

ADVANCED MATERIALS


TARGET INDUSTRY OVERVIEW

PLASTICS, GLASS, CERAMICS,
COMPOSITES, METALS & ALLOYS



SOUTH CAROLINA
I-77ALLIANCE

Five counties. One ideal opportunity.



Building on the strong work ethic and strategic location that helped create a long tradition of textile manufacturing, the South Carolina I-77 Alliance region now attracts international and domestic investment that is creating jobs, boosting profits, and building a bright future for producers of a wide range of critical Advanced Materials products. Among them are industrial filaments and resins, high-tech plastics and polymers, and auto tires and aviation components.

*South Carolina has fostered an enduring business-friendly environment that cultivated **GDP growth of 26%** from 2012 - 2017 in the Advanced Materials cluster, compared with only 13% nationally.*

Many of the brands calling South Carolina home are familiar: BMW and Boeing, Volvo Cars and Toray, Mercedes-Benz Vans and Michelin, Continental and Giti Tire, and China Jushi and Jarden Applied Materials. Plus, there are many others that are very well known to the manufacturers who depend on their components and chemicals.

We hope you enjoy learning about Advanced Materials manufacturing in South Carolina and the I-77 region, discovering the numerous reasons why hundreds of Advanced Materials companies call South Carolina home.

*— Harry M. Lightsey, III
Secretary, S.C. Department of Commerce*

*— Christopher Finn
Interim President and CEO, South Carolina I-77 Alliance*



SOUTH CAROLINA'S BUSINESS CLIMATE | 2018 *Area Development Magazine* Rankings

For decades, South Carolina has been recognized as a leader in state-level economic development and the top state for per capita foreign direct investment (FDI). *Area Development* magazine, a trade publication for corporate real estate and economic development, reported SC was ranked #5 in their “2018 Top States for Doing Business” survey of site selection consultants, with individual category rankings shown below. This report aligns with “Top Location Factors,” identified by respondents from the same survey.

RANKED

#1

Business Incentive Programs

RANKED

#2

Cooperative & Responsive State Government

RANKED

#4

Leading Workforce Development Programs (t)
Shovel-Ready Sites Program

Favorable General Regulatory Environment
Most Improved Economic Development Policies (t)

RANKED

#5

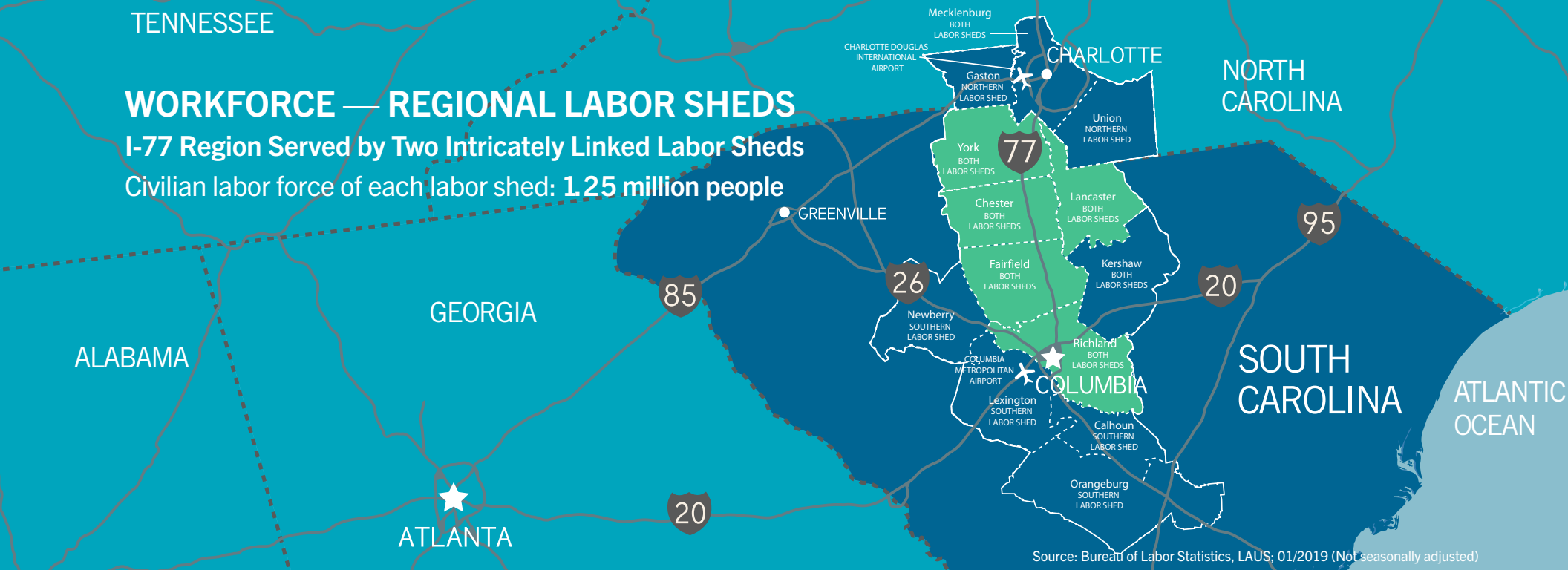
Overall Cost of Doing Business
Top States for Doing Business

