



Myanmar Engineering Council

'To hold paramount the safety, health and welfare of the public'

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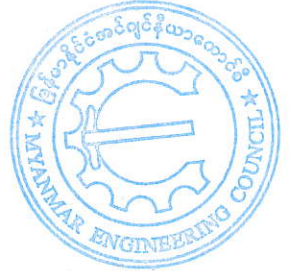
Chairman

ASEAN Chartered Professional Engineer Coordinating Committee

C/O ASEAN Secretariat

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REGULATED SCOPE OF WORK FOR PROFESSIONAL ENGINEER, MYANMAR

Dear Sir,

The Monitoring Committee of Myanmar submits the scope and Regulated works of Engineering Disciplines in Myanmar with the attached files.

Thanking you.

Yours Sincerely


6-11-2018

Khin Maung Tint

Chairman, Monitoring Committee

ASEAN Chartered Professional Engineers Register, Myanmar.

Myanmar Engineering Council

Regulated Scope of Work for Professional Engineer

Civil Engineering

Construction Engineering Discipline

1. Permanent buildings and other structures that represent a substantial hazard to human life in the event of failure, including but not limited to:
 - (a) Residential and commercial buildings above 8 storey or 28m (91.8 ft) height
 - (b) Covered structure whose primary occupancy is public assembly with an occupant load greater than 300
 - (c) Buildings and other structures with elementary school, secondary school or daycare facilities with an occupant load greater than 250
 - (d) Buildings and other structures with an occupant load greater than 500 for colleges or adult education facilities
 - (e) Healthcare facilities with an occupant load of greater than 20 resident patients, but not having surgery or emergency treatment facilities
 - (f) Jails and detention facilities
 - (g) Power generating stations, potable water and waste water treatment facilities and other public utility facilities
 - (h) Buildings and other structures containing sufficient quantities of toxic or explosive substances to be dangerous to the public if released
2. Buildings and other structures designated as essential facilities, including but not limited to:
 - (a) Hospitals and other healthcare facilities having surgery or emergency treatment facilities
 - (b) Fire, rescue and police stations and emergency vehicle garages (township level and above)
 - (c) Designated earthquake, hurricane or other emergency shelters
 - (d) Designated emergency preparedness, communication, and operation centers and other facilities required for emergency response
 - (e) Power generating stations and other public utility facilities required as emergency backup facilities for essential facilities structures
 - (f) Structures containing highly toxic materials
 - (g) Aviation control towers, air traffic control centers and emergency aircraft hangars
 - (h) Building and other structures having critical national defense functions
 - (i) Water treatment facilities required to maintain water pressure for the suppression
3. Silo or barn having capacity greater than 100m³ (3528 ft³)
4. Column structure, tower, or religious structure such as image of Buddha or pagoda having height greater than 15m (49.2ft) from existing ground level

5. Jetty or dockyard having DWT (Dead Weight Tons) 50 tons and above
6. Precast concrete or precast prestressed concrete having span length greater than 8m (26.2ft) span
7. Prestressed concrete floor area greater than 200m² (2151 ft²) (or) clear span greater than 12m (39.4ft)
8. Strengthening and retrofitting works of any size
9. Scaffolding or temporary supporting having height greater than 5m or weight of greater than 670 kg/m² (137 lb/ft²)
10. Concrete formwork of column having height greater than 5m or concrete formwork of beam having clear span greater than 9m (29.5 ft)
11. Substructure, retaining wall having height or depth greater than 3m (9.8ft)
12. Structure of public transportation system, public road runway and taxi way, highway of any size
13. Structure of Fluid container such as water tank, oil tank, swimming pool, having capacity greater than 50m³ (1764ft³)
14. Billboard or billboard structure having boarding area greater than 10m² and having height from ground level greater than 10m, billboard area greater than 5m² installed on roof, roof top, or awning or any attachments to the building
15. Any transmitting tower structure having height greater than 25m (82ft) from existing ground level or having equipment weight greater than 200kg (440lb)
16. Structure system with transfer slab or / and transfer beam supporting for more than one storey

Structural Engineering Discipline

1. Permanent buildings and other structures that represent a substantial hazard to human life in the event of failure, including but not limited to:
 - (a) Residential and commercial buildings above 8 storey or 28m (91.8 ft) height.
 - (b) Covered structures whose primary occupancy is public assembly with an occupant load greater than 300.
 - (c) Buildings and other structures with elementary school, secondary school or daycare facilities with an occupant load greater than 250.
 - (d) Buildings and other structures with an occupant load greater than 500 for colleges or adult education facilities
 - (e) Healthcare facilities with an occupant load of greater than 20 resident patients, but not having surgery or emergency treatment facilities.
 - (f) Jails and detention facilities.
 - (g) Any other occupancy with an occupant load greater than 1000.
 - (h) Power generating stations, potable water and waste water treatment facilities and other public utility facilities.
 - (i) Buildings and other structures containing sufficient quantities of toxic or explosive substances to be dangerous to the public if released.
2. Buildings and other structures designated as essential facilities, including but not limited to:
 - (a) Hospitals and other healthcare facilities having surgery or emergency treatment facilities.
 - (b) Fire, rescue and police stations and emergency vehicle garages (township level and above).
 - (c) Designated earthquake, hurricane or other emergency shelters.
 - (d) Designated emergency preparedness, communication, and operation centers and other facilities required for emergency response.
 - (e) Power generating stations and other public utility facilities required as emergency backup facilities for essential facilities structures.
 - (f) Structures containing highly toxic materials.
 - (g) Aviation control towers, air traffic control centers and emergency aircraft hangars.
 - (h) Buildings and other structures having critical national defense functions.
 - (i) Water treatment facilities required to maintain water pressure for fire suppression.
3. Silo or barn having capacity greater than 100m³ (3528 ft³).
4. Column structure, tower, or religious structure such as image of Buddha or pagoda having height greater than 15m (49.2 ft) from existing ground level.
5. Bridge structure having bridge individual span greater than 20m (65.6 ft).
6. Jetty or dockyard having DWT (Dead Weight Tons) 50 tons and above.
7. Precast concrete or precast prestressed concrete having span length greater than 8m (26.2 ft) span.
8. Prestressed concrete floor area greater than 200m² (2151 ft²) (or) span (clear) greater than 12m (39.4 ft).
9. Strengthening and retrofitting works of any size.
10. Scaffolding or temporary supporting having height greater than 5m or weight of greater than 670 kg/m² (137 lb/ft²). (See Figure 1 & Figure 2)

