



**Cleanroom
Specialist**

www.cainnovation.com

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About **us**

Clean Air Innovation is a part of PMS (Pharmaceuticals and Medical Supply) Ltd., Part.

Is the market leader of pharmaceutical machinery and extended to cosmetic, food and chemical machineries as well. We are an expert in cGMP clean room design and construction.

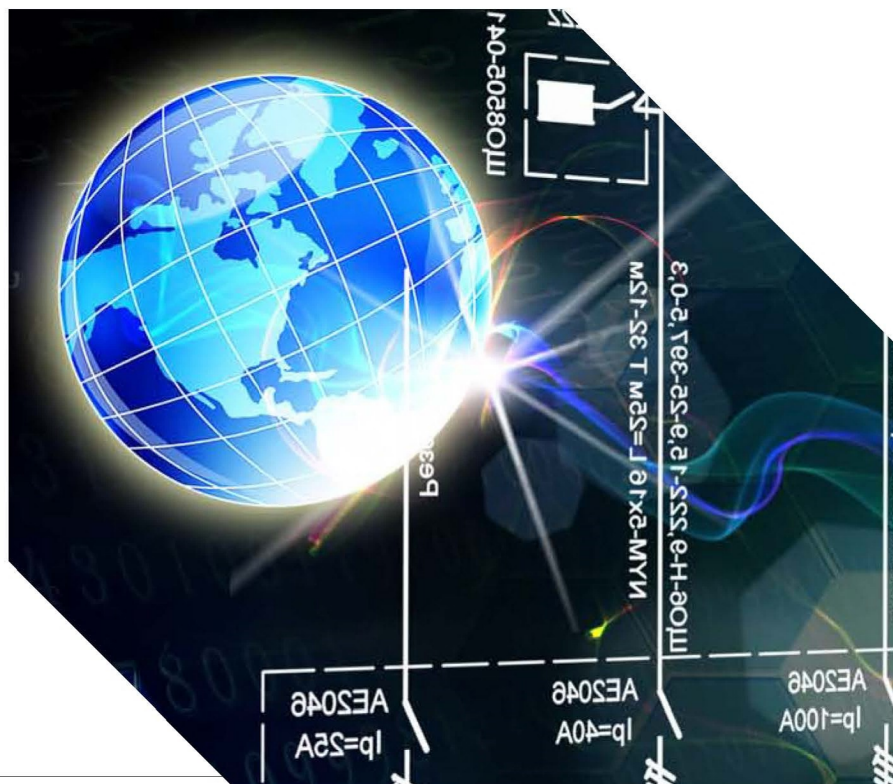
With the customizes design, we build our capability to meet customer requirement with energy saving and long term maintenance concern. We offer fully support to clean room regarding consulting, design facility construction and operation to pharmaceutical, health care, bio-technology and related industries.

Bring the **concept** to **operation**





Our concept has
been apply
more than
10 years



Experience & Expertise

Our in-house team will complete ventilation mechanical and electrical service and architectural design with the innovation solution. To make a project success you need a feasible concept, we can provide creative solution, innovative methods, advanced expert knowledge and a professional project management - from the first idea to the implementation of your production

We are able to do this because we can rely on many years of experience in engineering and installation of turnkey production facilities and approved production plants in the pharmaceutical industry.

Our projects are not only focused on processes for the production of solid pharmaceuticals but also on the production of liquid pharmaceuticals by sterile and non-sterile processes.



What we are..



Consult : To understand customer requirement

"We understand user process which is key of design basis especially Food and Pharmaceutical and all budget must be control to meet customer plan"

The first step of each project, we need to understand customer process to make clear direction and efficient design



Confidence : In our reliability

"The core of our design focus on Energy saving, User Friendly, Operating Cost, and ROI"

From our experience and expert team, our client can ensure that service will be solution for clean room

3 **Concepts** for our offering



Compliance : with world class regulation

"We guarantee that our design comply with world class standard i.e. cGMP, PIC/S and related regulation. You can ensure that your factory will comply with standard."

The final phase of each project, we provide validation to complete and quality our project for client

...Differentiate

ON TIME & ON BUDGET

If you would like to launch new product to market, shorten time to market or expand your production capacity for existing product. Therefore, if you can shorten the delivery schedule for your new factory you will reduce project costs and you can get opportunity to get market faster.

We have in-house measuring equipment and team to do self commissioning and qualification. Therefore we can save the loss time for validation.

Save Time - Increase Speed





Segmentation

With the specialist pharmaceutical team, we have various experiences in pharmaceutical industry in order to support our client and world changing.



Oral Solid dosage (OSD)

Increasing demand and competition in Thailand, OSD is the largest segment and continue the growth. Among competition and new regulation. Our design focus on regulation compliance and customer needed are priority.

Most of our client are well known and brand OSD plant. The core competence of our design focus on

- Regulation PIC/S, cGMP and WHO compliance
- Cost effectiveness
- High reliability design
- Prevention of cross contamination
- High containment equipment for processes
- Low production cost
- Energy saving and environmental care





Liquid, Oilmen & Cream

The second of growth in pharmaceutical industry are liquid, oilmen and cream segment. Material transfer piping, Cleaning-In-Place (CIP) and Cool Down system are required to design and operate.

We can provide suitable design and complete range of preparation line for Pharmaceutical factory.

Our formulation tanks are sized according to any batch production need and optimized production flows according to lay out. The overall design still follow regulation, customer need and cost effectiveness.





Sterile & aseptic

It is one of complex process and regulation High technology design is a must for design basis. Isolator and RABs (restricted access barrier system) is one of new technology will help conventional cleanroom to operate with high reliability regarding risk management for cross contamination.

With our experience and more than 5,000 m² sterile production area has been done. We help our client review design and follow our step conceptual design, basic design, detail design respectively.





Biopharmaceuticals

In order to improve patients' lives all over the world and number of previously incurable diseases can now be cured, or at least treated. The life expectancy and quality of life have improved for patients with diseases like multiple sclerosis, cancer and arthritis. And more rare diseases can be addressed with increasingly specialized drug.

