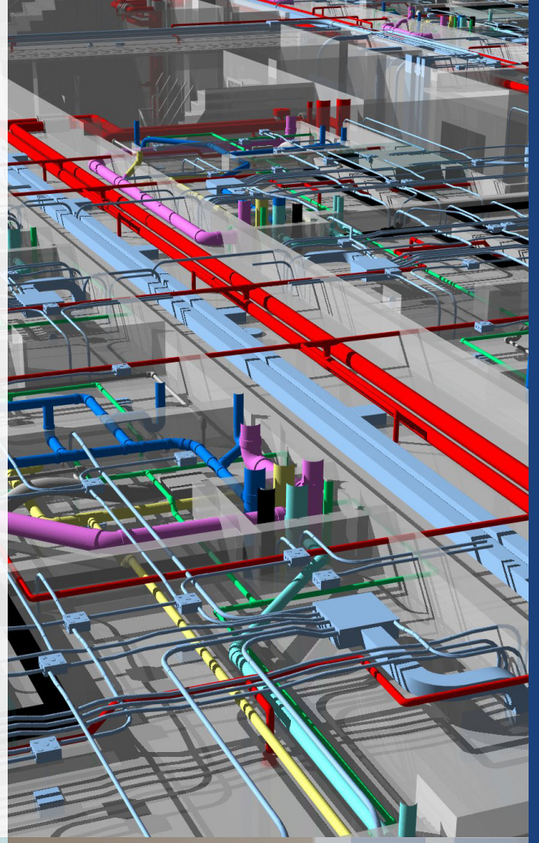
MEINHARDT

HOSPITALS, HEALTHCARE AND WELLNESS

capability statement

Content



"Developing technology and more intensive therapies are making hospitals more complex and more expensive to build and operate. That is leading to greater demands on MEP systems, and therefore higher consequences of failure. At the same time there is a drive towards outpatient, rather than inpatient services, to mitigate costs. Working with clients to simplify complex issues and balance competing objectives is the core challenge on health care projects."

Derek Angus
Associate Director - Hospital Specialist
derek@meinhardt.net

"With an aging society and rising wealth, the health sector in Thailand is expected to significantly grow in coming years. Having years of healthcare experience delivering projects, Meinhardt is well placed to help our clients realize their ambitions whether it be in the renovation of existing facilities or the design of full hospital facilities."

John Anderson
Director
johna@meinhardt.net

"Infectious viruses are not a new phenomenon. The Spanish Flu, SARS, now COVID. Between such headline pandemics, and indeed through them, patients still need day-to-day care for Maternity, Oncology, A&E, Cardiology, etc. By taking a long term view when making design decisions about healthcare facilities and following sound engineering principles, healthcare facilities can be prepared to provide healthcare for all occasions."

Matthew Silvester
Director
matthew@meinhardt.net

"The trend of human wellbeing is becoming more and more dominant in global society. It is not a random phenomenon but is scientific truth. Healthcare facilities will not only be for physical health issues or illness but also for mental health and other indicators for life fulfilment. At Meinhardt, we can provide tailored services to respond to such adapted trends required for now and for the future."

Sasiporn Sirilatthaporn
Director
sasiporn@meinhardt.net

"Our philosophy is simple; our clients'needs are paramount."

John Pollard
Managing Director and
Group Regional CEO, South Asia

Your Relationship with Meinhardt

Meinhardt invests in forming long-term relationships with our clients that generate Win-Win outcomes. We will be Your Trusted Adviser.

We have a Healthcare Centre of Excellence (CoE) in Bangkok

We have a carefully developed mix of experienced local and expatriate engineers that will deliver a value added service for your project

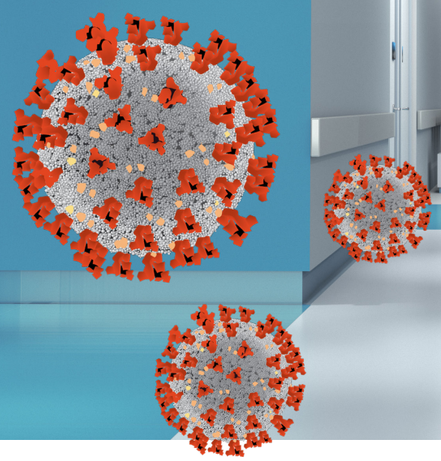
Meinhardt will design MEP systems for your hospital that will include: Flexibility, Redundancy and Resiliency, along with consideration of capital cost and operating cost.

