Medical Device Manufacturing + Innovation

In Greater Memphis, Tennessee

Industry Sector Overview

GREATER MEMPHIS CHAMBER

A History of Innovation in Medicine and Medical Technology Drives the Emerging Life Sciences Sector in Greater Memphis

INFRASTRUCTURE FOR INNOVATION

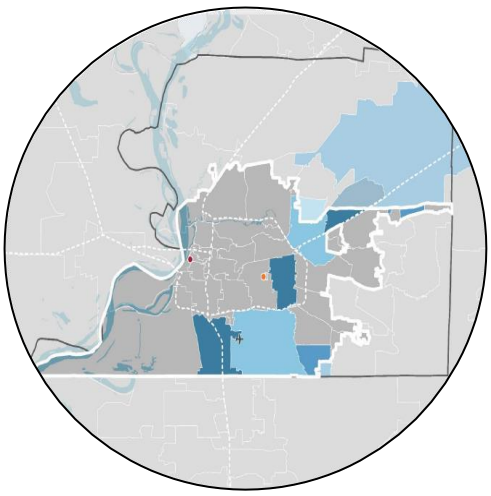
The entrepreneurial spirit and a focus on innovation mix with a culture of collaboration and compassion to drive the emerging Life Sciences cluster in Greater Memphis. Our City's low cost of living and our business-friendly governance make Memphis a prime location for the life science industry. From medical advances that brought the world some of the most renowned orthopedic innovations to medical breakthroughs in the fight against childhood cancer, Memphis is an epicenter of life changing advances in bioscience.

TAP INTO RESOURCES

The region's life science industry is backed by a collection of world class research assets including UT-Baptist Research Park, a large and growing bioscience research campus complemented by the Memphis Medical District, a 250-acre area of Downtown Memphis that boasts 9 of the region's key life sciences institutions, including St. Jude Children's Research Hospital, University of Tennessee Health Sciences Center, Regional One, Methodist Le Bonheur Healthcare, Southern College of Optometry, and Le Bonheur Children's Hospital.

Industry Presence: Medical Device

Job Density by Zip Code in Shelby County



FACT: The Greater Memphis area contains the second largest industry cluster of Orthopedic and Spinal medical device companies in the United States.

FACT: The FedEx World Hub in Memphis is one of the only places in the world where FedEx packages can be dropped off as late as midnight and delivered around the world as soon as the next day.

FACT: Memphis is home to the corporate headquarters of Trimetis, a $23M, 26,000 square-foot, pre-clinical GLP-complaint facility dedicated to helping companies accelerate research through access to specialized laboratories and research expertise.

MAJOR EMPLOYERS: Research and Development & Medical Device Manufacturing

Employer Name	Facility Type	Regional Employment
St. Jude Research Hospital	Research Hospital	4,000 +
Smith & Nephew, Inc.	Medical Device Manufacturing	2,300 +
Medtronic, Inc.	Medical Device Manufacturing	1,500 +
University of Tennessee Health Science Center	University Research Lab	1,000 +
UT-Baptist Research Park	Research Hospital	1,000 +
Wright Medical Technology, Inc.	Medical Device Manufacturing	600 +
MicroPort Orthopedics	Medical Device Manufacturing	500 +
American Esoteric Laboratories	Clinical Laboratory	400 +
Owens And Minor	Medical Device Manufacturing	400 +
Buckman Laboratories	Specialized Research in Biotechnology	200 +
Gyrus ENT LLC, an Olympus Co.	Medical Device Manufacturing	200 +
Olympus Surgical Technologies America	Medical Device Manufacturing	200 +
Pfizer	Specialized Research in Biotechnology	200 +
Bioventus	Medical Device Manufacturing	100 +
Nuvasive, Inc.	Specialized Research in Biotechnology	100 +
Onyx Medical Corp	Medical Device Manufacturing	100 +

ANNOUNCEMENTS AND EXPANSIONS: University of Tennessee Health & Science Center

UTHSC has launched a new statewide initiative with the goal of improving health outcomes, equity, and quality of life with hopes of moving from pill-pushing to health behavior changes. Addressing these issues are three key initiatives: the TN Heart Health Network, the Diabetes Wellness and Prevention Coalition, and the Cancer Prevention and Control Program. Each initiative offers insight, training, best practices, and support for patients as well as a new health data infrastructure to track outcomes and improve health in each given area.