WORKFORCE



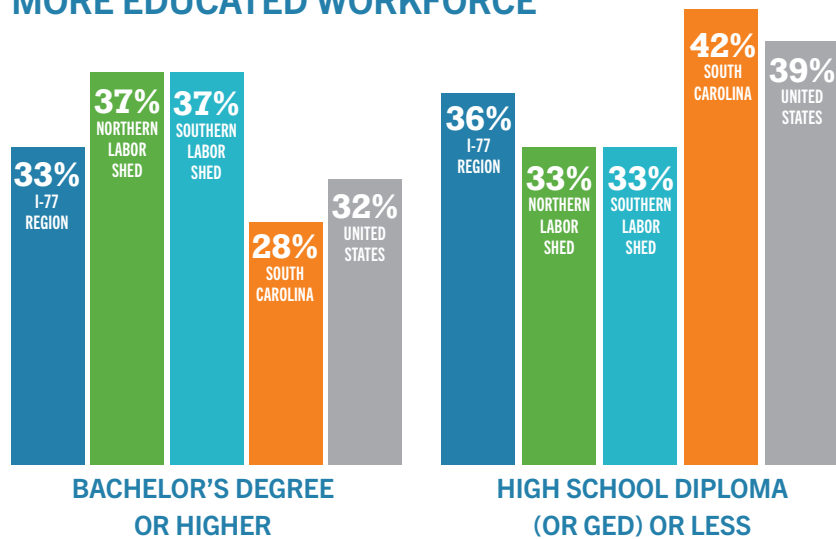
“Availability of skilled labor ranks No. 1 in the Consultants Survey...100 percent of the respondents to our Consultants Survey rated availability of skilled labor as “very important” or “important,”...Additionally, nearly all (98 percent) of the responding consultants say availability of skilled labor is affecting their clients’ facilities plans or current operations.”

— Area Development 14th Annual Consultants Survey, 2018

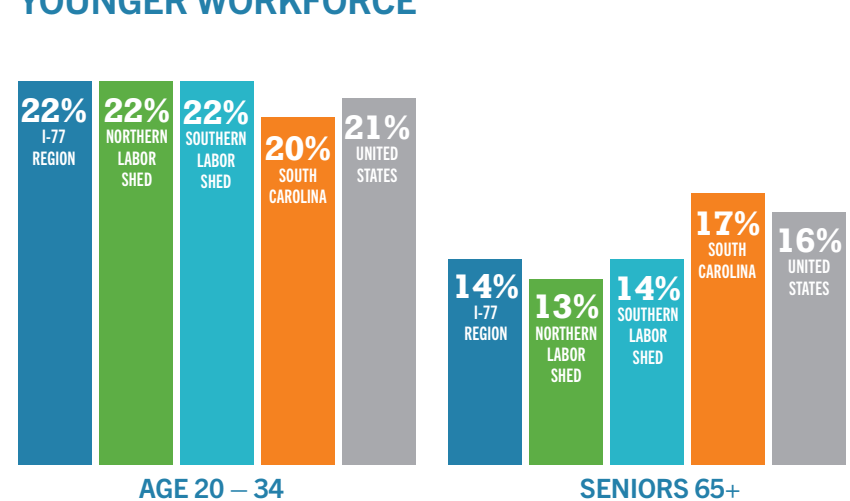


Two labor sheds serve the I-77 region and both offer new or expanding companies access to a massive workforce, shown above, and one that is more educated and younger than SC and US averages.

