitations, evaluating proposals, and drafting and negotiating the contract. During the detail engineering and construction phases, IFDC may continue to assist the client by reviewing the detail engineering, inspecting equipment during fabrication, developing plant operations and management skills, performance testing, and post-startup process and product optimization.

▶ *Medium-Scale Granulation Pilot Plant*

Production Cost Analyses

IFDC conducts comparative analyses of actual or potential production costs incurred by a client with respect to other competitors in the marketplace. These analyses are performed as a separate study or integrated into an overall market and supply study. IFDC can provide data on shipping and handling costs to the markets under consideration, as well as raw material supplies and other production cost components.



▶ *Wet Process Phosphoric Acid Pilot Plant*

Production Efficiency Enhancement

IFDC has comprehensive experience in solving common production problems encountered by fertilizer producers. Examples include:

- Process and equipment debottlenecking.
- Process optimization, with emphasis on decreasing production costs.
- Raw material consumption auditing (field measuring).
- Process design, additions, and improvements.
- Quality assurance methods and programs.
- On-site technical assistance and training.

Physical Property Testing

IFDC conducts various physical property testing for the purpose of product and process development. Physical properties tested include:

- Critical relative humidity
- Moisture absorption-penetration
- Flowability
- Density
- Impact resistance

- Abrasion resistance
- Crushing strength
- Particle size distribution
- Caking tendency
- Angle of repose
- Physical and chemical compatibility of raw materials and products

Examples of Selected IFDC Fertilizer Technology Program Projects

IFDC Fertilizer Technology Program activities range from information collection to the design and supervision of construction and startup of large-scale NPK granulation plants. The scope and diversity of the program are illustrated in the following examples of projects previously conducted:

- Developed, tested, and optimized new fertilizer production processes.
- Modified and improved existing fertilizer products.
- Developed process engineering design packages, which included material/energy balances, process flow diagrams, piping and instrumentation flow diagrams, equipment data sheets, and instrument data sheets.
- Increased production rates in a large-scale NPK granulation plant by 47%, with a substantial reduction in raw material costs.
- Assessed the quality control program of fertilizer producers and assisted in integrating quality control into their production processes.
- Developed, tested, and optimized a granulation process using new binders and generated data for process design.
- Prepared fertilizer for use in hydroponic experiments on NASA space shuttle missions.