Hospitals are complicated buildings to design and build. Meinhardt has experience in carefully coordinating the MEP designs with the architect (international or local), health planners, interior designers and other specialists. Our design philosophy is to not make MEP systems any more complicated than they need to be – we design for locally available expertise in construction, commissioning, operation and maintenance.

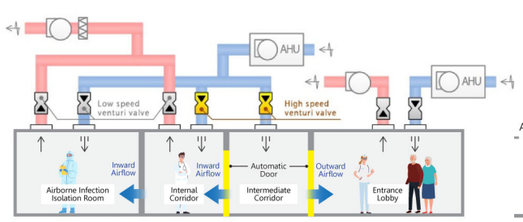
"Meinhardt Thailand played a key role in helping us replace the majority of our main MEP infrastructure, under very strict conditions and within a 24/7 environment. All of Meinhardt Thailand teams demonstrated professionalism throughout the entire project lifecycle and brought innovation on the table."

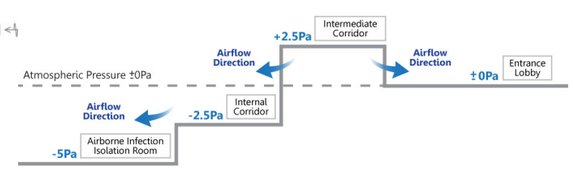
Konstantinos Sarris
Director of Property
Bumrungrad International Hospital

MEP Design Considerations and Risk Mitigation



- Negative airflow observation rooms for patients awaiting assessment or test results
- 24 hour operation and life critical services means that redundancy and provision for maintenance is more important than other buildings.
- High ventilation loads in a municipal, tropical climate needs to be balanced against cost of air cleaning/filtration and high energy consumption
- High water demand for sterilisation, laboratory processes and cleaning.
- Water treatment to a higher standard to minimise infection risk for patients with compromised immune systems.
- Airborne Infection Isolation (AII) Rooms with negative pressure.
- Negative airflow for Emergency Department waiting areas
- Dental rooms redesigned from positive airflow to negative airflow
- Critical air balance design and assessment
- Access to international knowledge, Standards and the latest research from ASHRAE
- Consideration of emerging technologies such as Bipolar Ionization





Hospital Renovations and Conversions of Existing Buildings

Renovating a hospital that operates 24/7 is extremely challenging.

Converting a building that was designed for another use into clinics is also very challenging.

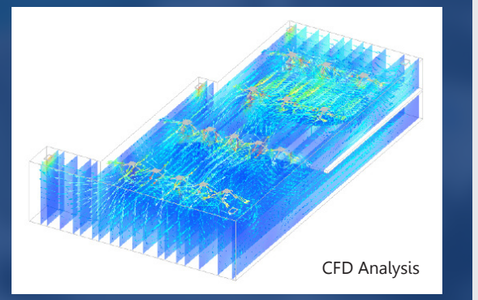
The Meinhardt healthcare team has experience with both types of projects. Having this experience allows us to better design your new hospital or healthcare building to facilitate future renovation. With the rapid pace of progress in healthcare treatments and technologies, plus competition with other operators, most hospital departments will need to be renovated every 6 to 8 years.

Structural challenges with existing building renovation

With only 20% to 25% of construction cost typically attributed to the cost of structure in a new build hospital, it is paramount that the structure should not hinder the planning and functionality of the facility. Given the need for adaption of spaces, change of function or addition of new services, renovation is common in hospitals.

The structural system chosen should be able to be easily adapted, with steel structures favored over concrete due to the ease with which steel structures can be modified. Hospitals structures need to be robust and resilient often serving a post disaster function. Floors are often heavily loaded with large equipment. Vibration needs to be controlled and structure needs to be designed for seismic loading. Our structural engineers have a wealth of experience in design of new construction and renovation projects. Working in cross discipline teams, they are aware of the need to coordinate services with structure and architecture.

How does Meinhardt deal with Specialist Areas and Equipment?