Therefore biopharmaceutical industry has been develop to serve i.e. vaccine. The biopharmaceutical industry was developed by Thailand government for a while and now commercial section is staring to develop in Thailand due to high demand. Facilities for biopharmaceutical industry are complex process stages and require extremely specific and innovative high-tech solution.





Turnkey Solution

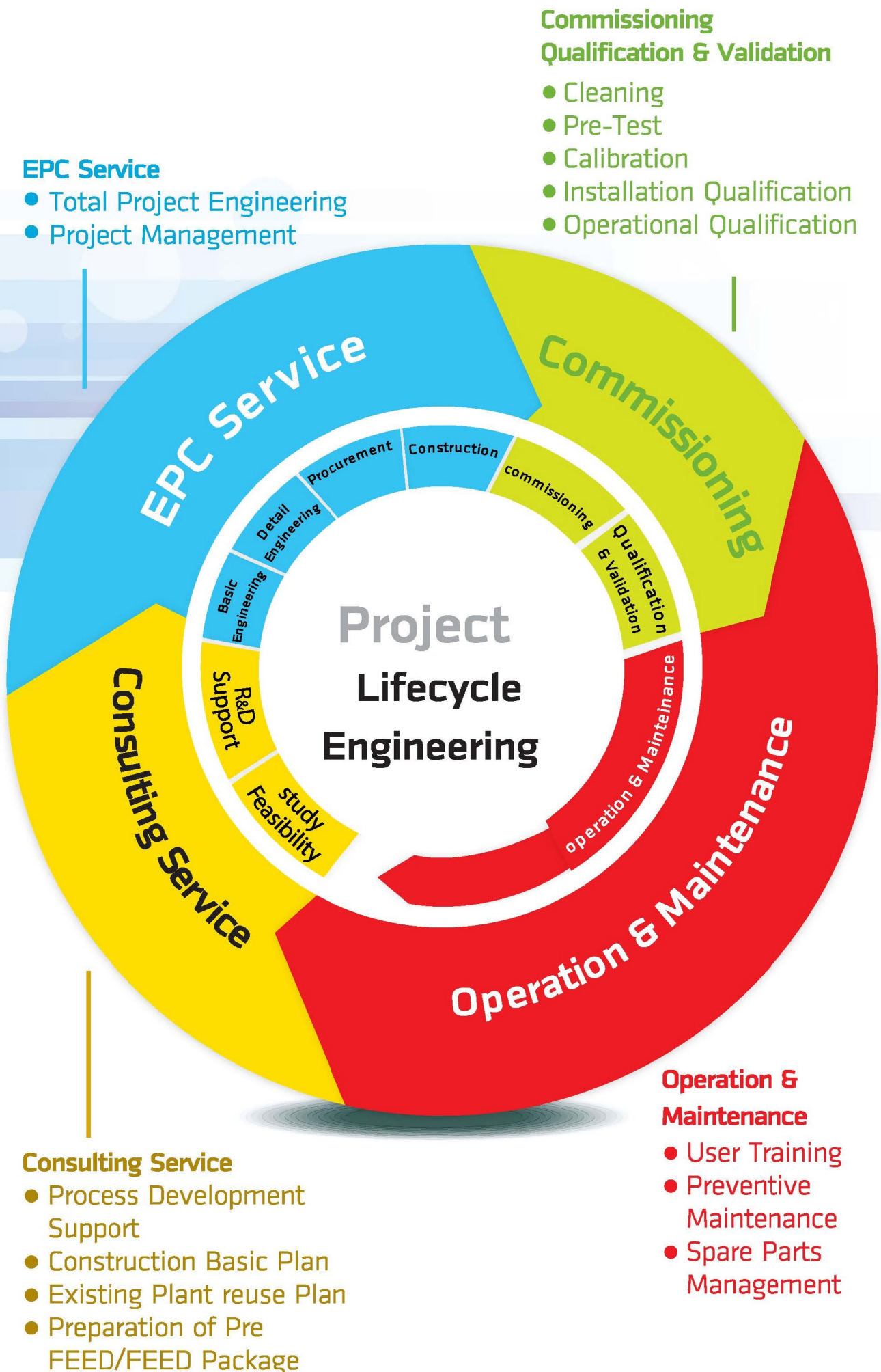
Everything from a single source

When planning a facility , It is important to find a right partner who can hand over a facility that meet your goal in term of time, cost and quality.

More over 10 years experience in Pharmaceutical industry, we offer the complete package of Pharmaceutical facility to our client.

We has engaged in Engineering, Procurement and Construction (EPC) of pharmaceutical industry. We offer the complete package for our client including the feasibility study, project development plan, basic design, EPC, commissioning up to operation and maintenance.





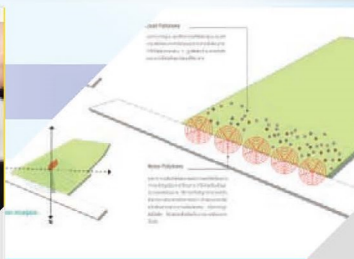
Our Design Process

Because the complex of the process to built pharmaceutical plant. We can help our client to go to every detail in every stage; Feasibility Study, Conceptual Design, Basic Design and Detail Design
We offer 4 steps: Feasibility study, Conceptual design, Basic Design and detail design



Feasibility study

- Site development
- Layout development
- Lay out option
- Process Architecture
- Qualification approach
- Main Equipment List
- Time Schedule
- Price Estimate



Conceptual Design

- Process Layout diagram
- Room Classification
- Material, product & personnel flow
- Automation Philosophy
- Draft Qualification Master plan
- Process & Clean utility
- Utility consumption
- HVAC Zoning
- Time Schedule
- Price Estimate



Basic Design

- Finalized layout
- Finalized Cleanroom
- Specifications
- Qualification Master plan
- Process & clean Utility P&ID
- Building design
- Site plan
- Fixed detail time Schedule
- Fixed price Proposal



Detailed Design

- Construction Material Specification
- Construction drawing
- Design review
- 3D tool Analyzes
- Procurement
- Project development
- Detail Document