MORE EDUCATED WORKFORCE



YOUNGER WORKFORCE



Source: Esri Community Analyst, 2018 Estimate

WORKFORCE — ADVANCED MATERIALS OCCUPATIONS



REGIONALLY SIGNIFICANT ADVANCED MATERIALS OCCUPATIONS*

Location quotients compare regional concentrations of employment to the national concentration. A value of 1.0 illustrates matching rates and values over 1.25 imply a unique strength. (Ex. – LQ = 4.96. Local employment is almost five times the Nation’s concentration rate)

SOC CODE	OCCUPATION	EMPLOYED	LQ
51-6091	Extruding/Forming Machine Setters/Operators/Tenders; Synthetic/Glass Fibers	300	5.10
51-9196	Paper Goods Machine Setters/Operators/Tenders	724	3.27
51-8091	Chemical Plant/System Operators	206	2.67
51-9197	Tire Builders	134	2.51
51-9011	Chemical Equipment Operators/Tenders	354	1.91

Source: Chmura Economics, JobsEQ; I-77 Region. Primary & secondary sectors as defined in appendix.

FASTEST GROWING ADVANCED MATERIALS OCCUPATIONS*

SOC CODE	OCCUPATION	I-77 REGION	SOUTH CAROLINA	UNITED STATES
51-9197	Tire Builders	262%	30%	8%
51-9041	Extruding/Forming/Pressing/Compacting Machine Setters/Operators/Tenders	64%	23%	8%
19-2031	Chemists	34%	23%	7%
51-9011	Chemical Equipment Operators/Tenders	29%	19%	4%
51-5112	Printing Press Operators	26%	8%	-3%

Source: Chmura Economics, JobsEQ; 2013 - 2018; Primary & secondary sectors as defined in appendix.

*Note: Occupations with minimum average employment of 75 during Q4 2018 included. Private sector only. Occupation groups analyzed: Engineering; Scientists; Installation, Maintenance, and Repair; and Production

WORKFORCE — EXISTING LABOR PIPELINE

An invaluable component of the Advanced Materials' growth in the I-77 region is access to a trained workforce coupled with competitive wages. The following table details employment and wages for the fifteen occupations* projected to have highest demand from Advanced Materials operations, based on national employment trends. The occupation with the highest projected demand is listed first and then ranked accordingly.

SOC Code	Occupation	I-77 Region			I-77 Median ²	Compared to USA Median ²
		Employed ¹	Entry-Level Wage ²	Experienced-Level Wage ²		
51-2092	Team Assemblers	2,531	\$10.14	\$18.27	\$15.19	+2.9%
51-1011	First-Line Supervisors of Production/Operating Workers	1,489	\$19.47	\$36.49	\$29.13	+2.9%
51-4041	Machinists	825	\$14.62	\$24.42	\$20.63	+0.7%
51-9061	Inspectors/Testers/Sorters/Samplers/Weighers	1,260	\$10.96	\$21.97	\$17.36	-3.2%
51-4121	Welders/Cutters/Solderers/Brazers	863	\$14.28	\$24.33	\$19.09	-1.2%
51-4072	Molding/Coremaking/Casting Machine Setters/Operators/Tenders, Metal/Plastic	354	\$12.36	\$20.00	\$16.44	+10.0%
51-4031	Cutting/Punching/Press Machine Setters/Operators/Tenders, Metal/Plastic	456	\$11.25	\$17.74	\$14.76	-7.3%
51-9198	Helpers--Production Workers	857	\$8.99	\$13.56	\$11.20	-10.7%
49-9041	Industrial Machinery Mechanics	992	\$16.92	\$29.38	\$25.34	+2.5%
49-9071	Maintenance/Repair Workers, General	2,596	\$12.12	\$20.72	\$16.92	-6.6%
51-4011	Computer-Controlled Machine Tool Operators, Metal/Plastic	296	\$14.71	\$23.41	\$19.18	+1.8%
51-9011	Chemical Equipment Operators/Tenders	354	\$16.15	\$25.82	\$22.79	-0.8%
51-9023	Mixing/Blending Machine Setters/Operators/Tenders	494	\$12.88	\$21.06	\$18.03	+2.5%
51-4021	Extruding/Drawing Machine Setters/Operators/Tenders, Metal/Plastic	302	\$14.76	\$22.07	\$19.86	+19.4%
17-2112	Industrial Engineers	643	\$27.79	\$47.21	\$39.90	-3.4%

■ LQ between 0.90 and 1.24 (Description on page 4)

■ LQ at or above 1.25 (Description on page 4)

Source: Chmura Economics, JobsEQ; Primary & secondary sectors as defined in appendix.