From the Initiative Director

"The launch of the consortium gives our partnering academic institutions, health systems, health plans, quality improvement organizations, providers, and patients across the state an historic opportunity to work together to improve the health of Tennesseans. "For the first time, our UTHSC campuses across the state are contributing their substantial educational, training, information technology, and communications assets to explicitly support our statewide partners in their efforts to measurably improve health equity and population health."

- Jim Bailey, MD, Robert S. Pearce Endowed Chair in Internal Medicine

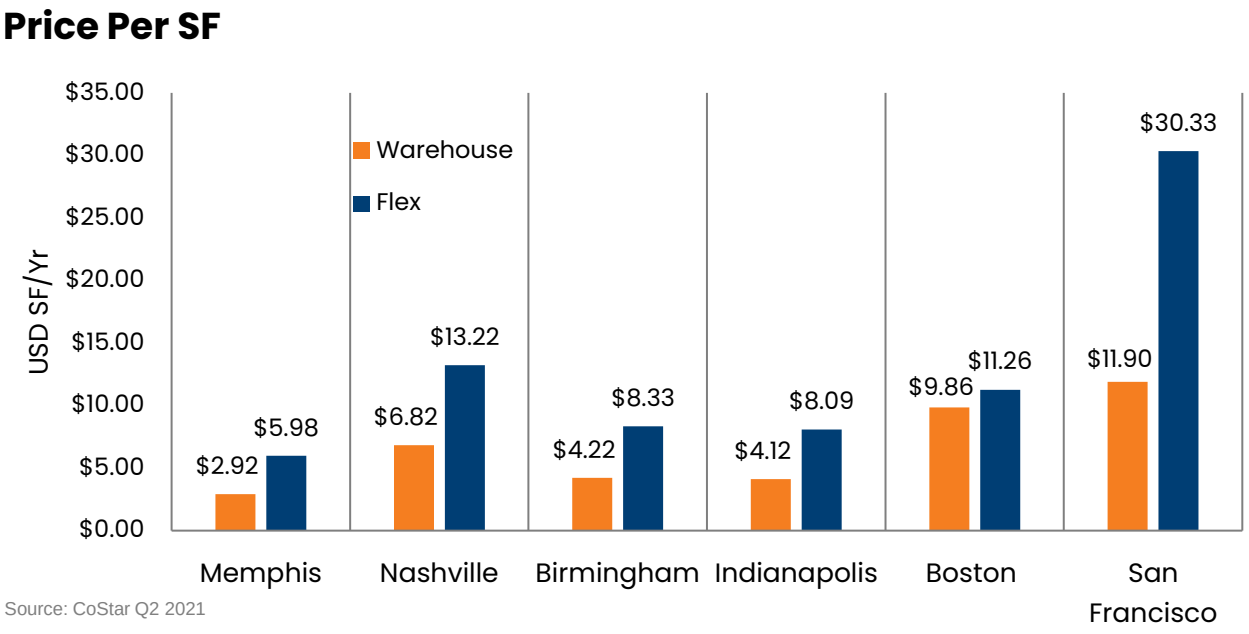
THE UNIVERSITY OF TENNESSEE HEALTH SCIENCE CENTER

REAL ESTATE: St. Jude Children's Research Hospital

St. Jude is comprised of 2.5 million square feet dedicated to research, clinical, and administrative space at its Memphis campus. Inside of its proposed $1.9 billion 2022-2027 construction budget is an allocation of $1.4 billion towards new "strategic initiatives" and $558 million into current facilities. Headlining these construction plans is Domino's Village. This village will be a $110 million housing complex for patients and families with 140 units of short and long-term stay, with many amenities including a direct connection to the Memphis campus by way of bridge. In addition, there will be two new parking garages, $500 million outpatient clinic with attached clinical office buildings, and expansion to the already robust cafeteria facilities.