11. Concrete formwork of column having height greater than 5m or concrete formwork of beam having clear span greater than 9m (29.5 ft). (See Figure 3)
12. Substructure, retaining wall having height or depth greater than 3m (9.8 ft). (See Figure 4 & Figure 5)
13. Structure of public transportation system, public road and highway of any size.
14. Structure of Fluid container; such as water tank, oil tank, swimming pool, having capacity greater than 50m³ (1764 ft³).
15. Billboard or billboard structure having boarding area greater than 10m² and having height from ground level greater than 10m , or billboard or billboard structure having billboard area greater than 5m² installed on roof, roof top, or awning or any attachments to the building. (See Figure 6)
16. Any transmitting tower structure having height greater than 25m (82 ft) from existing ground level or having equipment weight greater than 200 kg (440 lb). (See Figure 7)
17. Structure system with transfer slab or/and transfer beam supporting for more than one storey. (See Figure 8)
18. Façade or external cladding design for more than 8 storey building.

Geotechnical Engineering Discipline

- (i) Earth retaining or slope stabilizing system with high or depth more than 5m or for basement excavation, excavation area more than 250m² or building height more than 28m.
- (ii) Embankment high more than 5m
- (iii) Horizontal drilling & pipe jacking with a diameter, width or height more than 1m and any tunneling work.
- (iv) Foundation work for buildings of more than 90m high.
 - PE (Structure) or PE (Geotechnical) will Design the Foundation of Building height Up to 90 m
 - PE (Geotechnical) will Design the Foundation of Building more than 90 m height.
- (v) Design of Ultimate Load Test Pile shall be done and certified either by PE (Structure) or PE (Geotechnical).

Water Resources Engineering Discipline

Sub-discipline

- (1) Dam and Appurtenant Structures (Planning & Design)
- (2) Dam and Appurtenant Structures (Construction)
- (3) Irrigation and Drainage (Planning & Design)
- (4) Irrigation and Drainage (Construction)
- (5) River & Coastal Engineering

1.1 Dam and Appurtenant Structures (Planning & Design)

- (a) Investigation Work refers to research, analysis, testing, and requisition of data and statistics for use as concepts in investigation or verification of work.
- (b) Project Planning Work, Refers to the project study, analysis for optimal alternatives or project planning.
- (c) Design and Computational Work, refers to professional details study for construction, building/ construction work, plant and machinery layout with detailed computation programs , drawings, plans, specifications, or estimation.
- (d) Operation and Maintenance Supervision, refers to directing of operation, maintenance of engineering work pieces or system according to drawing, plan, and code of engineering professional practices.

2.1 Dam and Appurtenant Structures (Construction)

- (a) Investigation Work refers to research, analysis, testing, and requisition of data and statistics for use as concepts in investigation or verification of work.
- (b) Project Planning Work, refers to the project study, analysis for optimal alternatives, or project planning.
- (c) Construction Supervision refers to directing, controlling; or control of construction, building, installation, maintenance, modification, dismantlement, or mobilization of work according to drawing, plan, and code of engineering professional practices.
- (d) Operation and Maintenance Supervision, refers to directing of Operation, maintenance of engineering work pieces or system according to drawing, plan, and code of engineering professional practices.

3.1 Irrigation and Drainage (Planning & Design)

- (a) Investigation Work refers to research, analysis, testing, and requisition of data and statistics for use as concepts in investigation or verification of work.
- (b) Project Planning Work, refers to the project study analysis for optimal alternatives or project planning.
- (c) Design and Computational Work, refers to professional details study for construction, building/ construction work, and plant and machinery layout with detailed computation programs , drawings, plans, specifications of estimation.
- (d) Operation and Maintenance Supervision refers to directing of operation, maintenance of engineering work pieces or system according to drawing, plan and code of engineering professional practices.

4.1 Irrigation and Drainage (Construction)

- (a) Investigation Work refers to research, analysis, testing, and requisition of data and statistics for use as concepts in investigation or verification of work.
- (b) Project Planning Work refers to the project study, analysis for optimal alternatives or project planning.
- (c) Construction Supervision refers to direction, controlling; or control of construction, building, installation, maintenance, modification, dismantlement, or mobilization of work according to drawing, plan and code of engineering professional practices.
- (d) Operation and Maintenance Supervision, refers to directing of operation, maintenance of engineering work pieces or system according to drawing, plan, and code of engineering professional practices.