Operating Theatres and Invasive Procedure Rooms

- Semi-laminar air flow with HEPA filters
- Positively pressurised clean-room with high air change rate
- Dedicated air handling unit with supply air fan redundancy
- Hybrid operating theatres

Imaging Equipment (X-ray, MRI, CT scan) and Nuclear Accelerators

- High cooling loads, critical cooling and 24 hour cooling; sometimes requiring chilled water supply or dedicated cooling plant
- High impulse electrical loads
- Generator and UPS power demand
- Floor trenches for services to reach island' equipment
- Specialist fire protection systems, considering the high value equipment

Other Items

- Isolated Power Supplies (IPS) and clean earths for operating theatres, ICU, NICU, CCU and other critical areas
- Isolation rooms – AII and PE (protective environment)
- Hyperbaric chambers, Colon Hydrotherapy, other Wellness equipment
- Bronchoscopy and Emergency Department waiting/ triage areas
- Hospital laboratories
- Hospital data centres
- Pharmacy clean rooms
- CSSD clean and dirty rooms
- Nuclear medicine 'hot' rooms
- Solutions for areas requiring 24 hour cooling

How to Improve Indoor Air Quality?

Pre-cooled and dehumidified outdoor air to decouple humidity control from temperature control

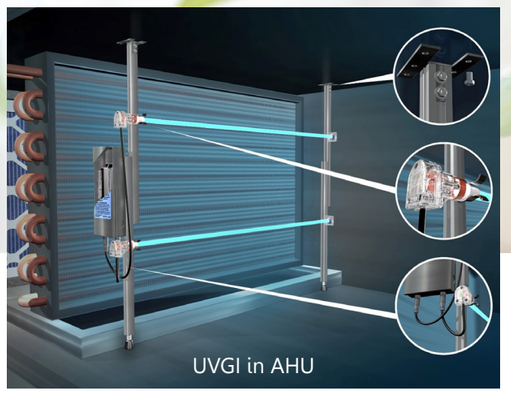
Design the building air balance for positive pressurisation to minimise ingress of hot/humid /unfiltered outdoor air at building entrances/ exits/leakage paths

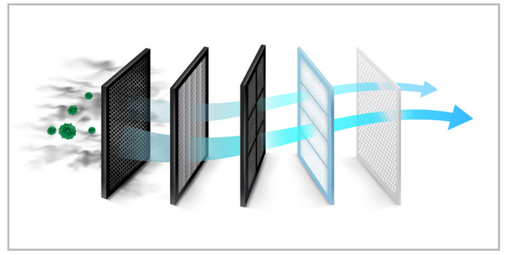
Avoid using ceiling plenums for return air in clinical areas because of the difficulty of disinfecting

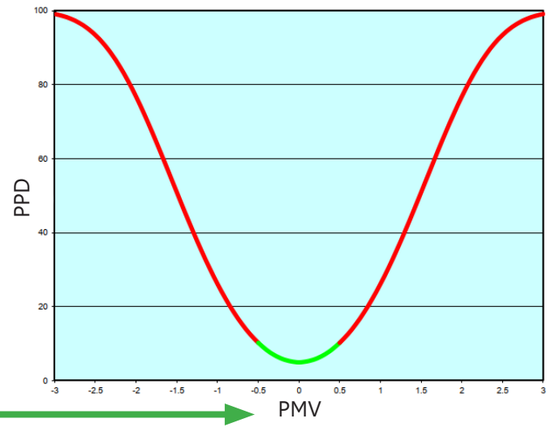
Higher grade air filters improve indoor air quality, but additional pressure drop needs to be considered

UVGI (ultraviolet germicidal irradiation) installed in air handling units is an effective means of reducing the risk of airborne infection inside buildings, but there are cautions and limitations

Meinhardt can investigate existing MVAC systems and advise on the practicality of retrofitting higher grade air filters and UVGI into existing AHUs







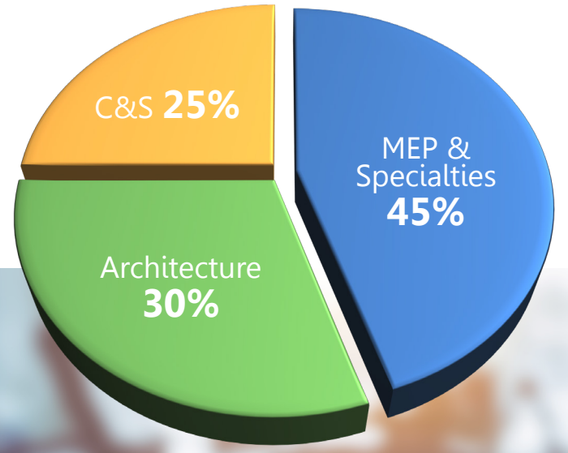
Acceptable Thermal Environment for General Comfort:
PPD <10, PMV Range -0.5 < PMV < +0.5

PPD = Predicted percentage dissatisfied
PMV = Predicted Mean Vote

Construction Costs

Specifying the most expensive / complicated / high-end equipment may not give clients the best value for money.