Already in construction and scheduled to open this year, the $412 million state of the art research tower. This will be a seven story, 625,000-square-foot facility that will effectively double the current amount of research space available to the hospital.

Clearly indicated is the affordability and evident availability of construction space within the greater Memphis area. Adding more context to cost savings, the chart below compares the average rent per square foot withing commercial and industrial space, comparatively, within similar major metropolitan areas nationwide.



Source: CoStar Q2 2021

WORKFORCE

Home to Fortune 500 companies FedEx, AutoZone and International Paper, Memphis is well positioned as an attractive location for quality and skillful talent. Comparatively, the region holds an extremely competitive workforce regarding training, quality, and availability of workers. Shown on the following pages, the critical mass and growth of both industry and occupations have been highlighted to provide deeper insight into regional presence related to the region's medical device ecosystem.

Industry

With over 88,000 people employed, the Health Care and Social Assistance sector within the Memphis MSA maintains a significant regional presence, capturing 12.9% of total civilian employment. Shown below, sub-industries that complement this presence from a manufacturing and wholesale perspective are highlighted. As shown, these industries hold a notable footprint within the region and have experienced significant growth over the past five years. Most recently, the mix of industries shown below have experienced 9% growth from 2015-2020 and are expected to grow by another 6% from 2020-2025 with just over 10,000 employees.

Industry Description	2015 Jobs	2020 Jobs	2025 Jobs	%Δ 2015-2020	%Δ 2020 - 2025
Medicinal and Botanical Manufacturing	39	93	124	138%	33%
Pharmaceutical Preparation Manufacturing	498	201	76	-60%	-62%
In-Vitro Diagnostic Substance Manufacturing	51	10	8	-80%	-20%
Analytical Laboratory Instrument Manufacturing	42	209	285	398%	36%
Irradiation Apparatus Manufacturing	5	8	9	60%	13%
Surgical and Medical Instrument Manufacturing	241	613	799	154%	30%
Surgical Appliance and Supplies Manufacturing	5,620	6,086	6,397	8%	5%
Dental Equipment and Supplies Manufacturing	28	9	5	-68%	-44%
Ophthalmic Goods Manufacturing	429	10	10	-98%	0%
Medical, Dental, and Hospital Equipment Wholesalers	1,914	2,086	2,111	9%	1%
Ophthalmic Goods Merchant Wholesalers	30	14	10	-53%	-29%
Research and Development in Biotechnology	181	278	297	54%	7%
Hazardous Waste Treatment and Disposal	112	393	513	251%	31%
Regional Total	**9,192**	**9,993**	**10,611**	**9%**	**6%**

Source: Economic Modeling Specialists International (EMSI Q2 2021 Dataset)

