

What is the engineering demand the University is addressing?

Alaska faces a shortage of qualified engineers. To respond to the state's need, the University of Alaska Board of Regents set a priority to more than double the annual number of baccalaureate graduates to 200. The premise to go ahead with both UAA and UAF Engineering Facilities is based on a study known as the "Ira Fink Report" finalized in March of 2011. This extensive study includes data on engineering enrollments and employment data after graduation, including data from the Alaska State Department of Labor on workforce in Alaska, as well as national data. A subset of the report is attached.

UA is steadily making progress on the goal of 200 graduates (156 graduates in FY13) and expects to reach it by 2022.

- The Alaska Department of Labor's current projections through 2020 indicate an average of 24 new engineering jobs will be available each year, plus another 64 openings from annual turnover and retirement.
 - Beyond basic engineering jobs leading to a Professional Engineer (PE) license, there are a number of different, high paying occupations in engineering related technical and management occupations that UA graduates are eligible to take.
- Many engineers working in Alaska are non-residents - up to 35 percent in some disciplines. These employees lack education and experience in Arctic engineering principles.
- Employers prefer to hire UA graduates, as they are more likely to remain in Alaska. Graduates from both UAA and UAF are essential, especially when addressing Arctic engineering issues and requirements thereof.

Engineering Degree programs at UAA and UAF:

Enrollment in the UA engineering programs increased from 806 undergraduates in 2007 to 1,034 in 2013. UAA's and UAF's engineering programs are complementary and collaborative, and both Deans are continuing to explore more collaboration in specific areas to address the demands in all programs.

The following is a listing of all engineering programs offered at UAA (11 programs) and UAF (21 programs)

UAA

Graduate Certificate (3)
GCRT Port & Coastal Engineering
GCRT Earthquake Engineering
GCRT Environmental Reg & Permitting

Bachelors (2)

BS Civil Engineering

BS Engineering

Masters (6)

Master of Civil Engineering (MCE) in Civil Engineering

MS Civil Engineering

MS Engineering Management

MS Science Management

MS Arctic Engineering

MS Project Management

UAF

Bachelors (7)

BS Civil Engineering

BS Computer Engineering

BS Electrical Engineering

BS Geological Engineering

BS Mechanical Engineering

BS Mining Engineering

BS Petroleum Engineering

Masters (13)

Masters of Civil Engineering (MCE) Civil Engineering

Master of Science (MS) Civil Engineering

MS Science Management

Masters of Software Engineering (MSE) Software Engineering

Masters of Electrical Engineering (MEE) Electrical Engineering

MS Electrical Engineering

MS Arctic Engineering

MS Environmental Engineering

MS Geological Engineering

MS Mechanical Engineering

MS Mining Engineering

MS Mineral Preparation Engineer

MS Petroleum Engineering

PHD (1)

Engineering

Table X-2
University of Alaska, Graduates by Career Cluster, 2009

Career Cluster	Total Graduates, 2000 to 2010	Total Graduates Resident in Alaska, 2009	Total Graduates Employed in Alaska, 2009	Percent
Agriculture, Food and Natural Resources	608	438	343	1.6%
Architecture and Construction	838	717	589	2.7
Arts, Audio/Visual Technology and Communications	1,468	983	802	3.7
Business, Management and Administration	4,246	3,205	2,715	12.6
Education and Training	8,633	6,594	5,734	26.7
Finance	249	168	142	0.7
Government and Public Administration	390	258	198	0.9
Health Science	5,394	4,294	3,653	17.0
Hospitality and Tourism	230	176	144	0.7
Human Services	1,730	1,444	1,208	5.6
Information Technology	430	278	231	1.1
Law, Public Safety, Corrections and Security	1,252	942	798	3.7
Manufacturing	1,308	1,121	954	4.4
Marketing, Sales and Service	168	112	95	0.5
Science, Technology, Engineering and Mathematics	5,210	3,456	2,909	13.5
Transportation, Distribution and Logistics	1,025	679	525	2.4
Not Assigned to a Career Cluster	769	574	479	2.2
Total	33,948	25,439	21,519	100.0%

Source: Ira Fink and Associates, Inc., based on data compiled and provided by the University of Alaska, Statewide Planning and Institutional Research and the State of Alaska, Department of Labor and Workforce Development, Research and Analysis Section.

