

DENNIS GROUP

Mechanical Engineering Career Pathway



Below are general guidelines on skills that are expected for our Mechanical Engineers at Dennis Group. The skills outlined cover Engineer I, Engineer II, Engineer III, Technical Expert, and Team Leader.

If you desire to dedicate 100% of your time within your discipline working in projects, you can aim to become a **Technical Expert**. This position is highly valuable at Dennis Group as we are frequently facing engineering challenges that require a lot of technical knowledge and experience.

If you wish to keep working within your discipline but prefer to assume a leadership position, you can aim to become a **Team Lead**. It is very important to the growth of the company that we have leaders that can help in the development of our younger employees and the management of resources within each department. Dennis Group offers a variety of resources, training and support for those in leadership positions.

Finally, if you wish to start managing projects, you can aim to become a **Project Manager**. If you choose this pathway, there is a different document that comprises the skill of different levels of project management.

Mechanical Engineering Competencies

Engineering & Design (HVAC)	Engineer I	Engineer II	Engineer III	Technical Expert	Team Lead
Equipment knowledge: Fan curves, fan types, accessories (curbs dampers, grilles), duct types, insulation, VAV's, VRV/VRF, filter types, coils, burners, & other (unit heaters, baseboard devices, split systems)	✓	✓	✓	✓	✓
Diffuser selection	✓	✓	✓	✓	✓
Sizing (ductwork, end devices)	✓	✓	✓	✓	✓
Sanitary design considerations (layouts, process exhaust)	✓	✓	✓	✓	✓
Calculations: Space heat loads, pressure drop, master calculation sheets, LEED / Code ventilation rates & surface heat transfer	✓	✓	✓	✓	✓
Ventilation: Fresh air, recirculation, & dilution	✓	✓	✓	✓	✓
Conditioning methods: Full cooling & heat removal	✓	✓	✓	✓	✓
Controls Functional description development		✓	✓	✓	✓
Software: 3EPlus, Trane Trace, Cook program, Psycalc program, & Engineering Tool Box		✓	✓	✓	✓
References: ASHRAE, NIOSH, Industrial Ventilation, Cook	✓	✓	✓	✓	✓
Building Code Familiarity, Compliance & Review		✓	✓	✓	✓
Specifications: Create, review existing		✓	✓	✓	✓

Engineering & Design (Plumbing)	Engineer I	Engineer II	Engineer III	Technical Expert	Team Lead
Equipment knowledge: Pump curves, pump types, accessories (valves, fittings), pipe materials, insulation, drains (roof & floor), clean-outs, vents, natural gas & propane devices, & other (backflow, metering devices, hose stations)	✓	✓	✓	✓	✓
Fixture selection	✓	✓	✓	✓	✓
Sizing (plumbing, vents, & end devices)	✓	✓	✓	✓	
Sanitary design considerations	✓	✓	✓	✓	✓
Calculations: Pipe sizing, pressure drop, water hammer, hot water heat loss & recirculation	✓	✓	✓	✓	
Software: Engineering Toolbox		✓	✓	✓	
Building Code Familiarity, Compliance & Review (DWV and water system Riser Diagrams)		✓	✓	✓	✓
Specifications: Create, review existing		✓	✓	✓	✓

Engineering & Design (Fire Protection)	Engineer I	Engineer II	Engineer III	Technical Expert	Team Lead
Equipment knowledge: Pump curves, pump types, accessories (valves, fittings), pipe materials, insulation, sprinkler heads, & other (backflow, control devices)	✓	✓	✓	✓	✓
Knowledge of hazard classifications	✓	✓	✓	✓	✓
Flow test (hydrant or other) analysis	✓	✓	✓	✓	✓
Sizing (piping, fire pump, water storage tanks, & end devices)	✓	✓	✓	✓	
Sanitary design considerations	✓	✓	✓	✓	✓
Calculations: Pipe sizing, pressure drop, water hammer, & end device flow	✓	✓	✓	✓	
Software: SprinklerCalc, Engineering Toolbox		✓	✓	✓	
NFPA Code Familiarity & Review		✓	✓	✓	✓
Insurance Carrier Requirements – Familiarity and review (FM Global, Liberty Mutual, etc.)		✓	✓	✓	✓
Specifications: Create, review existing		✓	✓	✓	✓

Engineering & Design (Utilities)	Engineer I	Engineer II	Engineer III	Technical Expert	Team Lead
Equipment knowledge: Fan curves, fan types, accessories (curbs dampers, grilles), duct types, insulation, VAV's, VRV/VRF, filter types, coils, burners, & other (unit heaters, baseboard devices, split systems)	✓	✓	✓	✓	✓
PID Drafting	✓	✓	✓	✓	✓
PID Design		✓	✓	✓	✓
Sizing (pumps, piping, tanks)	✓	✓	✓	✓	✓
Equipment selection		✓	✓	✓	✓
Sanitary design considerations	✓	✓	✓	✓	✓
Calculations: Space cooling loads, pressure drop, master calculation sheets, & pipe stress analysis	✓	✓	✓	✓	✓
Controls Functional description development		✓	✓	✓	✓
Software: CAE Pipe, Engineering Toolbox	✓	✓	✓	✓	✓
References: ASHRAE, IIAR	✓	✓	✓	✓	✓
Insurance Carrier Requirements – Familiarity and review (FM Global, Liberty Mutual, etc.)		✓	✓	✓	✓
NFPA Code Familiarity & Review		✓	✓	✓	✓
Specifications: Create, review existing		✓	✓	✓	✓