5.1 River & Coastal Engineering

- (a) Investigation Work refers to research, analysis, testing, and requisition of data and statistics for use as concepts in investigation or verification of work.
- (b) Project Planning Work refers to the project study, analysis for optimal alternatives or project planning.
- (c) Design and Computational Work refers to professional details study for construction, building/ construction work, and plant and machinery layout with detailed computation programs, drawings, plans, specifications or estimation.
- (d) Construction Supervision refers to directing, controlling or control of construction, building, installation, maintenance, modification, dismantlement, or mobilization of work according to drawing, plan and code of engineering professional practices.
- (e) Operation and Maintenance Supervision refers to directing of operation, maintenance of engineering work pieces or system according to drawing, plan and code of engineering professional practices.

Water Supply & Sanitation Engineering Discipline

- Aqueducts and other water supply conduits, except pipelines
- Long-distance pipelines
- Local pipelines
- Sewage and water treatment plants
- Outdoor sport and recreation facilities
- Military engineering works, eg., forts, blockhouses, bunkers, firing ranges, military testing centres, ets.
- Satellite launching sites
- Waste dumps and waste incinerators
- Plants for treating and processing other civil engineering works, n.e.c
- Site formation and clearance services
- Excavation and earthmoving services
- Water well drilling and septic system installation services
- Water well drilling services
- Septic system installation services
- Assembly and erection of prefabricated construction
- Water plumbing and drain laying services
- Water plumbing services
- Drain laying services
- Heating equipment installation services

Electrical Engineering

Electrical (Building Services) Engineering discipline

- (1) The holder of an electrical Registered Senior Engineer's license (R.S.E) shall be entitled to –
 - (a) Install, repair, maintain, operate, inspect and test an electrical installation where the operating voltage of such installation exceed 11,000 volts and the approved load of such installation does not exceed 1000kVA.
 - (b) Design and submit plans and drawings of an electrical installation where the operating voltage of such installation exceed 11,000 volts and the approved load of such installation does not exceed 1000kVA.
 - (c) Carry out any work or switching operation as instructed by or under the supervision of an authorized high voltage switching engineer.
- (2) The design, install, repair, maintain, operate, inspect, test and take full charge and responsibility for any electrical installation where the operating voltage of such installation does not exceed 33,000 volts.

Electrical (Power) Engineering Discipline

Scope of Regulated Engineering Work – Electrical Engineering

Electrical engineering consists of 2 sub-discipline; Electrical Power, Electrical Telecommunication.

Electrical Power

1. All consultancy of electrical power engineering work on project planning, design and computational work, construction or production supervision, investigation work or operation and maintenance supervision at all types and all sizes.
2. Project planning work
 - (1) Electrical power generating system having total capacity greater than 1,000 kVA or having maximum line voltage greater than 3,300 volt ,
 - (2) Power transmission line, power distribution system and electrical power system having combined total capacity greater than 1,000 kVA or having maximum line voltage greater than 3,300 volt,
3. Design and Computational Work
 - (1) Electrical system or electrical equipment having total capacity greater than 300kVA or having maximum line voltage greater than 3,300 volt ,
 - (2) Public Building Electrical system having total electrical power greater than 200 kVA ,
 - (3) Fire alarm and signaling system and lightning protection system of high rise building, large scale building, or condominium,
4. Construction or Production Supervision
 - (1) Electrical system or electrical device having capacity greater than 1,000 kVA or having maximum line voltage greater than 12 kV,
 - (2) Public Building Electrical system having combined electrical power 200 kVA ,
 - (3) Fire alarm and signaling system and lightning protection of high rise building, large scale building, or condominium,
5. Investigation Work
 - (1) Electrical system or electrical equipment having capacity greater than 1,000 kVA or with maximum line voltage greater than 12 kV,
 - (2) Fire alarm and signaling system and lightning protection system of high rise building, large scale building, or condominium,
6. Operation and Maintenance Supervision
 - (1) Electrical system or electrical equipment with capacity starting from 1,000 kVA and higher or with maximum line voltage starting from 12 kV and higher,

Electronic Engineering Discipline

(1) Communications

Telecommunication works, including tower, vsat, vuh, uhf, wireless/wired, broadcasting stations which propagate electromagnetic wave of frequency greater than 300 khz and having transmission power greater than 1 kw.

Communication system using electromagnetic wave more than 300 mhz and more than 60 audio channels.

(2) Industrial electronics and automation

any factory or Automation process which have more than 50 machines or process points.

(3) medical electronics

(4) laboratory and test equipment

(5) sensor and monitoring

more than 10 sites which each have sensors for weather monitoring, foresting or electric power line and other monitoring stations.

(6) computer, programming and networking

data center, computer network/lan with more than 100 user points or connections, wan system having more than 10 sites.

(7) consumer electronic

design and manufacturing for any consumer products or home appliance.