B. ENGINEERING GRADUATES OF THE UNIVERSITY OF ALASKA, 2000 TO 2010

To understand more fully the career paths of engineering graduates, those students who received a degree or certificate in engineering from the University of Alaska during the years 2000 to 2010 are identified by total population in Table X-3. As shown, 1,351 students graduated from the University of Alaska in engineering between 2000 and 2010. Of this population, approximately one-third, or 439, were no longer living in Alaska in the year 2010. Another 81, or 6 percent, were not working.

Among those who were employed in Alaska, 92 (7 percent) were self-employed and 739 were employed by companies and agencies. This was equal to 55 percent of all the UA engineering graduates over the past ten years.

Table X-3
University of Alaska, Engineering Graduates, 2000 to 2010

Total Engineering Graduates (2000 to 2010)	1,351	
Left the State ^a	439	32%
Not Working (2010)	81	6
Self-Employed in Alaska (2010)	92	7
Employed in Alaska (2010) (See Table X-4) ^b	739	55
Total Engineering Graduates	1,351	100%

Source: Ira Fink and Associates, Inc., based on data compiled and provided by the University of Alaska, Statewide Planning and Institutional Research and the State of Alaska, Department of Labor and Workforce Development, Research and Analysis Section.

Notes: a: Residency in Alaska is determined by application for Alaska Permanent Fund Distribution in 2009 or 2010.

b: Employment status includes wage and salary employment in Alaska in private sector, state and local government. No data for federal or military employment.

C. ENGINEERING EMPLOYMENT IN ALASKA

What Engineers Do

The UAF College of Engineering and Mines home page provides succinct descriptions of engineering for the programs offered at UAF. Complete descriptions of 19 engineering disciplines are shown in the appendix.

For example, civil and environmental engineers plan, design, and supervise the construction and operation of facilities essential to modern life. Electrical and computer engineers design and build computers, communications systems, instrumentation, and electric power systems. Geological engineers work with the earth to evaluate site conditions and design plans for construction activities to have minimum impact on the environment. Mechanical engineers plan, design, and supervise the manufacturing of machines, systems for energy conversion, materials processing, and aerospace technology. Mining engineers design and supervise the process by which minerals are safely and efficiently extracted from the earth while protecting the environment. Petroleum engineers design and supervise the process by which oil and natural gas is drilled and extracted.

As these brief definitions portray, engineers are specialists. An engineer's education centers on the study of an engineering specialty along with courses in mathematics and physical and life sciences. As noted in Wikipedia, "one difficulty in increasing public awareness of the profession is that average people, in a typical run of ordinary life, do not ever have any personal dealings with engineers, even though they benefit from their work every day. By contrast, it is common to visit a doctor at least once a year, the chartered accountant at tax time, and, occasionally, even a lawyer."

Table X-4

**Engineering and Engineering-Related Employment in Alaska in 2010 of
University of Alaska Engineering Graduates from 2000 to 2010**

Engineers	
Civil Engineers	94
Electrical Engineers	35
Petroleum Engineers	28
Mechanical Engineers	22
Environmental Engineers	15
Electronics Engineers	8
Mining and Geological Engineers	5
Computer Software Engineers	2
Biomedical Engineers	1
Computer Hardware Engineers	1
All Other Engineers	<u>104</u>
<i>Total Engineers</i>	<i>315</i>
 Technicians	
Civil Engineering Technicians	105
Engineering Technicians	33
Life, Physical, and Social Science Technicians	25
Electrical and Electronic Engineering Technicians	6
Environmental Science and Protection Technicians	5
Surveying and Mapping Technicians	3
Biological Technicians	2
Environmental Engineering Technicians	2
Mechanical Engineering Technicians	2
Broadcast Technicians	1
Industrial Engineering Technicians	<u>1</u>
<i>Total Technicians</i>	<i>185</i>
 Scientists	
Environmental Scientists	12
Physical Scientists	5
Conservation Scientists	2
Materials Scientists	<u>2</u>
<i>Total Scientists</i>	<i>21</i>
 Construction Related	
Architects	15
Surveyors	7
Construction and Building Inspectors	5
Construction Laborers	5
Managers of Construction Trades	5
Operating Engineers	4
Construction and Related Workers	1
Cost Estimators	<u>1</u>
<i>Total Construction Related</i>	<i>43</i>