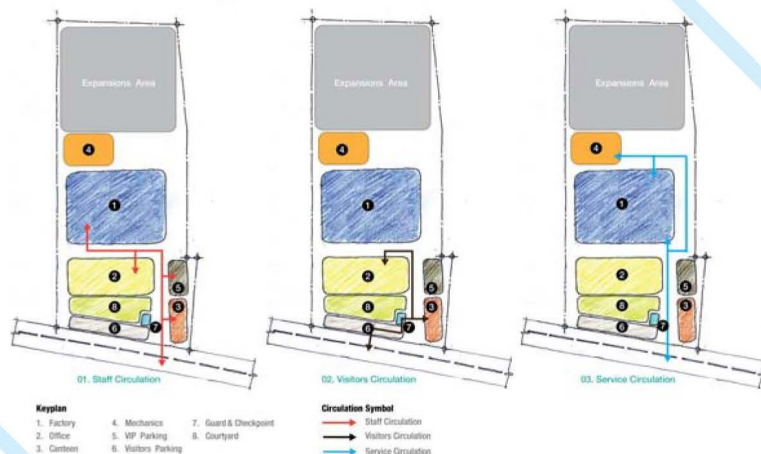
SCHEMETRIC 1 TYPE A1

Keyplan

1. Factory	8,000 SQ.M.
2. Office	3,000 SQ.M.
3. Canteen	500 SQ.M.
4. Mechanic	1,000 SQ.M.
5. Visitor Parking	20 UNIT
6. Staff Parking	20 UNIT
7. Expansion	10,000 SQ.M.



SCHEMETRIC 1 CIRCULATION Diagram

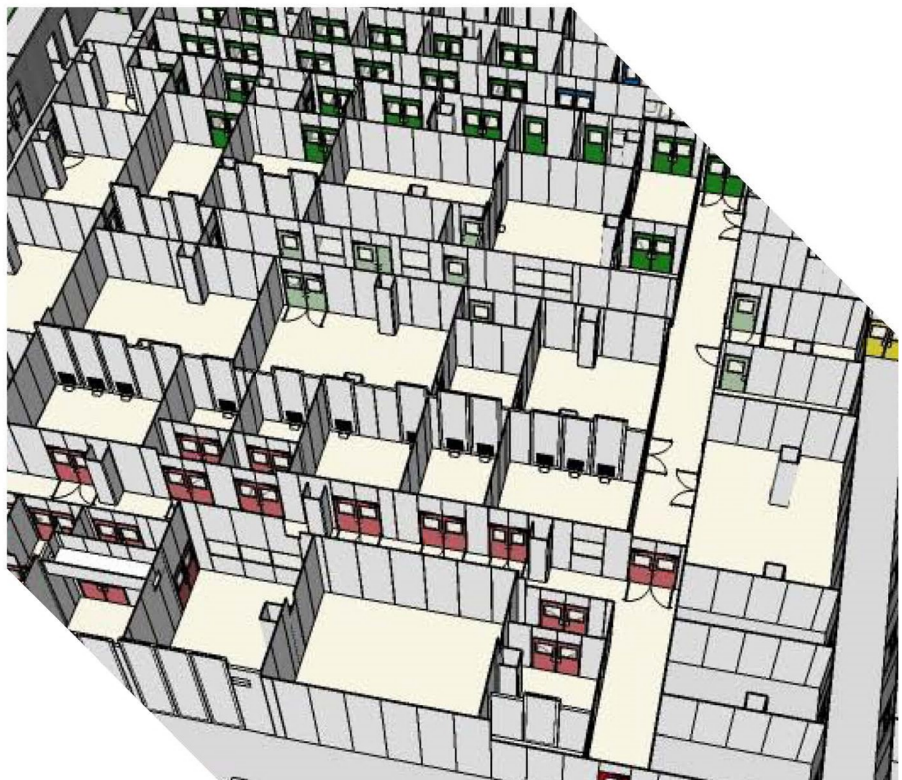


Site Master plan

We prepare site master plan for our client and have developed an extremely successful and well respected method of executing this work , and have prepared studies Every site master plan is unique, ranging from a simple study to optimize the location of a single new building, through to a major study to assess the future development of a large, mature pharmaceutical site.

Each plan is therefore tailored to suit the particular project, using appropriate techniques from our proven portfolio of methods. We can call on the specialist resource within the Pharmaceutical Division to generate footprints of pharmaceutical buildings and optimize materials and personnel flows.





Process Layout Development

We have the specialist skills to quickly identify layout solutions for all types of facility design. Irrespective of the size and scale of the project, our dedicated layout specialists are on hand to identify, through the most appropriate means, design alternatives that reflect our vast experience in all fields of pharmaceutical design.

We offer state-of-the-art 2D and 3D CAD designs as well as hand-made concept drawings to visualize the embryonic design.

We are particularly experienced in conceptualization techniques for small projects in this respect, ensuring commitment to detail and efficiency of effort.

Our team provides consultancy services to the pharmaceutical industry. A well-conceived layout is one of the most important factors in controlling project cost. Decisions made at the concept stage of the project are critical.

Our structural approach to layout design has been tailored to the identification of the optimal design of plant layout.





Utility Design

Utility design is regarding water for injection, highly purified water, purified water and clean steam. We are consultancy and design capability for high purified water and steam systems encompasses all of the current issues clients may face when upgrading existing systems or considering new builds. HVAC is our key to success for cleanroom

- GMP auditing process and system performance troubleshooting
- Compliance with client requirement
- Expert in knowledge of regulatory inspection requirement
- Appraisal of emerging and industry proven technology
- Water system integration and capital/operating cost analysis
- Detailed the hydraulic/thermal capacity analysis
- The Utility optimization using capacity and demand simulation



Sustainable Design

Managing the environment and energy conservation. We believe that the reducing of environment impact and efficiency designs can be done together.