Chemical Engineering Discipline

Regulated Scope of Work for Professional Engineer

Consulting, design, supervision, evaluation, investigation and recommendation work for the following areas:

1. Manufacturing Industry, or Industry

- i. utilizing: (a) Chemical reaction, physical chemistry, biochemistry, electrochemistry having power system greater than 500 kW, or
 - (b) Physical properties alteration or phase change on raw materials having power system greater than 500 kW, or
 - (c) Dangerous chemical substances in mixture or admixture of all sizes, or
 - (d) Chemical catalysis, biochemical catalysis, biological catalysis of all sizes, or
- ii. producing: in form of the powder or pellet which may cause explosion or electrostatic charges, and hazardous chemical substances of all sizes

2. Manufacturing process of all sizes utilizing or generating dangerous, toxic or flammable chemical substances

3. Manufacturing process consisting of:

- i. the following operation units having power system greater than 50 kW
 - (a) Distillation tower, absorption / adsorption tower, filtration unit, extraction device, precipitation tank, heat exchanging unit, crystallization device, etc., and/ or
 - (b) Other particle separation equipment such as membrane separation, ion exchange unit, filter press, etc., and/ or
 - (c) Other separation equipment such as screening, filter bag, cyclone, or electrostatic dust collector, etc., and/ or
 - (d) Evaporator, incinerator, furnace, process heater, dryer, industrial kiln, etc., and/or
- ii. Reactors of all types and sizes

4. Manufacturing Industry, or Industry

- i. utilizing environmental technologies:
 - (a) Water section: drinking water treatment, ground and surface water remediation, and industrial process water treatment
 - (b) Wastewater section: wastewater treatment process of above mentioned manufacturing process or industry (1(i),1(ii),2, 3(i),3(ii))
 - (c) Air pollution control and monitoring for emission from the above mentioned industries,(1(i),1(ii),2,3(i),3(ii)), thermal and electrical energy generation and industrial sources such as boilers, incinerators, kiln and smelters and other developments or projects
 - (d) Solid Waste management: hazardous waste management, hospital waste management, recycling and resource recovery

ii. requiring environmental impact assessment: for the above mentioned industries(1(i),1(ii),2,3(i),3(ii))

iii. renewable energy; bio-fuel production and bio-energy production unit for power system greater than 500 kW

5. Storage or handling system within factory (for shipment out of the factory)

- of dangerous, chemical, or toxic substances, powder or grains which may cause an explosion or electrostatic charges having capacity greater than 20 metric tons

6. Chemical and industrial safety including process safety, chemical hazards for all industries and fire hazards for industries using flammable chemicals

Mining Engineering Discipline

Scale of Mine Planning, Design and Operational Monitoring mentioned in the following table shall be understood as defined under the Myanmar Mines Law and its related Rules and Regulations prevailing as at 2018 October as far as applicable.

Regulated Scope of Works for Professional Engineer (Mining)

Planning and Design Approval

Any Large-scale Mining

Quality Control of Products and Services in any Mines and Quarries

Blasting works distance less than 500 m from public area (Risks to public)

Open Excavation Work depth/height greater than 50 m in Mines and Quarries

Underground Excavation/Deep Excavation Work Deeper than 4 m in/or Near Public Area

Subsurface Ventilation & Air Conditioning in all Underground Excavations and Tunnels

Any Drilling for Exploration and Earth Excavation

Any Tunneling Works and Urban Tunnel

All Types of Dredging in Land, River and near Shore

Mine Safety and Health; Risk Assessment and Management System

Environmental Impact Assessment, Management Plan and Mine Closure Plan

Operational Monitoring

All Large-scale Mining

Project Control of any Type of Mines, Excavations, Quarries

Blasting works within a distance less than 250 m from Public Area

Open Excavation Work depth/height greater than 50 m in Mines and Quarries

Underground Excavation/Deep Excavation Work deeper than 4 m in or Near Public Area

Subsurface Ventilation & Air Conditioning in all Underground Excavations and Tunnels

Any Drilling for Exploration and Earth Excavation

Any Tunneling Work including Urban Tunnel

Dredging in any Operation

Mine Safety and Health; Risk Assessment and Management

Environmental Impact Assessment, Management, Mitigation and Mine Closure

Naval Architecture and Marine Engineering Discipline

Scope of Regulated Engineering works

- (1) Design works and signing for approval of ship above 500 GT.
- (2) New building works of ship above 500 GT.
- (3) Repairing works of ship above 500 GT.
- (4) Marine electrical installation and repairing works of ship above 500 Gt.
- (5) Ship design, signing for approval, ship building and repairing works of passenger ship above 12 passengers.
- (6) Ship design, signing for approval, ship building and repairing works of ship above 5 GT for fibre and aluminium hull.
- (7) Marine system design works for 750 Kilo-watt propulsion system.
- (8) Consultant services for design and building works of ship.

Remark: Every kind of works mentioned above should be amicable with the area of practice guidelines.

Aerospace Engineering Discipline

Regulated Scope of Work for Professional Engineer

(1) Propulsion and Flight Vehicles/ Aeronautical

- Aerodynamics
- Aircraft Structure
- Gas Turbine & Aerospace propulsion
- Flight Vehicle design
- Industrial Management
- Aircraft Maintenance
- Airworthiness and Legislation

(2) Avionics

- Control and Automation Engineering
- Microwave technique
- Telecommunication
- Satellite Communication
- Aerospace Navigation
- Embedded system design
- Airworthiness and Legislation
- Avionic Equipment Maintenance

(3) Electrical Systems and Instrumentation

- Aircraft Instrumentation
- Control and Automation Engineering
- Electrical Installation Design
- Aircraft electrical systems
- Computer Applications
- Servo Engineering Design
- Airworthiness and Legislation
- Aircraft Electrical & Electronics Maintenance