We consult with our clients to provide options leading to design decisions that deliver economical and functional solutions.



Typical Hospital Construction Costs

Bumrungrad International Hospital, Thailand

Mövenpick BDMS Wellness Resort, Thailand

RAKxa Wellness, Thailand

Queen Sirikit Medical Center, Thailand

Other Services

- **Authority Submissions** – additional requirements for healthcare facilities from the Ministry of Public Health which will issue the license to operate the facility, plus EIA and BMA/Or Bor Tor submissions
- **Assistance with LEED and WELL Assessments and Submissions** – advice on implications and cost/benefit studies. We have Accredited Professional staff for LEED and WELL.
- **Lighting Design** – interior lighting design for private residences, resorts, retail, hospitals & commercial buildings. Externally, our lighting design input can enhance the appearance of hard & soft landscaping, facades & building features.
- **Façade Engineering** – From design to construction and post-completion assessment, our team provides an integrated approach to all aspects of Façade engineering.
- **Transport Planning & Engineering** – provides expert advice to development and transport-led projects to facilitate integrated, successful and sustainable solutions to modern day transport problems.

Asia Royal Hospital (AR III), Myanmar

Vimut International Hospital, Thailand

STS Hospital, Bangladesh

Sansara Huahin, Thailand

Key People

Derek Angus - Hospital Specialist
Associate Director - Meinhardt Thailand
derek@meinhardt.net

- B.Eng.(Mechanical Engineering) (1st Class Honors)
- Registered Professional Engineer Queensland (RPEQ)
- FIEAust, CPEng, NER
- LEED AP BC+D

How can I fix the humidity problem in my existing hospital?

The volume of pre-cooled outside air being delivered into the building must exceed the volume of exhaust. Otherwise there will be uncontrolled infiltration of hot and humid outside air into the building. The chilled water temperate leaving the chillers should also be checked against the design value because even a small increase will significantly reduce the dehumidification ability of the AHUs.

How can MVAC systems assist to mitigate the spread of airborne contaminants?

Higher air change rates help to dilute contaminants, and ventilation systems direct airflows from clean to less clean areas where exhaust grilles are located. Appropriate grade air filters at AHUs remove contaminants and keep cooling coils clean.

Kittisak Pulviwatchaikarn
Associate Director - Meinhardt Thailand
kittisak@meinhardt.net

- B.Eng. (Mechanical Engineering)
- Thai Professional Engineering License (Level 2) No. 3362

Why efficiency and flexibility are important for Hospitals and Healthcare facilities?

Hospitals and healthcare facilities consume 2-3 times more energy consumption than the commercial building from 24 high ventilation loads, specialist equipment etc. and need 24 hours operation. Hence, the good planning for main plant and main distribution will be required during the stage for system efficiency, redundancy, resilient and future technology.

What are the ventilation and air circulation strategies for Hospitals and Healthcare facilities?

The high ventilation rates, pressure relationship between the zones, appropriate airflows are necessary maintained to ensure the infection control and patient safety. The ventilation rates are defined in ASHRAE Standards 62.1 and 170. The air circulation will be from clean to dirty zones. A central HVAC system serve multiple zones should be avoided.

Dr. Methee Chiewanichakorn
Associate Director - Meinhardt Thailand
methee@meinhardt.net

- B.Eng. (1st Class Honors)., M.Eng. (Structural Engineering), Ph.D. (Structural and Earthquake Engineering)
- LEED® AP BD+C
- Thai Professional Engineering License (Level 2) No. 11929
- California Professional Engineering (Civil) License No. C72776
- California Structural Engineering License No. S5645