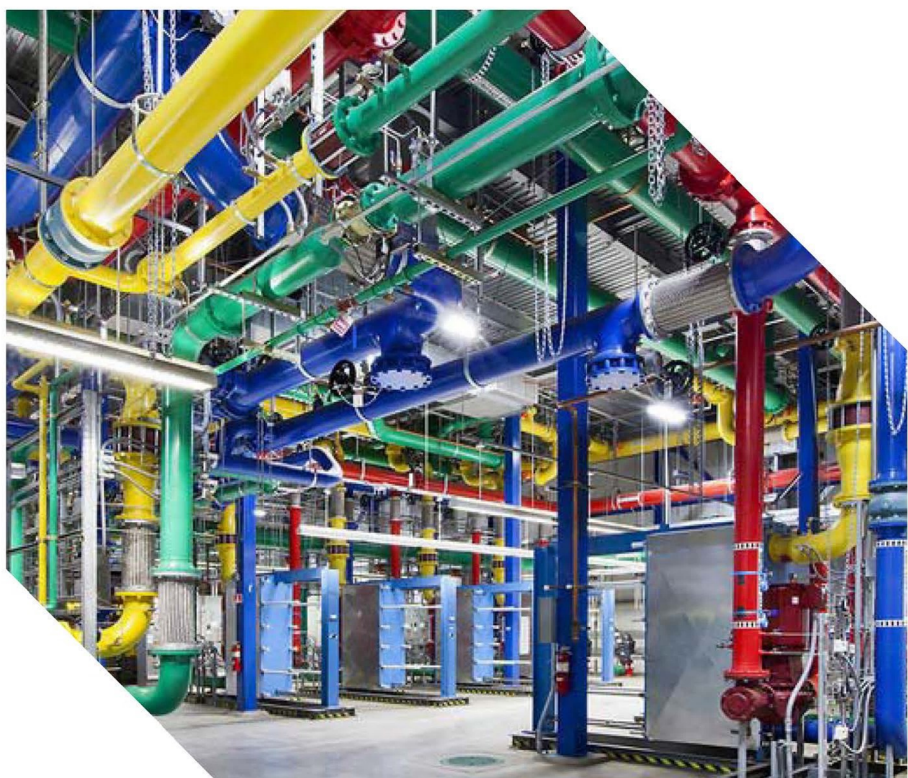
We have identify that energy consumption in facility, mainly is from HVAC system is biggest part which can help reduce overall energy consumption. However, not only HVAC design will create saving, the architectural design are also part of the green design as well.

Commissioning and Validation

We work according to cGMP and WHO for facility design. We commission all type of system both of GMP critical and non critical point which is following below step.

- Cleaning
- Pretesting
- Commissioning
- Calibration and testing of equipment, utilities and HVAC
- Mechanical complete
- Installation qualification
- Operation qualification
- User training





HVAC Design

The reliability of our solution is based on quality at every level, from design to construction. Our Knowledge of state-of-the-art technologies, standards and regulations means that we can customize the best solution for all of your needs regardless of the contamination control. Every facility type has its own complex set of intelligent system: fire safety, security, manufacturing operations, energy management.

We provide energy-saving controls solutions using Building Management System (BMS) customize specification for your facility.



Cooling Tower

- Sequence control for motors
- Water quality control
- Making system for production equipment

Ice / water storage tank

- Reduce peak demand

Water Cooled Chiller

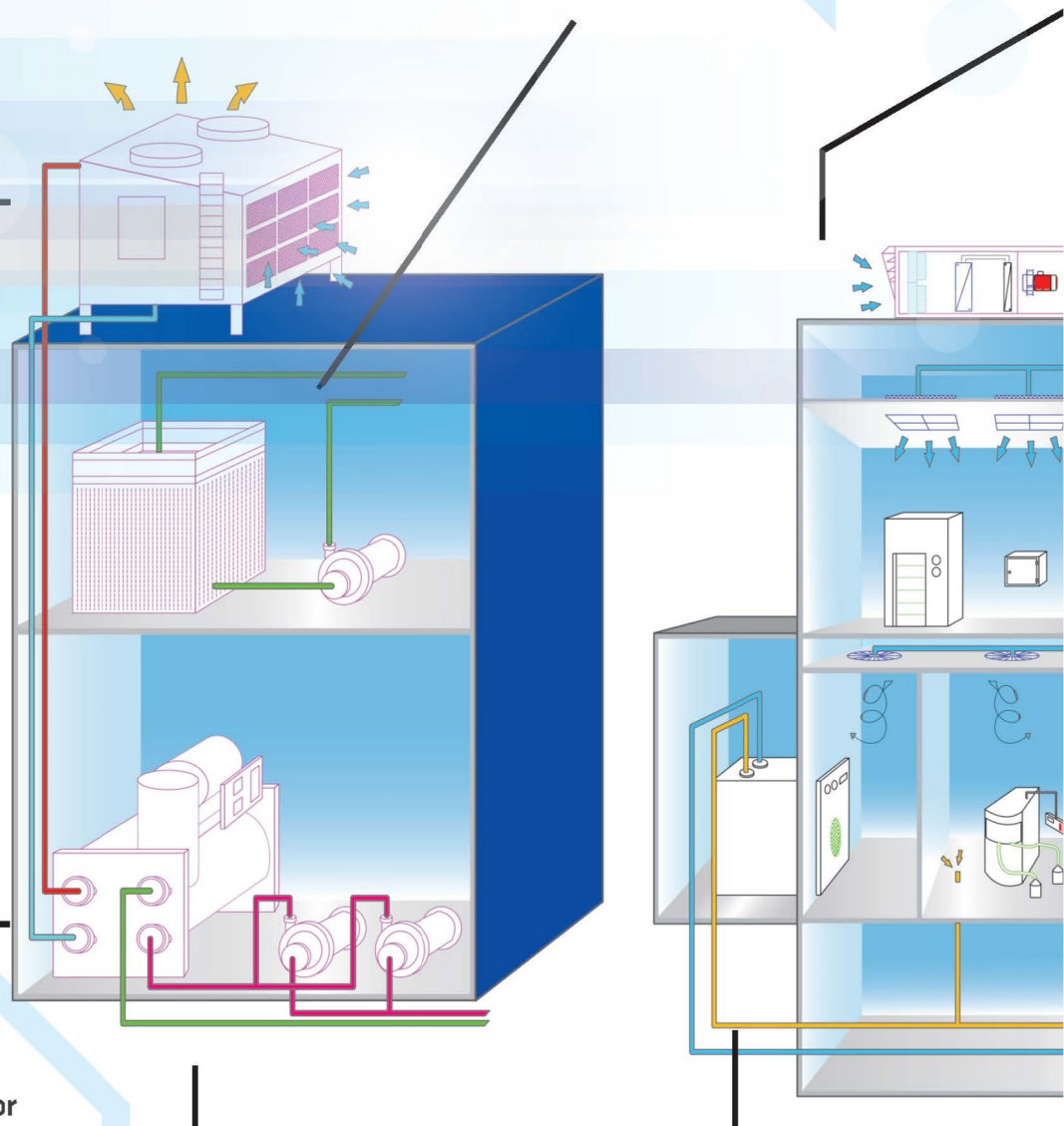
- Chiller sequence control
- Reset set-point outlet temp.
- Limit current limit
- Chiller plant management