(4) Fuel and Propellant

- Chemical Kinetics and Reactor Design
- Mass Transfer
- Plant Design
- Instrumentation and Automatic Process Control
- Pollution Control and Maintenance
- Fuel system design
- Explosives and Propellant technology
- Airworthiness and Legislation

(5) Space System

- Space Environment Utilization
- Spacecraft Structure
- Spacecraft Dynamics and Control
- Orbital Mechanics and Design
- Satellite Communication and Navigation
- Spacecraft Design
- Remote Sensing & GIS application
- Airworthiness and Legislation

Petroleum Engineering Discipline

Areas of Practice for Professional Engineers (PE)

The work at the PE differs from that at RSE in

- (1) greater scope and complexity of assignments,
- (2) increased requirements for planning, adapting methods, and interpreting results,
- (3) greater freedom from supervision, and
- (4) more difficult person-to-person relationships.

Nature of work

The work requires a thorough knowledge of petroleum engineering guides, precedents, methods, and techniques. Assignments typically involve a variety of difficult problems requiring analysis and evaluation of alternatives, substantial modification of standard practice, and negotiation and coordination. PEs are required to be fully qualified to plan and carry out assignments requiring application of sound judgment and specialized knowledge of all conventional aspects of their area of assignment. Contacts frequently involve providing guidance to lessees and company representatives on technical and regulatory problems, coordinating operations, securing cooperation of oil and gas companies, and testifying on engineering findings.

The following are typical PE assignments:

1. Plans and conducts engineering surveys and investigations designed to improve petroleum production by increasing oil recovery. Assembles, analyzes, and interprets data concerning oil and gas fields with respect to
 - (a) attitude and characteristics of producing formations,
 - (b) pressure, temperature, composition, and phase relations of the fluids,
 - (c) methods of drilling and operating wells, and
 - (d) behavior of fluids under producing conditions. The purpose is to determine how the development and operation of the fields can be improved to increase the recovery of oil and gas by employing accepted and modern engineering techniques. Visits representatives of oil companies and State regulatory offices to obtain engineering data and technical information, and, where necessary, makes engineering and production tests in collaboration with company engineers. Predicts reservoir performance, and prepares reports recommending changes in practice to effect increased recovery.
2. Independently plans and conducts studies of development, drilling, completion, and producing and Installation practices on leased public or State owned oil and gas lands. Conducts reservoir studies with the aid of geophysical and geological data, electric-logs, core analyses, and individual well information to ascertain the type of geological structure and the characteristics of the reservoir; determines the number of wells completed in a reservoir and the adequacy of well-spacing and completion programs to properly drain the reservoir without undue waste of reservoir energy. Determines the adequacy of and compliance with requirements of proposed development and production plans. Furnishes technical advice and assistance to lessees in determining whether well locations, drilling or production methods, repairing and completing wells, Installations etc., meet requirements. In the event of accidental escape of oil, gas or salt water, directs the suspension of operations on leases to alleviate hazardous conditions or to prevent waste to property damage.
3. Prepares analyses, reports, and recommendations on problems involved in certificate or rule-making proceedings in connection with regulation of the transportation or sale of natural gas. Evaluates engineering proposals for effectiveness, accuracy, reasonableness, and conformance to requirements. Prepares exhibits and testifies on engineering and related regulatory issues. Reviews testimony and presentations of other witnesses and The PE level is characterized by a combination of factors such as the following:

4. Recognition of the PE as a highly skilled professional equipped by training and experience to deal fully with diversified, advanced engineering problems in his area of specialization;
5. Assignments of such scope and magnitude as to require one or more engineering assistants to perform the more routine duties;
6. Numerous important complex problems which require originality in planning and organizing the work, in making novel adaptations of methods, or in devising new approaches;
7. Required highly developed skill in promotion of improved practice, in negotiation of agreements, or in presenting testimony as an expert witness on complex engineering issues;
8. A high degree of reliance is placed on recommendations and conclusions on matters of considerable importance to the success of affected agency programs.
9. Advises legal staff in cross examination and preparation of briefs and arguments.

Mechatronic Engineering Discipline

(Factory Automation)

1. All Consultancy of Factory Automation (Mechatronics) Engineering work on project planning work, design and computational work, Operation or Production, Maintenance Supervision work.
2. Project Planning Work
 - i. Manufacturing or service industries with factory automation having labor employment greater than 100 persons or having plant financial investment greater than 100 million kyats excluding land cost.
 - ii. Production, automated control factory using PLCs, Pneumatic, Hydraulic system utilizing labour employment greater than 100 persons or having plant financial investment greater than 100 million kyats excluding land cost.
 - iii. Factory automation system having each of equipment value greater than 10 million kyats or having each of project value greater than 50 million kyats, or having combined total power system greater than 150 kilowatts, or serving in a building having the occupancy greater than 300 persons.
 - iv. Fire protection system, Heating and Ventilation Control system, lighting system having system value starting greater than 5 million kyats or having building fire protection gross floor area of 3000 square meters.
3. Design and Computation Work
 - i. Design for Factory automation, design of electrical and automated control systems including Human Machine Interface (HMI) development, calibration of sensors and instruments, programming of PLCs and user interfaces, hydraulic, pneumatic, electrical, electronic devices for factory automation.
 - ii. Design, program and simulate automated machinery and processes in industries such as the energy sector in plants, car manufacturing facilities or food processing plants and robots.
 - iii. Design for fire protection system, lighting system having system value starting greater than 5 million kyats or having building fire protection gross floor area of 3000 square meters.
 - iv. CAD drawings for physical components of electrical and automation system including motor control schematics/specification, control panel layouts and I/O wiring.
4. Operating or Production, Maintenance Supervision Work
 - i. Operation infrastructure and equipments for automated controlled factory having labor employment greater than 100 persons or having plant financial investment greater than 100 million kyats excluding land cost.
 - ii. Ventilation system, lighting system, automated manufacturing systems, heating, ventilation and air-conditioning systems, and various automobile subsystems or any automated factory having labor employment greater than 100 persons or having plant financial investment greater than 100 million kyats excluding land cost.
 - iii. Manufacturing and operation process having labor employment greater than 100 persons or having plant financial investment greater than 100 million kyats excluding land cost.
 - iv. Maintenance process supervision for Factory automation, design of electrical and automated control systems such as PLCs, hydraulic, pneumatic, electrical, electronic devices for factory automation.