*Note: Occupation groups analyzed: Engineering; Scientists; Installation, Maintenance, and Repair; and Production

1 - Average private-sector employment during four quarters ending Q4 2018

2 - 2017 Average Annual Wage, based on 2,080 hours annually

HIGHER EDUCATION

DARLA MOORE SCHOOL OF BUSINESS

One of the most critical elements and strengths of the United States is its research and development (R&D) institutions...Research being conducted at top U.S. universities not only gives this country a world class standing; it helps attract the best and the brightest talent from around the globe.

— Site Selection magazine



HIGHER EDUCATION — ADVANCED MATERIALS DEGREES*

The I-77 region and its extended geography is home to numerous research universities and technical colleges. These institutions churn the labor force, providing new talent in addition to the existing, trained workforce. The following table details the 2016 - 2017 higher-education graduates for programs that align with occupations demanded by Advanced Materials operations, based on national hiring trends.

CIP Code	Programs	Certificates or 2-Year Degree	Bachelor's Degree	Post-Bachelor's Degree	Total Awards
14.1901	Mechanical Engineering	0	345	68	413
14.1001	Electrical/Electronics Engineering	0	117	128	245
40.0501	Chemistry, General	0	168	37	205
48.0508	Welding Technology/Welder	196	0	0	196
15.0303	Electrical/Electronic/Communications Engineering Technology/Technician	92	27	0	119
14.0901	Computer Engineering, General	0	73	40	113
47.0105	Industrial Electronics Technology/Technician	112	0	0	112
14.0701	Chemical Engineering	0	79	18	97
15.0805	Mechanical Engineering/Mechanical Technology/Technician	33	54	0	87
48.0503	Machine Shop Technology/Assistant	75	0	0	75
	TOTAL FOR TOP TEN PROGRAMS	508	863	291	1,662
	TOTAL FOR (31) PROGRAMS RELATED TO ADVANCED MATERIALS OCCUPATIONS¹	924	996	360	2,280

TOTAL HIGHER EDUCATION STUDENT POPULATION

I-77 REGION

ENROLLMENT (2017 - 2018)

57,934

GRADUATES (2016 - 2017) — 14,087

(8 TWO AND FOUR-YEAR SCHOOLS
AND 2 TECHNICAL COLLEGES
WITH MULTIPLE CAMPUSES)

EXTENDED REGION*

96,634

GRADUATES — 20,683

(17 TWO AND FOUR-YEAR SCHOOLS
AND 4 TECHNICAL COLLEGES)

TOTAL STUDENT POPULATION

= 154,568

TOTAL GRADUATES — 34,770

Source: Chmura Economics, JobsEQ
*Note - School year 2017 - 2018. Graduates reflects students with dual majors, therefore some school's figures may be higher than National Center for Education Statistics (NCES) database.
Extended Region includes counties adjacent to I-77 region and/or counties in either labor shed as defined on page 3.
1 - Occupation groups analyzed: Engineering; Scientists; Installation, Maintenance, and Repair; and Production