Water Pump

- Sequence control for water pumps
- Variable frequency drive control

Clean Room Area

- Cross contamination control
- Air flow pattern distribution
- Limit air leakage
- Night / Day mode control
- Light luminaries control
- Cleanroom equipment
- Building Automation System



Rooftop unit

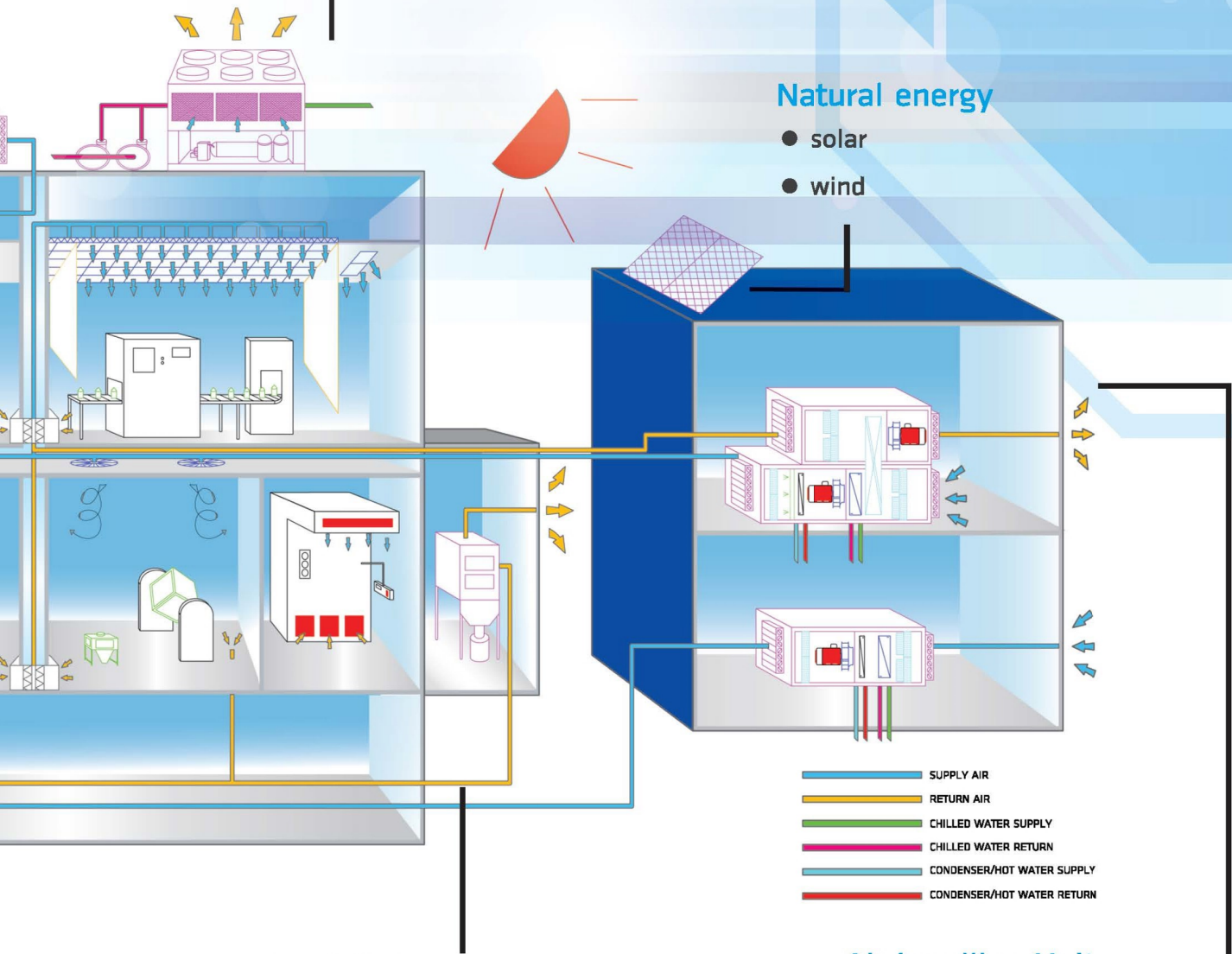
- Control of introduced outside air

Air Cooled equipment

- High efficiency unit
- Heat Pump for heat recovery

Natural energy

- solar
- wind



Dust Collector

- Emission control (Dust, Fume,...)
- Method of cleaning
- Variable frequency drive

Air handling Unit

- AHU zoning base on the process
- High efficiency Plug fan
- Suitable method for Heat recovery
- Variable frequency drive
- Optimize air filtration
- Sequence control for motors
- Reliability & Robustness unit
- BAS for control



Construction

All of our installer partners are specially recruited and we make sure that reach our standard and customer requirement. Therefore you can ensure that they are experts and well trained with many experience so that the best work of installation can fulfill your need.

We can guarantee the deployment of highly qualified project engineers, smooth implementation, absolute adherence, to schedule and to budget, and also ensure trouble free technical and organizational coordination of all interfaces throughout the entire project.

