



JNE

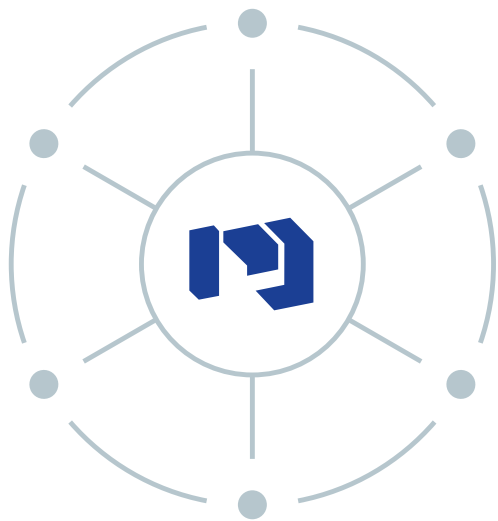
Consulting



PHARMACEUTICAL INDUSTRY

ENGINEERING SUCCESS GLOBALLY SINCE 1980

Responding to the economic and technological challenges in the pharmaceutical industry, JNE provides solutions to meet clients' demands for continuous improvement by adding strategic value to your projects through innovative engineering.



About Us

JNE meets the increasing technical demands of the pharmaceutical industry by incorporating the latest sophisticated software and hardware tools into our engineering design process.

We are continually attracting engineers, technologists, and qualified staff from a broad range of industries, ensuring expertise in all fields of engineering.

Our in-house Subject Matter Experts draw on their fields of specialization to support our engineering teams.

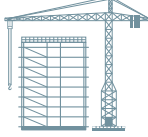



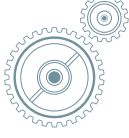



From Concept to Completion

In addition to full-service engineering, encompassing the major disciplines, we offer services such as program management and procurement.

We provide a level of detail in our construction engineering that gives clear direction to the contractor. JNE is always focused on constructability, reliability, and maintainability. This ensures the most cost-effective construction while minimizing downtime in your existing operations.

JNE provides project and construction management services using proven technologies, systems, and work processes to provide you with optimal results. We deliver your complex and challenging construction projects safely, on time, and within budget.

JNE's project teams can solve your most demanding engineering challenges.

		 Civil/Structural Engineering	 Electrical, Instrumentation + Controls	 Process Engineering
 Project Engineering	 Mechanical Engineering	 Piping Engineering	 Forensic Engineering	 PHSR + Industrial Safety

Project Planning + Execution

JNE Consulting's proven expertise in project development and capital planning will ensure that your project starts off on a solid foundation. We understand that when it comes to project work, surprises are never good. Our capital planning services guarantee that your project scope is clearly defined and your project funding needs are accurately predicted.

We offer pre-feasibility studies to select the best available technology for your project. We conduct a feasibility study for the selected technology to develop a detailed project execution plan, including Capital Expenditure (CAPEX) and Operating Expense (OPEX), project schedule, and financial Return on Investment (ROI) with sensitivity analysis.

Front-end engineering design and project planning provides clients with a strategic plan clearly outlining all of the requirements of the project at the early stages to help identify risk areas, opportunities for value engineering, and provide a cost estimate for budgeting and capital approval purposes.

- › Project Scope Development
- › Functional Specifications
- › General Arrangements
- › Needs and Facility Analysis
- › Process Equipment Planning
- › Project Scheduling
- › Operational Assessments
- › Detailed Workflow Analysis

Automation + Panel Fabrication

Our full-service automation integration capabilities allow JNE to deliver fully tested systems to minimize on-site installation and commissioning time. We offer various industry standard certifications such as cUL or UL, Canadian Standards Association (CSA), and/or Electrical Standards Association (ESA) upon request.

Environmental Services

JNE designs custom wastewater, air, and solid waste treatment facilities for our clients. Our process engineers have many years of experience and have designed wastewater treatment plants in excess of 100,000 gallons per minute and air emissions control systems in excess of 1,000,000 standard cubic feet per minute. We can also provide process evaluations of existing systems, often resulting in cost-saving retrofits.

Pharmaceutical Industry Experience

CLIENTS

- Apotex
 - Torpharm
 - Novex
 - Brantford Chemicals
- Patheon
- MDS SCIEX
- LifeLabs
- Blue-Zone
- Procter & Gamble
- Draxis Pharma Inc.
- Aventis
- Torcan Chemicals Ltd.
- Diversey, Inc.
- Greenfield Global Inc.

SUCCESSFUL PROJECTS

- Production Suite Design
- Flaker Systems
- Fluid Bed Processes
- Spray Dryer Systems
- Granulator Processes
- Batch to Continuous Process Systems
- High Potency Products
- Reactor Suites
- Antibiotic Facilities
- Methylene Chloride Recovery System
- Solids Loading Vacuum System
- CIP System
- Thermal Oil Heating/Cooling/Quenching for Pharmaceutical Reactors
- Increased Encapsulation Capacity
- Zoning & Packaging Expansion
- New Distribution Centers
- Exhaust Systems
- Industrial Alcohol Expansion

ACTIVITIES

Process Design, INCLUDING

- Design Basis
- Detailed Design, 3D and 2D
- Equipment Specifications
- Piping Specifications
- Material Compatibility Selection
- Functional Description, Controls
- Equipment and Valves Database
- Technical Writing
- Training Manual
- Material Take-Offs
- Bid Packages & Evaluation
- TSSA Packages
- Hazard & Operability Studies (HAZOP)

Building Services Design

- HVAC Reviews & Detailed Design
 - New Systems and Existing Systems Retrofit
 - Pressurization Diagrams
 - Air Locks
 - Dust Collection Equipment
- Power Distribution & Controls
- Hazmat Facilities
- Specialty Gas Storage & Distribution
- CAT3 Containment
- Building Permits
- Multiple Building Services Systems (Purified Water; Natural Gas; Compressed Air; etc.)