Table X-4 (continued)
**Engineering and Engineering-Related Employment in Alaska in 2010 of
 University of Alaska Engineering Graduates from 2000 to 2010**

Oil and Gas	
Service Unit Operators	6
Rotary Drill Operators	4
Roustabouts	<u>1</u>
<i>Total Oil and Gas</i>	<i>11</i>
Hydrologists and Geoscientists	
Hydrologists	4
Geoscientists	<u>3</u>
<i>Total Hydrologists and Geoscientists</i>	<i>7</i>
Technology	
Computer Support Specialists	6
Computer Programmers	4
Computer Specialists	2
Network and Computer Systems Administrators	<u>2</u>
<i>Total Technology</i>	<i>14</i>
Electrical	
Electrical, Powerhouse and Substation Repairers	1
Electricians	<u>1</u>
<i>Total Electrical</i>	<i>2</i>
Managers	
Engineering Managers	12
Construction Managers	10
Managers, All Other	7
General and Operations Managers	5
Administrative Services Managers	3
Natural Sciences Managers	3
Computer and Information Systems Managers	2
Manager of Production and Operating Workers	2
Chief Executives	<u>1</u>
<i>Total Managers</i>	<i>45</i>
Administrative and Support	
Office and Administrative Support	34
Office Clerks	9
Business Operations Specialists	5
Material Recording, Scheduling Clerks	5
Operations Research Analysts	3
Bookkeeping and Accounting Clerks	2
Management Analysts	2
Secretaries	2
Receptionists and Information Clerks	<u>1</u>
<i>Total Administrative and Support</i>	<i>63</i>



Table X-4 (continued)
**Engineering and Engineering-Related Employment in Alaska in 2010 of
 University of Alaska Engineering Graduates from 2000 to 2010**

Drafting	
Drafters	2
Electrical Drafters	2
Mechanical Drafters	2
Architectural and Civil Drafters	1
<i>Total Drafting</i>	<u>7</u>
Labor/Repair	
Laborers and Freight Movers	4
Helpers – Installation, Maintenance, and Repair	1
Maintenance and Repair Workers	1
<i>Total Labor/Repair</i>	<u>6</u>
Other Specialties	
Postsecondary Engineering Faculty	6
Forest and Conservation Workers	3
Retail Salespersons	3
Cartographers and Photogrammetrists	2
Occupational Health and Safety Specialists	1
Sailors and Marine Oilers	1
Sales Engineers	1
Tour Guides	1
Transportation Workers	1
Urban and Regional Planners	1
<i>Total Other Specialties</i>	<u>20</u>
Total, All Engineering Graduates Employed in 2010 in Alaska	739

Source: Ira Fink and Associates, Inc., based on data compiled and provided by the University of Alaska, Statewide Planning and Institutional Research and the State of Alaska, Department of Labor and Workforce Development, Research and Analysis Section.

In some employment situations, a new graduate is trained to become a specialist based upon their inclinations, the company's needs, and their education. In other employment, the person must have years of experience to be able to understand the entirety of process and become a project manager.

E. INTERVIEWS WITH EMPLOYERS OF ENGINEERS IN ALASKA

Employer Interviews

As part of the Engineering Plan 2010, phone interviews were conducted with a variety of individual who were directly involved in the employment of University of Alaska engineering graduates throughout Alaska.