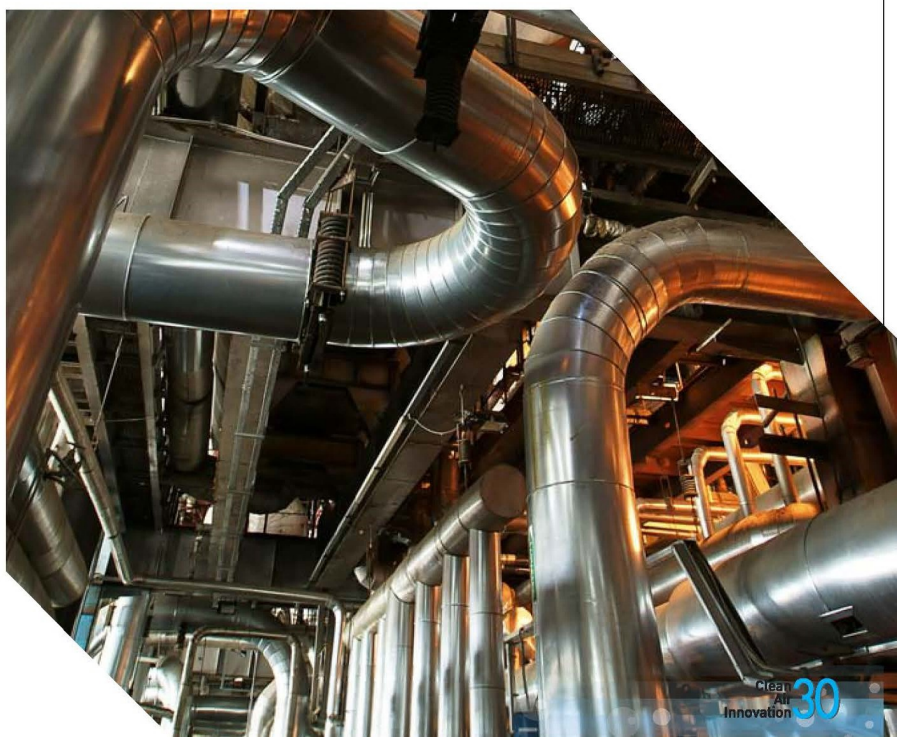
Operation

We will be at your right hand through the entire process from the very first idea through every stage to commissioning. More over we will commission the plant, and train and instruct your operation personnel.





Project Highlights and References



Thailand Plasma Fractionation Plant of Thai Red Cross Society

Atlantic Pharmaceutical Co., Ltd.



In the year B.E. 2554 by the Thai Red Cross Society. Has approved in principle the establishment of plasma fraction products. For use in the treatment of patients in the country. The cooperation of the three major Thai FDA, NHSO and GPO were the production technology of the Green Cross Corporation (Korea), a company that manufactures plasma products. The international standard by the WHO – GMP. The Plasma fractionation plant maximum capacity is 200,000 liters per year, including more than 2,000 million baht budget for design and construction period of four years and in B.E. 2558 it began production.

Atlantic group is a group of companies specializing in the manufacturing and distribution of pharmaceutical and related products. The group was established in 1949. products have successfully been for over 45 years Atlantic Group's products are now accredited and used in hospitals and clinics, as well as sold in a majority of drugstores both Thailand and in foreign countries, Atlantic Group plans to continue expanding its business both locally and abroad.

Sterile & OSD Products

- Grade B/A 355 m²
- Grade C 270 m²
- Grade D 3,150 m²



Biopharmaceutical Products

- Administrator Building 876 m²
- GMP Building 7,706 m²
- Animal Building 665 m²
- Utility Building 1,073 m²
- Waste Water Treatment & Solid Waste

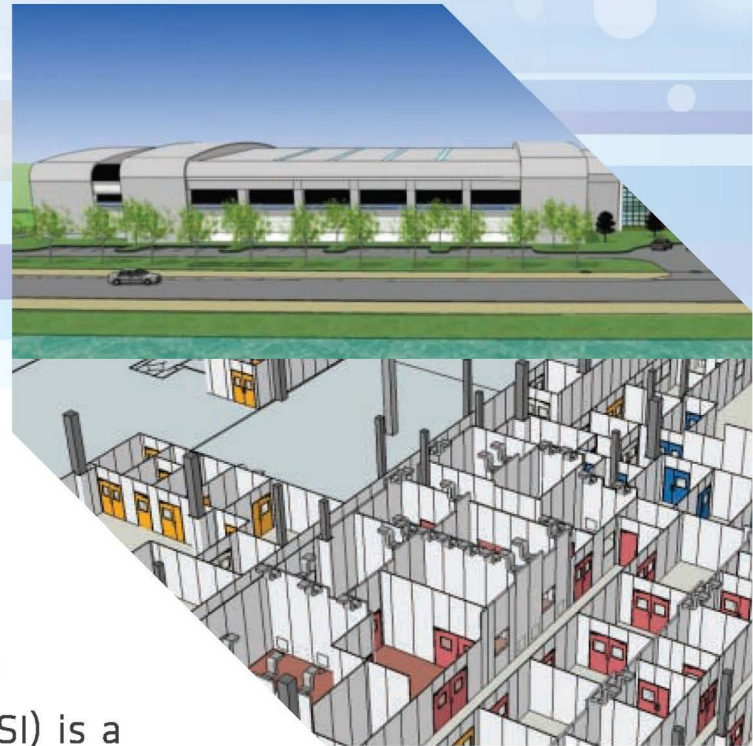
Thai Pharmed 1942 Co., Ltd.



The company was established since 1942, is one of the market leaders in the pharmaceutical business. It currently manufactures more than 100 different items in finished pharmaceutical products sold to the general public through drugstores, doctor clinics, and hospitals throughout the country as well as to neighboring countries. FLYING RABBIT, TD, are the three company's major trademarks.

Solid and Liquid Product

- Grade D 4,120 m²
- Warehouse & other 2,460 m²



Osoth Inter Laboratories Co., Ltd.



Osoth Inter Laboratories Co., Ltd. (OSI) is a pharmaceutical company and dietary supplement for its own brand and for OEM products. OSI is under umbrella of SAHA group, the well known of multi business especially cosmetics & consumer products. OSI is a pharmaceutical supplement for its own brand and for OEM products. Furthermore there are additional licenses

OSD Products

- Grade D 2,950 m²
- Warehouse & other 3,150 m²



Community Pharmacy Public Co.,Ltd.