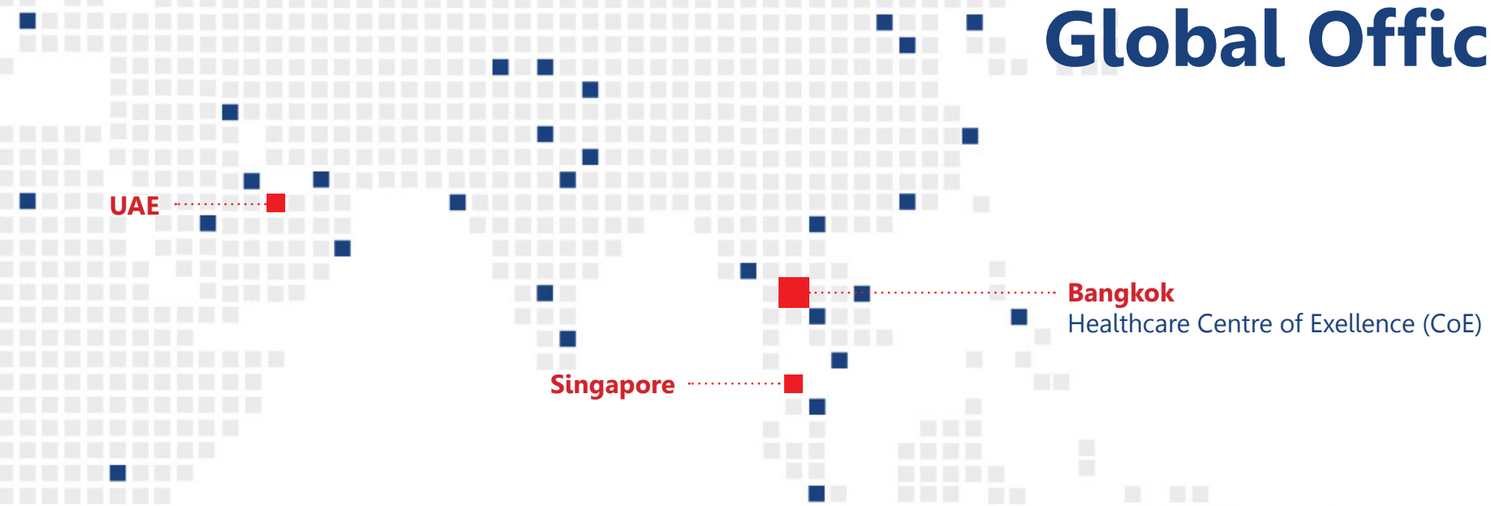
How is building regulation treating hospital buildings different from others?

Hospitals and Healthcare facilities are categorized as the so-called "Essential Facilities" in Thai seismic design building regulations. They meant to experience minimal structural damages and to remain in operation during earthquake events. Hence, these buildings are to be designed to resist much stronger earthquakes.

What else should structural engineers be considering besides designing safe buildings?

Having hospital buildings standing up during major earthquakes is important, non-structural components such as architectural and MEP elements must remain operational as well. Seismic bracing of non-structural components is as important as seismic design of structural components.

Global Offices



Roy Samuels
Director - Meinhardt Group Design (MEP)

- B.Eng. (Mechanical Engineering)
- Dip. Management
- Member (MIEAust), Engineers, Australia
- Chartered Professional Engineer (CPEng) - Engineers, Australia
- NER - Engineers, Australia

Ehab Ibrahim
Projects Director - Meinhardt MENA

- BSc (Engineering)
- Accredited Tier Designer - Uptime; Reg 2525
- Certified Project Management Expert
- Member of ASHREA
- Member of the Society of Engineers, UAE
- Member of Egyptian Syndicate of Engineers, Egypt
- MIET, IEEE

Sean Treweek
Managing Director - Meinhardt Australia

- M.Business Administration
- M.Commercial Law
- M.Design Science (Building Services)
- B.Eng. (Honours)
- Engineering Executive and Fellow, Engineers Australia F.IEAUST Eng.Exe
- Fellow, Australian Institute of Refrigeration Heating and Air Conditioning Inc. F.AIRAH
- Registered Building Practitioner EM 36726
- CPEng, NER

Meinhardt Offices Worldwide

Meinhardt Key Offices with Experts on Hospitals & Healthcare

MEINHARDT

Meinhardt has a Healthcare Centre of Excellence (CoE) in Bangkok that will be your trusted adviser. Our experts will:

- Provide solutions with: Flexibility, Redundancy, Resiliency, Buildability and Maintainability, along with consideration of capital cost and operating cost
- Renovate your existing healthcare facility whilst minimising operational risks
- Alleviate your indoor air quality concerns
- Deliver value for money solutions

Meinhardt (Thailand) Ltd.

6th, 15th, 16th Floor, Thanapoom Tower
1550 New Petchburi Road, Makkasan,
Ratchtevee, Bangkok 10400, Thailand
Tel: +66(2) 207-0568
Fax: +66(2) 207-0574
thai@meinhardt.net

www.meinhardt.net