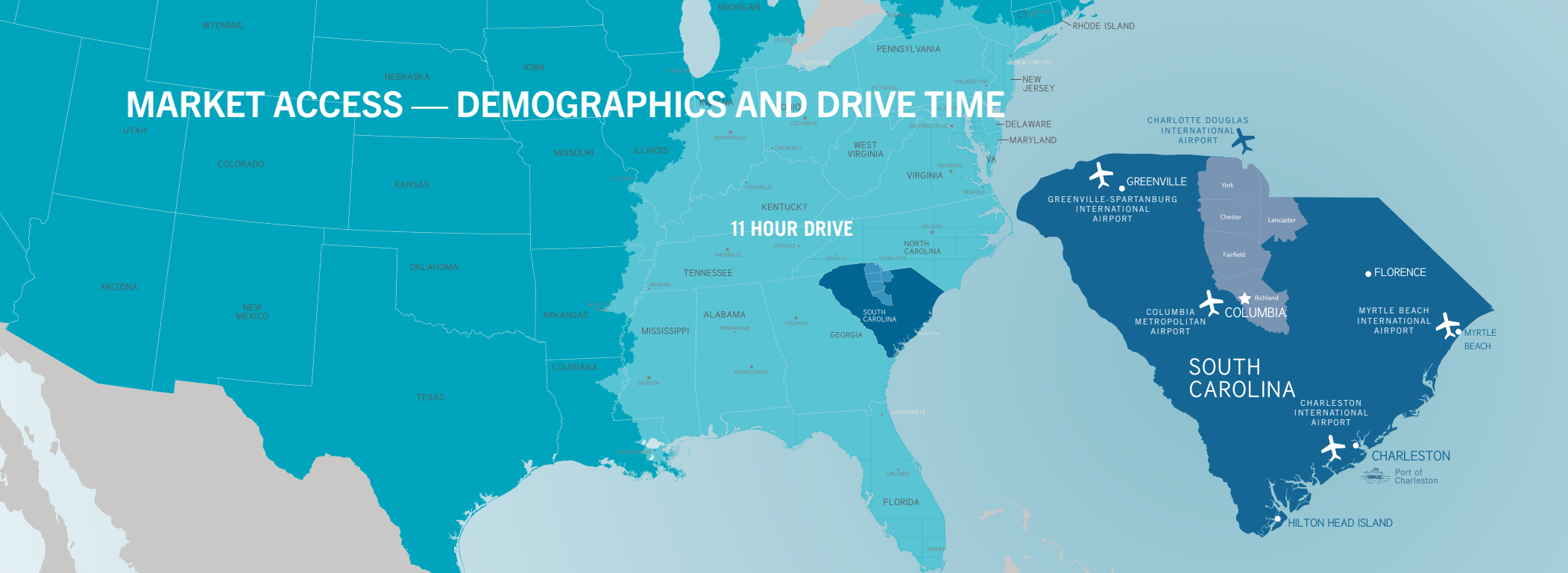
MARKET ACCESS



“Highway accessibility remains our Corporate Survey respondents number-one site selection concern,...[including] the related factors of highway accessibility and proximity to markets and suppliers.”

— Area Development 14th Annual Consultants Survey, 2018

MARKET ACCESS — DEMOGRAPHICS AND DRIVE TIME



LARGE — AND GROWING — REGION

3.4

MILLION PEOPLE
COMBINED MSA POPULATION

TWO METROPOLITAN AREAS

2.6 MILLION

CHARLOTTE METRO REGION

833,000

COLUMBIA METRO REGION

12%

I-77 REGION
POPULATION GROWTH

746,588 (2010)

838,727 (2018)

US '10 – '18 GROWTH, 6%

DOMESTIC MARKET ACCESS

45%

PERCENTAGE OF
US POPULATION
WITHIN AN
11-HOUR DRIVE

EXISTING INDUSTRY & SUPPLY CHAIN



“Manufacturers are beginning to learn that supply-chain management is more than just ‘leaning on’ their suppliers to shave pennies off the cost of a part, raw material, or component. Transportation and logistics should play a bigger role in the site selection process earlier in the decision-making process.”

— Area Development magazine, November 2012, The Confluence of Facility Planning and Supply Chain Strategy

133,000

MAJORITY-OWNED, FOREIGN-AFFILIATED COMPANIES EMPLOY MORE THAN 133,000 SOUTH CAROLINIANS, WHICH IS THE EQUIVALENT OF 1 OUT OF EVERY 16 JOBS IN SOUTH CAROLINA



The I-77 region and its extended geography are home to a roster of industry-leading Advanced Materials companies and suppliers. Additionally, some of the world's most successful corporations operate OEM plants in South Carolina that are dependent on Advanced Materials sectors.

INDUSTRIAL GASES

- PRAXAIR
- AIRGAS USA
- LINDE

SPECIALTY CHEMICALS

- BASF CORP
- OMNOVA SOLUTIONS
- JONES-HAMILTON
- PULCRA CHEMICALS
- ATOTECH
- NATION FORD CHEMICAL CO.
- CYTEC

PIGMENTS AND MASTERBATCHES

- CLARIANT

RESINS

- DAK AMERICAS

FIBERS AND FILAMENTS

- SUNFIBER
- INVISTA
- CHINA HENGSHI FOUNDATION COMPANY
- CHINA JUSHI USA
- SHAKESPEARE COMPANY
- COMPOSITE RESOURCES

POLYMERS

- SPECIALTY POLYMERS, INC.

ALLOYS AND METALS

- ATI SPECIALTY MATERIALS
- NEXT GEN ALLOYS

SC Manufacturers



To learn more: sccommerce.com/industries

EXISTING INDUSTRY — EXPORTS



The I-77 region is a substantial exporter of Advanced Materials goods and those manufacturers play a vital role in the global economy. High export values indicate a concentration and specialization of both industry and the labor force.