Community Pharmacy was found in 1983 With the objective of pharmaceuticals to best serve the community at large their vision was to make it possible for Thai people to enjoy quality drugs and medicine at the fair and economical price, Substitute against expensive imported drugs while at the same time develop skills and transfer pharmaceutical knowledge to Thai personnel. It is one of large factory renovation, in the mean time customer require to operate as usual. In order to meet customer requirement we provide turnkey solution to our customer and we can build the new production to multi-floor of new building with not much interrupt the normal operation

OSD, Penicillin Products

- Grade D 3,583 m²
- Un-grade 1,055 m²

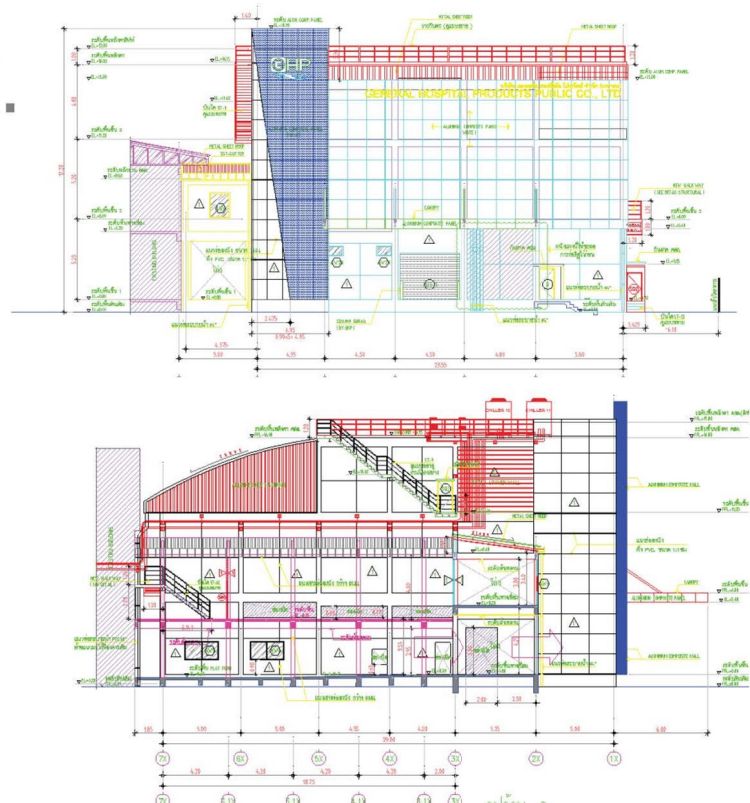


General Hospital Products Public Co.,Ltd.

The factory was found since 1969. Now GHP is market leader for Bowl Fill Seal technology. And this project we had alliance partner with Synertec Asia. Our scope is fully design and build HVAC system and cleanroom finishing.

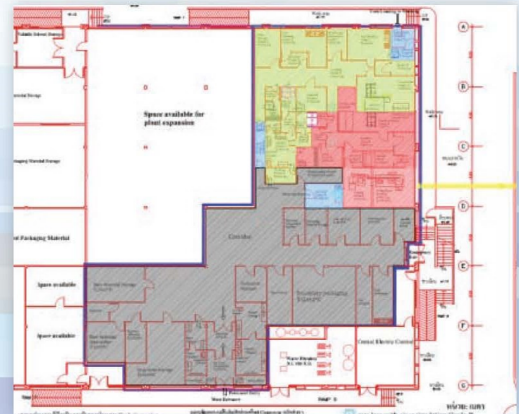
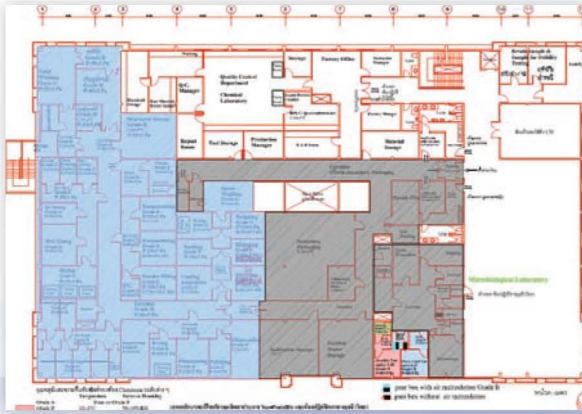
I.V. Solution Products

- Grade C 750 m²



Modern Manu Co.,Ltd.

One of renovation with the complex process. Our customer require to produce during new renovation is ongoing. In order to meet customer expectation, the good planning and on time schedule are a must.



Sterile Cephalosporin & OSD Products

- Grade A 30 m²
- Grade B 92 m²
- Grade C 170 m²
- Grade D 707 m²
- Un-grade 900 m²

BM Pharmacy Ltd., Part.

The factory was establish since 1970, BM Pharmacy is a leading manufacturer of pharmaceutical products in Thailand with annual sales of more than 100 million baht (more than US \$2 million).

The manufacturing processes are in complete compliance with the WHO Good Manufacturing Practice (GMP) – a recognition awarded by Thai Food and Drug Administration. In order to expand business in existing area. We provide a turnkey design solution for OSD facilities, which is consist of solid, weighting and packing respectively.

Solid Pharmaceutical Product

- Cleanroom Grade D 1,200 m²
- Un-grade 250 m²





Sterile Products

- Grade A 50 m²
- Grade B 95 m²
- Grade C 140 m²
- Grade D 115 m²
- Un-grade 285 m²

Thai Nakorn Patana Co., Ltd.



The company was established since 1979, with more than two

decades of growth and development, Thai Nakorn Patana has become a leading manufacturer, employing more than 1,600 workers. Company premises are situated on 6 acres plot of land, comprised of 18,000 square meters of production area, 20,000 square meters for warehouse and 5,000 for office building. The scopes of work we provide are for hormone injection process, eye drop and normal sterile. OSD facilities which is consist of solid, cream, ointment, soft-gel, liquid and weighting and packing.



OSD Products

- Grade D 12,500 m²
- Un-grade 6,500 m²





Advance Pharmaceutical Manufacturing Co., Ltd.