(System Design)

1. System Design

- i. Utilizing:
 - (a) In development of Mechatronic products traditionally by several design experts from different design domains.
 - (b) Getting system thinking including both system philosophy and system concepts to solve the problems.
 - (c) Creating design for robustness rather than optimization.
 - (d) Supporting the function for project management by controlling with three key aspects such as budget, time and quality and then getting the objectives of system engineering to reduce the risk and failure.
 - (e) Managing the industrial engineering by planning all system engineering activities and controlling the progress.
 - (f) Evaluating the material handling system and plant layout.
 - (g) Focusing the reliability and maintenance engineering and also cost accounting and depreciation.
- ii. Producing: all products using mechanical and electrical technologies.

2. Managing and Design considering process with automation processes for all industries.

3. Managing and Design considering process consisting of:

- software for designing and project managements.
- other equipment and machinery for industrial automation.
- other theories and ethics for industrial managements.

4. Machine and Industrial safety including process and product safety for all industries.

Area of Practice for Professional Engineers (PE) (System Design)

1. Investigation of Mechatronic System Design projects with research, analysis, testing the data and statistics of design for use as concepts in investigation or verification of work.
2. Design Project planning with method study and work study of the projects by solving the complex problems.
3. Operation and Maintenance Supervision for planning all system engineering activities and controlling the progress.
4. Operation and Maintenance Supervision for evaluating the material handling system and plant layout.
5. Consultancy work for project management by controlling with three key aspects such as budget, time and quality.
6. Consultancy work for managing and design considering process.
7. Consultancy work for machine and industrial safety including process and product safety for all industries.

(Image Processing)

1. All consultancy of Image Processing (Mechatronics) Engineer work in the industrial, medical and hi-tech fields.
2. Vision Quality Control in Manufacturing Industry, or Industry
 - i. producing: (a) production of medical devices using medical imaging technology to develop optimized imaging techniques and advanced diagnostic efficacy including the areas of computed tomography, magnetic resonance energy, hybrid energy, radiographic image interpretation and breast imaging, with factory automation having labor employment greater than 1000 persons or having plant financial investment greater than 300 million kyats excluding land cost, or
3. Vision-based urban management system for public area, including traffic control system, autonomous driving system, etc., having system value starting greater than 300 million kyats
4. Machine vision and industrial safety, which include process safety and video surveillance under harsh environmental conditions

1. Air Conditioning and Mechanical Ventilation (ACMV)

(1) Consultancy & Investigation Works

Engineering work on project planning, design and computational work, construction / installation or production supervision, operation or maintenance supervision at all types and sizes.

(2) Project planning work

- a) Machinery having each of equipment value greater than 250 million kyats, or having each of project value greater than 500 million kyats, or having combined total power system greater than 100 kilowatts, or serving in a building having gross floor area greater than 2,000 square meters, or serving in a building having the occupancy greater than 200 persons.
- b) Other types of chillers, vapors boiler or Steam boiler, or pressure vessel having each of equipment value greater than 250 million kyats, or having each of project value greater than 500 million kyats, or other type of vapors boiler or steam boiler, pressure vessel, or industrial kiln, utilizing annual thermal power greater than 20 mega-joules, or other type of vapors boiler or steam boiler, pressure vessel, or industrial kiln, serving in a building having gross floor area greater than 2,000 square meters, or serving in a building having the occupancy greater than 200 persons.
- c) Air Conditioning System having each of equipment value greater than 250 million kyats or having each of project value greater than 500 million kyats or having combined total power system greater than 100 kilowatts, or serving in a building having gross floor area greater than 2,000 square meters, or serving in a building having the occupancy greater than 200 persons.
- d) Fluid system in pressure pipeline, or in vacuum pipes having each of equipment value greater than 250 million kyats or having each of project value greater than 500 million kyats or having combined total power system greater than 100 kilowatts, or pressure pipeline, or in vacuum pipes having fluid pressure greater than 500 kilopascals or having vacuum pressure less than minus 50 kilopascals, or refrigerant capacity of more than 100 kgs, or serving in a building having gross floor area greater than 2,000 square meters, or serving in a building having the occupancy greater than 200 persons.
- e) Energy management having capacity greater than 1,000 kilowatts or having annual energy greater than 20 mega-joules.