2017 EXPORT VALUE: PRIMARY INDUSTRIES*

\$4.7
BILLION

SOUTH CAROLINA

15% OF SOUTH CAROLINA'S PRIMARY INDUSTRIES EXPORTS ARE MADE IN THE I-77 REGION

\$699
MILLION

I-77 REGION

2017 EXPORT VALUE: SECONDARY INDUSTRIES & SUPPLY CHAIN*

\$8.7
BILLION

SOUTH CAROLINA

16% OF SOUTH CAROLINA'S SECONDARY INDUSTRIES & SUPPLY CHAIN EXPORTS ARE MADE IN THE I-77 REGION

\$1.4
BILLION

I-77 REGION

*Note: Export data only at four-digit NAICS code level therefore data may include sectors not captured in Primary & Secondary Industries as defined in appendix. Supply Chain sectors defined on page 13. INSTEAD OF TOP INDIVIDUAL SECTORS STANDARDIZED TO REFLECT CLUSTER GROUPINGS

Source: Brookings Institution, Export Monitor 2017

EXISTING INDUSTRY - SUPPLY CHAIN, TOP 15 INDUSTRIES*

Advanced Materials companies in the I-77 region benefit from a vast network of local suppliers. The following table details current employment and respective change since 2015 for industries projected to have highest demand from Advanced Materials operations, based on national supply chain data. The industry with the highest projected demand is listed first and then ranked accordingly.

NAICS Code	Industry	Employed, Q4 2018			5-Year Employment Change			
		Extended Region	I-77 Region	% in I-77 Region	Extended Region	I-77 Region	South Carolina	USA
325110	Petrochemical Mfg.	375	0	0%	68%	0%	-20%	8%
325211	Plastics Material/Resin Mfg.	1,233	350	28%	45%	50%	36%	8%
325199	All Other Basic Organic Chemical Mfg.	475	200	42%	7%	67%	8%	15%
331110	Iron/Steel Mills and Ferroalloy Mfg.	971	154	16%	2%	295672%	63%	-8%
325180	Other Basic Inorganic Chemical Mfg.	1,685	1,230	73%	9%	10%	10%	3%
332710	Machine Shops	2,290	349	15%	4%	-2%	3%	0%
325193	Ethyl Alcohol Mfg.	0	0	0%	0%	0%	757%	10%
334413	Semiconductor/Related Device Mfg.	7	7	100%	-66%	666%	-7%	0%
331420	Copper Rolling/Drawing/Extruding/Alloying	122	0	0%	-64%	0%	91%	-5%
326199	All Other Plastics Product Mfg.	2,101	184	9%	9%	238%	27%	12%
325130	Synthetic Dye/Pigment Mfg.	323	153	48%	-44%	15%	-11%	-4%
322121	Paper (except Newsprint) Mills	1,039	762	73%	40%	22%	52%	-15%
322211	Corrugated/Solid Fiber Box Mfg.	1,105	102	9%	-5%	5%	-5%	8%
325220	Artificial/Synthetic Fibers/Filaments Mfg.	2,388	332	14%	22%	44%	13%	-2%
325998	All Other Miscellaneous Chemical Product/Preparation Mfg.	288	108	38%	24%	-4%	10%	11%

■ LQ between 0.90 - 1.24 (Description on page 4)

■ LQ 1.25 or higher (Description on page 4)

■ Employment change rate exceeds National Average (Positive growth only)

* Note: Private-sector, manufacturing sectors only. Petroleum refineries not included. Extended Region as defined on Page 7.