Procurement	Engineer I	Engineer II	Engineer III	Technical Expert	Team Lead
Vendor & subcontractor selection		✓	✓	✓	✓
Bid Package: equipment and sub-contractor – bid list, scope of work, milestone schedule	✓	✓	✓	✓	✓
Bid Review: tabulation, client review(s), recommendation		✓	✓	✓	✓
Vendor shop inspection / FAT	✓	✓	✓	✓	✓

CAD Drafting	Engineer I	Engineer II	Engineer III	Technical Expert	Team Lead
Basic layout & drawing setup, symbols, layers & colors (specific to trade)	✓	✓	✓	✓	✓
Shop drawing review	✓	✓	✓	✓	✓
Discipline drawing coordination review	✓	✓	✓	✓	✓
Create mechanical schedules	✓	✓	✓	✓	✓
Review and update mechanical design standards/details		✓	✓	✓	✓
Peer design reviews			✓	✓	✓

Project Management, Construction Management & Training	Engineer I	Engineer II	Engineer III	Technical Expert	Team Lead
Cost estimating – Preliminary engineering phase			✓	✓	✓
Cost estimating – Detail engineering phase		✓	✓	✓	✓
Scheduling – MS Project			✓	✓	✓
Field support: Construction & start-up	✓	✓	✓	✓	✓
Field support: Construction administration, contractor lead (coordinate with other trades, facilitate/negotiate change orders with PM, direct design changes)		✓	✓	✓	✓
Field support: Discipline lead for commissioning activities		✓	✓	✓	✓
Project lead for discipline study			✓	✓	✓
Training lead for new hires/interns			✓	✓	✓

Mechanical Engineer Level I

Typical Minimum Experience: 0-3 Years

- ✓ Works within a group with work overseen by the team lead
- ✓ Day-day tasks assigned by Sr. Engineer in first year
- ✓ Assigned to small projects after 1st year training is complete
- ✓ Gains knowledge of how DG executes projects
- ✓ Potential to spend time on site to expedite knowledge and understanding of project execution.
- ✓ Learns basic engineering tasks of design and execution
- ✓ Becomes familiar with equipment, components, materials, specification, etc.
- ✓ Limited direct client contact
- ✓ Completes self-directed trainings as directed by team or department lead.
- ✓ Working towards or has completed F.E. certification.

Intra-Discipline Mobility: Engineer II

Mechanical Engineer Level II

Typical Minimum Experience: 3-6 Years

- ✓ May work independently or with other ME's, depending on project size.
- ✓ Capable of executing all tasks necessary to complete the engineering on a project from design through execution.
- ✓ May still need to rely on Eng III or Lead for day-to-day design feedback.
- ✓ Interfaces directly with clients.
- ✓ Can provide cost estimation and scheduling to PM's.
- ✓ May present engineering findings to clients and be lead mechanical engineer based on project scope and size. Depending on job a 3–6-year individual should be able to perform this task.
- ✓ Completes job improvement or engineer sought training courses as approved by team or department lead.
- ✓ Assist department leads in department initiatives and standards improvements.
- ✓ Working towards or has completed F.E. certification.

Intra-Discipline Mobility: Engineer III

Mechanical Engineer Level III

Typical Minimum Experience: 6-8 Years

- ✓ Works independently on projects.
- ✓ Fully versed in all activities associated with design and execution.
- ✓ Has successfully executed several large mechanical projects (of various sizes, applications and in different roles)
- ✓ Able to work on several involved projects simultaneously.
- ✓ Subject matter expert in multiple areas or specific mechanical systems.
- ✓ Is required provide guidance and direction to other engineers. (Both Eng I and Eng II within ME department and other departments)
- ✓ Interfaces directly with clients.
- ✓ Completes job improvement or engineer sought training courses as approved by team or department lead.
- ✓ Assist department leads in department initiatives and standards improvements.
- ✓ Has obtained P.E. certification - Preferred, not required.

Intra-Discipline Mobility: Technical Expert, Team Lead

Other Mobility: Assistant Project Manager

Mechanical Engineer Technical Expert

Typical Minimum Experience: 8+ Years

- ✓ Reports directly to the Discipline Manager.
- ✓ Fully versed in all activities associated with design and execution within their expertise.
- ✓ Has successfully executed several large projects.
- ✓ Subject matter expert in multiple areas and specific process systems.
- ✓ Able to provide guidance and direction to other engineers.
- ✓ Interfaces directly with clients

Intra-Discipline Mobility: Team Leader, Discipline Manager.

Other Mobility: Project Manager

Mechanical Engineer Team Leader

Typical Minimum Experience: 8+ Years

- ✓ Fully versed in all activities associated with design and execution.
- ✓ Has successfully executed several large projects.
- ✓ Subject matter expert in multiple areas.
- ✓ Ability to communicate with Leads and Engineers across all departments.
- ✓ Responsible for managing Engineers I through III. Including: assigning and monitoring work, mentoring and evaluating performance, fielding design questions and providing guidance to complete tasks, and be available to help manage deadline conflicts as needed.
- ✓ Works with the Office Discipline Manager and project managers to obtain work.
- ✓ Supports project teams and backs up team members as necessary.
- ✓ Assists with interviewing and hiring new team members.
- ✓ Interfaces directly with clients.

Intra-Discipline Mobility: Technical Expert, Discipline Manager

Other Mobility: Project Manager