(3) Design and Computational Work

- a) Machinery having each of combined equipment power greater than 7.5 kilowatts.
- b) Steam boiler or other type of vapors boiler, pressure vessel, or industrial kiln at all sizes.
- c) Air Conditioning System having each of equipment power greater than 7.5 kilowatts or having conditioned or refrigerated gross floor area greater than 400 square meters.
- d) Fluid system in pressure pipeline, or in vacuum pipes having fluid pressure greater than 500 kilopascals or vacuum pressure less than minus 50 kilopascals or refrigerant capacity of more than 100 kgs, or serving in a building having gross floor area greater than 2,000 square meters, or serving in a building having the occupancy greater than 200 persons.
- e) Energy management at all sizes.

(4) Construction or Production Supervision.

- a) Machinery having each of combined total power system greater than 20 kilowatt.
- b) Steam boiler or other type of vapors boiler, pressure vessel, or industrial kiln having pressure greater than 500 kilopascals or having volumetric capacity greater than 1 cubic meter, or having stream production capacity or other type of vapors production capacity greater than 500 kilogram per hour.
- c) Air Conditioning System having equipment power greater than 20 kilowatts,
- d) Fluid system in pressure pipeline or in vacuum pipes having fluid pressure greater than 500 kilopascal or having vacuum pressure less than minus 50 kilopascals or refrigerant capacity of more than 100 kgs.

(5) Operation and Maintenance Supervision

- a) Machinery having combined total power system greater than 500 kilowatts.
- b) Steam boiler or other type of vapors boiler, pressure vessel, or industrial kiln having stream production capacity of or other type of vapors production capacity greater than 20,000 kilogram per hour.
- c) Air compressor or gas compressor having pressure greater than 1,300 kilopascals and having volumetric capacity greater than 10 cubic meters.
- d) Air Conditioning System having each of power system greater than 500 kilowatts.
- e) Fluid system in pressure pipeline, or in vacuum pipes having fluid pressure greater than 500 kilopascals or having vacuum pressure less than minus 50 kilopascals, or refrigerant capacity of more than 100 kgs.

2. Building Services (BS)

(1) Consultancy & Investigation Works

Mechanical engineering work on project planning, design and computational work, construction/installation or production supervision, operation or maintenance supervision at all types and sizes.

(2) Project planning work

- (a) Machinery having each of equipment value greater than 250 million MMK, or having each of project value greater than 500 million MMK, or having combined total power system greater than 100 kilowatts, or serving in a building having gross floor area greater than 2,000 square meters, or serving in a building having the occupancy greater than 200 persons.
- (b) Other types of vapors boiler or Steam boiler, pressure vessel, or industrial kiln having each of equipment value greater than 250 million MMK, or having each of project value greater than 500 million MMK, or other type of vapors boiler or steam boiler, pressure vessel, or industrial kiln, utilizing annual thermal power greater than 20 mega-joules, or other type of vapors boiler or steam boiler, pressure vessel, or industrial kiln, serving in a building having gross floor area greater than 2,000 square meters, or serving in a building having the occupancy greater than 200 persons.
- (c) Fluid system in pressure pipeline, or in vacuum pipes having each of equipment value greater than 250 million MMK, or having each of project value greater than 500 million MMK or having combined total power system greater than 100 kilowatts or serving in a building having gross floor area greater than 2,000 square meters, or serving in a building having the occupancy greater than 200 persons.
- (d) Energy management having capacity greater than 1,000 kilowatts or having annual energy greater than 20 mega-joules.
- (e) Fire protection system having each of system value greater than 100 million MMK, or having fire protection gross floor area greater than 2,000 square meters or any public building having above two stories.

(3) Design and Computational Work

- (a) Machinery having each of combined equipment power greater than 7.5 kilowatts or serving in a building having gross floor area greater than 2,000 square meters, or serving in a building having the occupancy greater than 200 persons.
- (b) Steam boiler or other type of vapors boiler, pressure vessel, or industrial kiln at all sizes.
- (c) Fluid system in pressure pipeline, or in vacuum pipes having fluid pressure greater than 500 kilopascals or vacuum pressure less than minus 50 kilopascals.
- (d) Energy management at all sizes.
- (e) Fire protection system having fire protection gross floor area greater than 2,000 square meters (except private houses) or any public building having above two stories or as required by Myanmar National Fire Code.

(4) Construction or Production Supervision

- (a) Machinery having each of combined total power system greater than 20 kilowatt.
- (b) Steam boiler or other type of vapors boiler, pressure vessel, or industrial kiln having pressure greater than 500 kilopascals or having volumetric capacity greater than 1 cubic meter, or having stream production capacity or other type of vapors production capacity greater than 500 kilogram per hour.
- (c) Fluid system in pressure pipeline or in vacuum pipes having fluid pressure greater than 500 kilopascal or having vacuum pressure less than minus 50 kilopascals.
- (d) Fire protection system having fire protection gross floor area greater than 5,000 square meters or any public building having above two stories.

(5) Operation and Maintenance Supervision

- (a) Machinery having combined total power system greater than 500 kilowatts.
- (b) Steam boiler or other type of vapors boiler, pressure vessel, or industrial kiln having stream production capacity of, or other type of vapors production capacity greater than 20,000 kilogram per hour.
- (c) Air conditioner or refrigerator having each of power system greater than 500 kilowatts.
- (d) Fluid system in pressure pipeline, or in vacuum pipes having fluid pressure greater than 500 kilopascals or vacuum pressure less than minus 50 kilopascals.
- (e) Fire protection system having fire protection gross floor area greater than 5,000 square meters.