SUPPLY CHAIN

RECENT ANNOUNCEMENTS IN I-77 REGION

MIWON SPECIALTY CHEMICAL CO., USA
 COATINGS & CURING SYSTEMS
25 NEW JOBS

SHAYNANO USA, INC.
 NANOMATERIALS
40 NEW JOBS

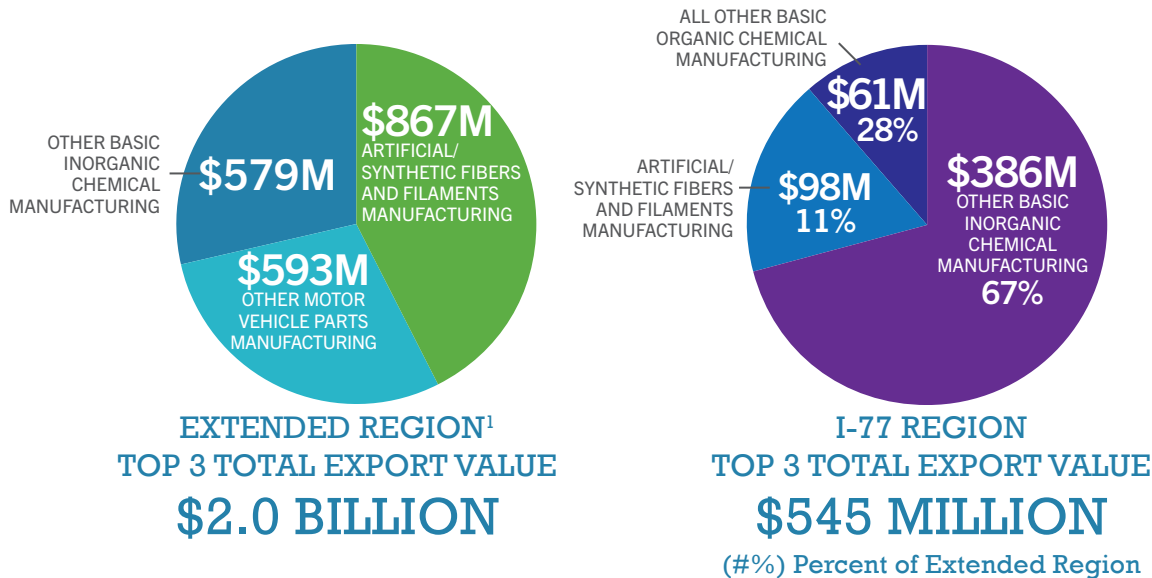
OWENS CORNING
 NON-WOVEN MATERIALS & COMPOSITES
16 NEW JOBS

CHINA HENGSHI FOUNDATION COMPANY
 FIBERGLASS FABRICS
48 NEW JOBS

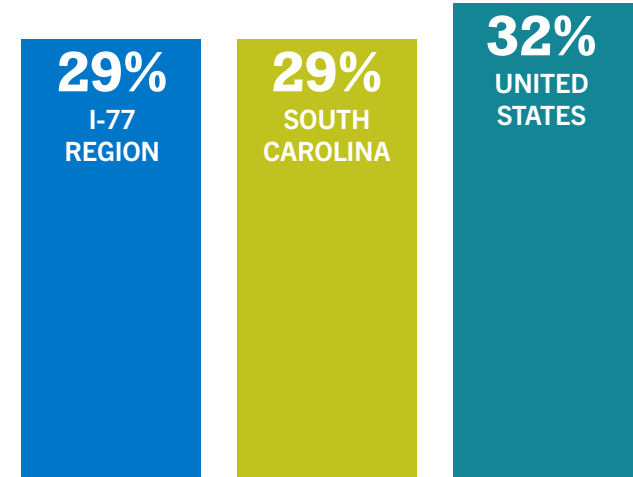
NEXT GEN ALLOYS
 (ATI & GE)
 MATERIALS R&D
29 NEW JOBS

Source: South Carolina Department of Commerce

TOP 3 SUPPLY CHAIN SECTORS,* BY 2023 GDP



ADVANCED MATERIALS SUPPLY CHAIN GDP GROWTH, 2020 – 2023*



Source: Chmura Economics, Jobs EQ
 *Note: Supply chain as defined on page 13. Private-sector operations.
 1 - Extended Region as defined on Page 7.

SOUTH CAROLINA'S BUSINESS FRIENDLY ENVIRONMENT

1.9%

UNIONIZATION

PRIVATE SECTOR
MANUFACTURING

2ND LOWEST IN THE US

1.7%

UNIONIZATION

ALL
PRIVATE SECTOR

LOWEST IN THE US

2.6%

UNIONIZATION

TOTAL ALL PUBLIC +
PRIVATE SECTOR

LOWEST IN THE US

Source: Unionstats.com

REAL ESTATE

\$3.44

PER SQ. FT.

LEASE RATES FOR MANUFACTURING SPACE
IN THE I-77 REGION RANGE FROM \$3.15 –
\$3.73 PSF/YEAR. (US AVG: \$5.15 PSF/YEAR)

INDUSTRIAL POWER RATES IN SOUTH CAROLINA

12%

LOWER

INDUSTRIAL POWER RATES IN
SOUTH CAROLINA ARE 12% LOWER
THAN THE NATIONAL AVERAGE

6.09¢

PER KILOWATTHOUR

INDUSTRIAL ELECTRICITY RATES
SOUTH CAROLINA AVERAGE
2017 ANNUAL DATA

WORKFORCE RESOURCES AND INDUSTRY PARTNERSHIPS



WORKFORCE DEVELOPMENT



readySC™ Workforce Training

For more than 50 years, the SC Technical College System has powered readySC™ which provides well-trained employees to companies investing in South Carolina. The readySC™ program includes recruiting, screening and training as well as a tailored curriculum to fit a company's specific needs.