Established in 1963, Nakorn Patana Pharma Company Limited is one of the manufacturers and distributors of modern medicines in non-sterile products (powders, tablets, capsules, liquid dosage forms and semi-solid dosage forms). Since 1989, the company has participated in Good

Manufacturing Practices (GMP), which aims at developing and improving the in-house pharmaceutical industry in Thailand. In order to expand production capacity, The new factory was located at Ayutthaya. Therefore we provide design and build for facilities, which is consist of solid, cream, liquid, weighting and packing respectively, Chemical lab and R&D.

OSD Product

- Cleanroom Grade D 2,300 m²
- Un-grade 2,400 m²
- Laboratory Room
- Stability room

OSD Product

- Grade D 3,200 m²
- Un-grade 1,950 m²



Patar Lab Co., Ltd.



The scope of work we provide are OSD facilities, which is consist of solid, cream, ointment, soft-gel, liquid, weighting and packing respectively, Chemical lab and R&D.

New Life Pharma Co.,Ltd.



NEW LIFE
PHARMA CO.,LTD.

The scope of work we provide are OSD facilities, which is consist of solid, weighting, cream, ointment, liquid, packing, chemical & micro lab, R&D and stability room. Also design and built for hormone plant facilities.



OSD and Hormone Product

- Cleanroom Grade D 2,500 m²
- Warehouse, packing 1,100 m²

Pharma Innova Co., Ltd.



The scope of work we provide are cleanroom as sterile grade for “Blow Fill Seal ” system and chemical lab.

(I.V. Solution Products)

- Cleanroom Grade C 200 m²
- Cleanroom Grade D 750 m²
- Un-grade 770 m²





Utopian Co.,Ltd.



Utopian Co., Ltd. was established and registered as a limited company on February 12, 2523 with registered capital of Baht 35 million and employs 170 people with a total factory area of 6 acres, divided into 6,700 square meters of factory space.

Sterile & OSD Products (Penicillin & Cephalosporin)

- Grade B/A 170 m²
- Grade C 250 m²
- Grade D 2,700 m²



Osotspa Co.,Ltd.



Osotspa Ltd. is a manufacturer of consumer products in Thailand. Found in 1891 as "Teck Heng Yoo" The pharmacy was found by Mr.Pae who sold the Chinese ancient medicine called "Krisnaklan" that could effectively cure the stomachache. At that time, apart from the well-known Krisnaklan Trakilane, other common drugs were produced, some of them have been known until now such as stomachic mixture, cough syrup, One-One pastilles, Botan pastilles, and Aspirin under name Tunjai.

OSD Product

- Grade D 950 m²

Seven Stars Pharmaceutical Co., Ltd.



Seven Stars Pharmaceutical Co.,Ltd. was established in 21 June 1984 in order to manufacture and distribute non-patented pharmaceutical products for human and animals. There are more than 1,000 items of pharmaceutical and medical products registered with Thai Food and Drug Administration, Ministry of Public Health. The potential in pharmaceutical production of Seven Stars Pharmaceutical covers various types of medicine production such as tablet, Film coated tablet, sugar coated tablet, hard gelatin capsule, medical powder in sachet, medical powder in bottle, liquid dosage form, semi-solid dosage form, cream, and inhaler. All of dosage form have been produced under the GMP PIC/S standard which is the highest quality standard in pharmaceutical production on the international level.



Pharmaceutical & Food Generic, Penicillin & Cephalosporin OSD Products)

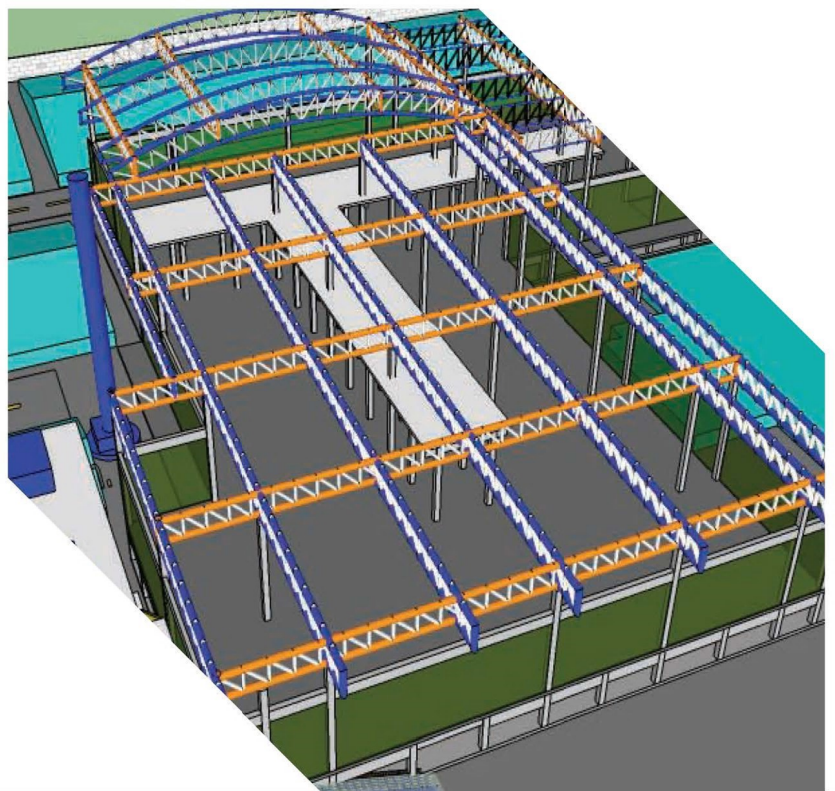
- Grade D 3,900 m²
- Warehouse & Other 5,500 m²

Yaowaraj Co.,Ltd.

Yaowaraj is the new project we have just achieve in Y2014. The status is on going.

OSD Products

- Grade D 12,500 m²
- Un-grade 6,500 m²





Advance Pharmaceutical Manufacturing

Osotspa

Osoth Inter Laboratories

Thainakorn Pattana

Seven Stars Pharmaceutical

Modern Manu

New Life Pharma

Patar Lab

BM Pharma

Yaowaraj

Thai Pharmed 1942

Community Pharmacy Public

Atlantic

Utopian



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