

Industrial and Manufacturing Engineers



Industrial and Manufacturing Engineers perform various functions in their work, ranging from cost modelling, process improvement, and technical engineering design work. This gives them a multifaceted skill set, with proficiencies in core technologies used in manufacturing, management, financial modelling, as well as skills and abilities well-suited to scientific inquiry and data analysis. These are versatile professionals, which thrive in fast-paced, evolving environments.

Skills

Skills are developed through training and experience, and are the practical proficiencies someone possesses. The following are top key skills industrial and manufacturing engineers employ in their work:

1. Critical Thinking
2. Speaking
3. Systems Evaluation
4. Judgement and Decision Making
5. Reading Comprehension

Tasks

Tasks are the assigned duties that an occupational group performs in their daily work. The following are the tasks industrial and manufacturing engineers most regularly encounter:

1. Teach safety standards or environmental compliance methods.
2. Research product safety.
3. Update technical knowledge.
4. Maintain operational records or records systems.
5. Explain engineering drawings, specifications, or other technical information.

Technical Knowledge

Technical Knowledge is the understanding of theory and utility of modern tools in a work environment. The following tools are used by industrial and manufacturing engineers regularly:

1. Process mapping and design software
2. Enterprise resource planning software
3. Computer-aided design & manufacturing software
4. Analytical or scientific software
5. Project management software

Abilities

Abilities refer to the innate faculties that allow workers to carry out tasks and activities. The following are the top abilities that industrial and manufacturing engineers possess:

1. Inductive & Deductive Reasoning
2. Problem Sensitivity
3. Written & Oral Comprehension and Expression
4. Information Ordering
5. Category Flexibility

Skills Transferability Matrix

FOCAL's Skills Transferability Matrices analyze the transferability of an occupation across a multitude of other occupations on the basis of similarities in **skills, technical knowledge, tasks,** and **abilities** as outlined by the O*Net database. It aims to show workers how to leverage their skill set in changing occupations, planning a career path, and transitioning to other industries. It also assists policy makers and educators address changing skill sets and areas of opportunity for workforce entrants in developing industries. Employers can also use this tool in reskilling or upskilling workers to circumvent skills shortages, and reduce the hiring and training challenges.

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Occupations	Skills	Technical Knowledge	Tasks	Abilities	Total
Computer engineers (except software engineers and designers)	88%	75%	23%	89%	69%
Other professional engineers, n.e.c.	85%	72%	24%	91%	68%
Mechanical engineers	82%	63%	39%	88%	68%
Civil engineering technologists and technicians	86%	63%	28%	86%	66%
Natural and applied science policy researchers, consultants and program officers	91%	56%	7%	91%	61%
Database analysts and data administrators	86%	75%	0%	83%	61%
Biologists and related scientists	91%	56%	0%	92%	60%
Chemists	89%	59%	0%	89%	59%
Engineering managers	78%	75%	0%	84%	59%
Inspectors in public and environmental health and occupational health & safety	91%	44%	6%	89%	58%
Metallurgical and materials engineers	85%	47%	8%	88%	57%
Geoscientists and oceanographers	88%	50%	0%	89%	57%
Contractors and supervisors, machining/other metal forming trades	76%	63%	0%	82%	55%
Other professional occupations in physical sciences	90%	34%	2%	90%	54%
Supervisors, other mechanical and metal products manufacturing	75%	53%	0%	81%	52%

After scanning over 2,600 skills, technical competencies, tasks, and abilities of each of the 500 occupations as defined by the National Occupational Classification (NOC) system, a skills transferability matrix for industrial and manufacturing engineers is produced. In the matrix above, a high score is highlighted in green and indicates the high transferability potential of an attribute of an occupation with that of industrial and manufacturing engineers. Lower or no transferability areas are marked in red. Transferability among other professional science roles was found to be high for industrial and manufacturing engineers. Moderate transferability is observed with roles involving geology and biology, suggesting commonality in skillsets between the occupations. The strong skill, ability and technology transferability makes up for weak task transferability, with strongest transferability observed with professional engineering roles. With high technology and ability scores for transferability to engineering management, with additional skill and task training, industrial and manufacturing engineers may transition into engineering management roles.

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