The South Carolina Technical College System

Apprenticeship Carolina™, a division of the SC Technical College System, works to ensure all employers in South Carolina have access to the information and technical assistance they need to create demand-driven registered apprenticeship programs. At no cost to the employer, apprenticeship consultants are available to guide companies through the registered apprenticeship development process from initial information to full recognition in the national Registered Apprenticeship System.

APPENDIX – INDUSTRY CLASSIFICATION

The North American Industry Classification System (NAICS) is the standard six-digit categorization code used by Federal statistical agencies in classifying business establishments for collecting, analyzing, and publishing statistical data related to the U.S. business economy. The following NAICS codes were collectively used to define the cluster in order to collect, aggregate, and analyze industry and workforce data.

PRIMARY INDUSTRIES — Advanced Materials Manufacturers

NAICS	TITLE
212325	Clay and Ceramic and Refractory Minerals Mining
31323	Nonwoven Fabric Mills
3251	Basic Chemical Manufacturing
3252	Resin, Synthetic Rubber, and Artificial Synthetic Fibers and Filaments Manufacturing
325991	Custom Compounding of Purchased Resins
325998	All Other Miscellaneous Chemical Product and Preparation Manufacturing
327410	Lime Manufacturing

NAICS	TITLE
3311	Iron and Steel Mills and Ferroalloy Manufacturing
331313	Alumina Refining and Primary Aluminum Production
331314	Secondary Smelting and Alloying of Aluminum
331410	Nonferrous Metal (except Aluminum) Smelting and Refining
331492	Secondary Smelting, Refining, and Alloying of Nonferrous Metal (except Copper and Aluminum)
335991	Carbon and Graphite Product Manufacturing

SECONDARY INDUSTRIES — Manufacturers primarily engaged in adding value to or creating new products from Advanced Materials

NAICS	TITLE
3133	Textile and Fabric Finishing and Fabric Coating Mills
314994	Rope, Cordage, Twine, Tire Cord, and Tire Fabric Mills
321114	Wood Preservation
32222	Paper Bag and Coated and Treated Paper Manufacturing
32412	Asphalt Paving, Roofing, and Saturated Materials Manufacturing
32419	Other Petroleum and Coal Products Manufacturing
3253	Pesticide, Fertilizer, and Other Agricultural Chemical Manufacturing
3255	Paint, Coating, and Adhesive Manufacturing
3256	Soap, Cleaning Compound, and Toilet Preparation Manufacturing
325910	Printing Ink Manufacturing
325920	Explosives Manufacturing
325992	Photographic Film, Paper, Plate, and Chemical Manufacturing
3261	Plastics Product Manufacturing
3262	Rubber Product Manufacturing
3271	Clay Product and Refractory Manufacturing
3272	Glass and Glass Product Manufacturing
3273	Cement and Concrete Product Manufacturing
327420	Gypsum Product Manufacturing
3279	Other Nonmetallic Mineral Product Manufacturing
3312	Steel Product Manufacturing from Purchased Steel

NAICS	TITLE
331315	Aluminum Sheet, Plate, and Foil Manufacturing
331318	Other Aluminum Rolling, Drawing, and Extruding
331420	Copper Rolling, Drawing, Extruding, and Alloying
331491	Nonferrous Metal (except Copper and Aluminum) Rolling, Drawing, and Extruding
3315	Foundries
3321	Forging and Stamping
33231	Plate Work and Fabricated Structural Product Manufacturing
332322	Sheet Metal Work Manufacturing
332323	Ornamental and Architectural Metal Work Manufacturing
3324	Boiler, Tank, and Shipping Container Manufacturing
3325	Hardware Manufacturing
3326	Spring and Wire Product Manufacturing
3327	Machine Shops; Turned Product; and Screw, Nut, and Bolt Manufacturing
33291	Metal Valve Manufacturing
332991	Ball and Roller Bearing Manufacturing
332996	Fabricated Pipe and Pipe Fitting Manufacturing
332999	All Other Miscellaneous Fabricated Metal Product Manufacturing
3344	Semiconductor and Other Electronic Component Manufacturing
335929	Other Communication and Energy Wire Manufacturing



SOUTH CAROLINA
I-77ALLIANCE

www.I77Alliance.com