Front-End Engineering

- PFD and P&IDs Development
- Preliminary Equipment, Piping, HVAC Layouts for GMPs Area

Control Systems

- Process and Equipment Control System Interface
- Building Automation System Interface

Detailed Mechanical Design

- Platforms and Supports
- Material Handling Specialty Equipment
- Conveyors
- Lifting Devices

Project Management & Construction Support

- Communication with General Contractors and Subcontractors
- Liaising with Local Authorities
- Developing Milestones/Critical Path Schedules
- Design coordination with architect and other consultants
- Construction engineering and Installation Support
- Construction Progress Review and Inspections

Commissioning & Validation Support

- Developing and Execution of Commissioning Plans and Start-Ups
- Direct, Indirect, No-Impact System Classification
- Installation Qualification Support for FDA Approval
- Turnover Report and Information Package

Consumer Products Industry Experience

Duncan Hines Cookie Plant
Brockville, Ontario

Crisco Oil
Oakville, Ontario

West Shampoo Making System
Hamilton, Ontario

SGP (Scalable Global Process) Skin Care
Australia

Osaka Aerosis — Hair Care Styling Aids Facility
Shanghai

Thailand Hair Care
Thailand

Thailand Skin Care
Thailand

New Hair Care Making Facility
Hyderabad, India

Korea Hair Care Plant Rescue
Vietnam

Bacon and Wiener Plant
Hamilton, Ontario

Chocolate Making and Packaging
Hamilton, Ontario

Jam Manufacturing Facility
Stoney Creek, Ontario

Diversified Industrial Experience

The projects below illustrate JNE's diversity in project size and content:

ArcelorMittal Dofasco
Hot Strip Mill Modernization

Project Value: \$130M
Conceptual and detailed engineering and design services and construction support for hot strip mill.

Genum Corporation
The Millennium Project

Project Value: \$23M
Design engineering for cleanroom and laboratory facility.

PRAXAIR
Star Enterprise

Project Value: \$2M
Delaware City Refinery Air Separation Unit — Project planning, design engineering and construction management.

Evrax North America
Rail Mill

Project Value: \$480M
Complete engineering services, interface management, OEM coordination, and construction support.

Dofasco
No.5 Galvanizing Line Project

Project Value: \$180M
Engineering design coordination and project management for galvanizing line.

CanAmera Foods Inc.
Construction of New Packaging Facility

Project Value: \$4.5M
Design engineering and construction management for packaging lines and warehouse.



Innovative Designs

In response to specific challenges, JNE has provided creative design solutions for our clients, as shown in the following examples.

Flaker Temperature Control

Precision temperature control was required on a flaker system to maximize yield. Accuracy was achieved using controlled heating on the premix and dual loop thermal oil/chilled glycol systems on the hot and cold rolls of the flaker.

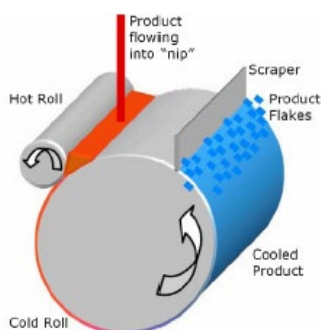


Diagram of flaking machine with product flowing into the gap between the hot and cold rolls.

Operational Flexibility

Suites designed to allow the efficient use of multiple flammable/non-flammable solvents by providing optional nitrogen purge controls and effective solvent monitoring safety systems. Some of these suites are adjacent to each other and can be combined by opening roll-up doors between them as required, complete with all necessary safety interlocks.

Systems designed for multiple suites to access the same equipment, and use the equipment for different purposes, i.e. vacuum pumps used for powder loading or the low vacuum required for granulation.

Solvent Recovery System

A solvent recovery system was designed for a granulator used to process methylene chloride or water. When solvent was present, the exhaust was diverted to a condenser where 99% of the methylene chloride was recovered. During recovery the vacuum was controlled in the granulator despite vacuum fluctuations in the exhaust ducting resulting from the condensing operation. Efficient granulation was maintained during the solvent recovery.

Isolation Technology

Isolation technology was designed for a conveyor pass-through to maintain cGMP isolation on the "primary" side (processing areas) while protecting personnel on the "secondary" side (packaging areas) from exposure to pharmaceutical ingredients.

cGMP Firewater Drainage

cGMP firewater drainage system was provided to meet fire codes in rooms where solvents are used. Sprinkler water that may be contaminated with solvents was automatically diverted to a suitable area while still satisfying the requirements of sanitary design.



DIOSNA Granulator

Improved Granulation Efficiency

Heat transfer efficiency was studied and a heating/cooling design provided to greatly increase productivity in granulation processes.

Pre-Engineered Skids

Pre-engineered skid designs have been provided for specific utilities, i.e. purified water, high pressure wash and thermal oil. Control system configurations, interface with building automation systems and space constraints are considered along with current and future capacity requirements.

cGMP Pneumatic Scale Lifting Device

Weighing of large tanks was necessary in a location where pits were not permitted. The full tanks were too heavy to be safely pushed onto the scales using ramps. A cGMP pneumatic scale lifting device was designed to bring the surface mounted scale up under the tank, lifting it to allow safe weighing.

Batch to Continuous Process Conversion

Conversion of batch to continuous process using a vacuum distillation column for vitamin production. Design required control of the raw material input, reaction rate and finished product handling. Throughput was greatly improved and the increased productivity made the process profitable.



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