3. ***Industrial Manufacturing Processes and Materials (IMPM)***

(1) **Advisory and Consultancy Work:** It includes undertaking of preparatory technical feasibility studies and project impact studies. Examples are suggestion, professional judgment, or certification of engineering works.

(a) Public industrial project at any size.

(b) Mechanical work having total installed power greater than 600 kilowatts.

(2) **Project planning work**

(1) Machinery having each of equipment value greater than 400 million MMK or greater than 800 million MMK or having combined total power system greater than 100 kilowatts or serving in a building having gross floor area greater than 2,000 square meters or serving a building having the occupancy greater than 200 persons.

(2) Other types of vapours boiler or Steam boiler, pressure vessel, or industrial kiln having each of equipment value greater than 400 million MMK or having each of project value greater than **800 million MMK** or other type of vapours boiler or steam boiler, pressure vessel, or industrial kiln, utilizing annual thermal power greater than 15 mega-joules or other type of vapours boiler, pressure vessel, or industrial kiln, serving in building having gross floor area greater than 2,000 square metres or serving in a building having the occupancy greater than 200 persons.

(3) Fluid system in pressure pipeline, or in vacuum pipes having each of equipment value greater than **400 million MMK** or having each of project value greater than **800 million MMK** or having combined total power system greater than 100 kilowatts or serving in a building having gross floor area greater than 2,000 square metres or serving in a building having the occupancy greater than 200 persons.

(4) Energy management having capacity greater than 800 kilowatts or having annual energy greater than 15 mega- joules.

(3) **Design and Computational Work**

(1) Machinery having each of combined equipment power than 7.5 kilowatts.

(2) Steam boiler or type of vapours boiler pressure vessel, or industrial kiln at all sizes.

(3) Fluid system in pressure pipeline or in vacuum pipes having fluid pressure greater than 500 kilopascal or vacuum pressure less than minus 50 kilopascal.

(4) Energy management at all sizes.

(4) **Fabrication and Production Supervision**

(1) Machinery having each of combined total power system greater than 20 kilowatts.

(2) Steam boiler or other type of vapours boiler pressure vessel, or industrial kiln having pressure greater than 500 kilopascal, or having volumetric capacity greater than 1 cubic metre, or haring stream production capacity or other type of vapours production capacity greater than 500 kilogram per hour.

(3) Non- standard parts production capacity greater than 2 tons/day.

(4) Fluid system in pressure pipeline or in vacuum pipes having fluid pressure greater than 500 kilopascal or vacuum pressure less than minus 50 kilopascal.

- (5) Steel structure fabrication of production greater than 5000 tons per Year (or) total production cost more than 600 million MMK (or) work site of more than 100 skilled welders with different qualification.

(5) Operation and Maintenance Supervision

- (1) Machinery having combined total power system greater than 500kilowatts.
- (2) Steam boiler or other type of vapours boiler pressure vessel, or industrial kiln having steam production capacity of 20,000 kilogram per hour or other type of vapours production capacity greater than 20,000 kilogram per hour.
- (3) Air compressor or gas compressor having pressure greater than 800 kilopascal and having volumetric capacity greater than 8 cubic metres.
- (4) Fluid system in pressure pipeline or in vacuum pipes having fluid pressure greater than 500 kilopascal.

4. Maintenance of Plant & Equipment (MPE)

(1) Project Planning & Design Services

- (a) Service industries having labour employment greater than 50 persons or having plant financial investment greater than 400 million MMK excluding land cost.
- (b) Production, making or assembling, manufacturing of finish products or semi finishing products, melting, casting, molding, milling, or metal coating and heat treating, annealing, or forming of metal, wood or other materials utilizing labour employment greater than 50 persons or having plant financial investment greater than 800 million MMK excluding land cost.
- (c) Metal smelting and purification of metal having following production capacity; tin metal greater than 2 tons daily production; lead, zinc, copper or antimony greater than 5 tons daily production; or in case of iron or steel greater than 30 tons daily production.

(2) Operation and Maintenance Supervision

- (a) Operation infrastructure and equipment for pollution control, waste water treatment, toxicity, dangerous substances or treatment plants having labour employment greater than 50 persons or having plants financial investment greater than 800 million MMK excluding land cost.
- (b) Plants operating with pressure vessel higher than atmospheric pressure or having labour employment greater than 50 persons having plants financial investment greater than 800 million MMK excluding land cost.
- (c) Industrial waste at any size or capacity.
- (d) Steam boiler or other type of vapours boiler, pressure vessel, or industrial kiln at all sizes according to code of engineering professional practices.

(3) Inspection and investigation work

- (a) Testing and analysis services of physical properties

Testing and analysis services of physical properties such as strength, Ductility, electrical conductivity and radioactivity of materials such as Metal, plastics, textiles, woods, glass, concrete and other materials. Tests are tension, hardness, impact resistance, fatigue resistance, and high- temperature effects, etc.

- (b) Technical Inspection Services

Testing and analysis services of a technical or scientific nature which do not alter or affect the object being tested. Included are radiographic, magnetic, and ultrasonic testing of machine parts and structures conducted in order to identify defects. These tests are often conducted on site. Excluded are inspection services of a non-technical or scientific nature , such as visual inspection of buildings, machines, etc.