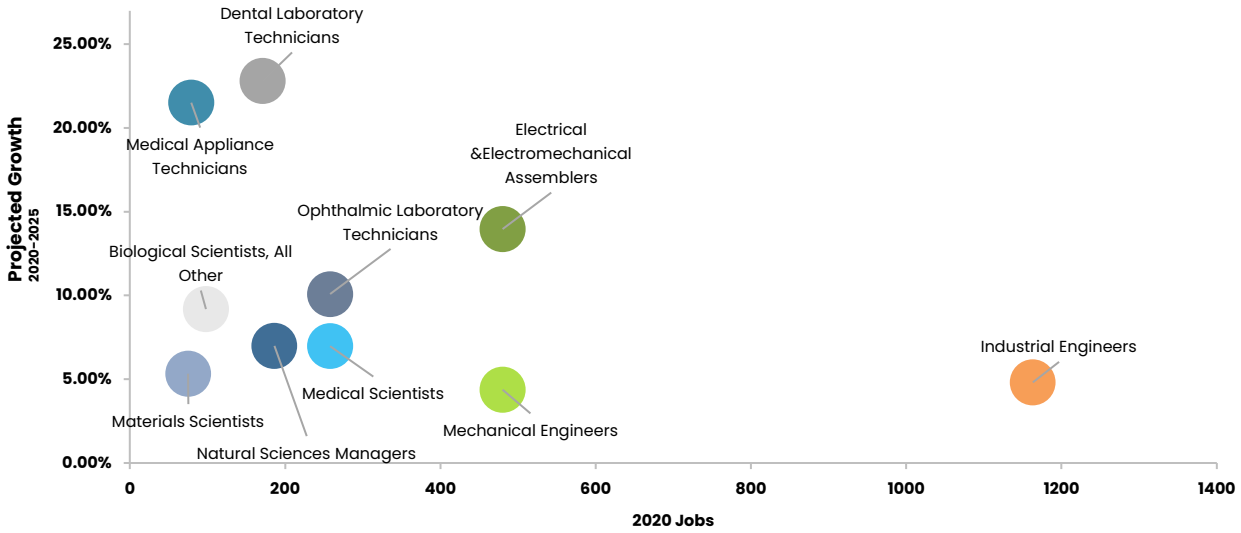
Occupations

Historically, growth within specialized medical device and production occupations has been steady. As seen below, both sub-occupational categories are expected to see positive growth from 2020-2025. The overall occupational sector employs just over 11,000 residents and expects 3.20% growth over the same period.

Occupational Description	2020 Jobs	2025 Jobs	2020 - 2025 % Change	2020 Median Annual Earnings
Research and Development				
Natural Sciences Managers	186	199	6.99%	$126,345.43
Biomedical Engineers	83	86	3.61%	$71,187.14
Mechanical Engineers	480	501	4.38%	$81,759.39
Biochemists and Biophysicists	298	307	3.02%	$91,808.50
Biological Scientists, All Other	98	107	9.18%	$71,242.07
Epidemiologists	33	34	3.03%	$81,860.09
Medical Scientists	258	276	6.98%	$75,983.12
Chemists	192	197	2.60%	$72,405.72
Materials Scientists	75	79	5.33%	$111,294.95
Physical Scientists, All Other	45	45	0.00%	$168,727.40
Biological Technicians	811	808	-0.37%	$50,553.77
Clinical Laboratory Techs	2,385	2,403	0.75%	$56,399.61
Regional Total of Occupational Mix	**4,944**	**5,044**	**2.02%**	
Specialized Medical Device and Production Occupations				
Industrial Engineers	1,163	1,219	4.82%	$75,620.62
Industrial Engineering Technicians	361	358	-0.83%	$51,609.05
Supervisors of Production and Operating Workers	2,964	3,010	1.55%	$55,747.73
Electrical &Electromechanical Assemblers	480	547	13.96%	$35,610.28
Multiple Machine Tool Setters & Operators	616	633	2.76%	$32,192.38
Grinding and Polishing Machine Tool Operators	109	108	-0.92%	$31,311.87
Dental Laboratory Technicians	171	210	22.81%	$31,502.81
Medical Appliance Technicians	79	96	21.52%	$44,128.08
Ophthalmic Laboratory Technicians	258	284	10.08%	$34,394.80
Computer Controlled Tool Operators	259	260	0.39%	$40,364.75
Regional Total of Occupational Mix	**6,459**	**6,724**	**4.10%**	
Total of All Represented Occupations	**11,403**	**11,768**	**3.20%**	

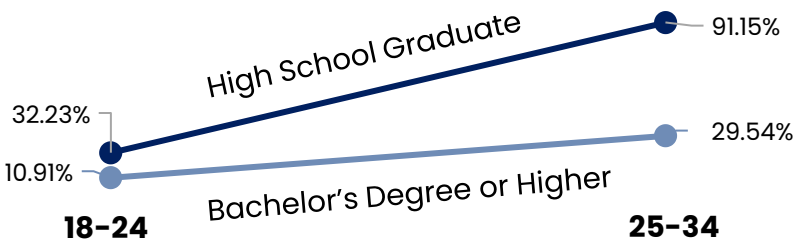
Occupational Presence and Projected Growth

Additional insight can be found by identifying which occupations are projected to realize the fastest growth over the next five years. Paired together, 45% of the occupations (10) shown on the previous page are forecasted to expand by over 4% from 2020 to 2025. Shown below, high yield research and production occupations maintain strong forecasted growth. These occupations, as well as others, will continue to build critical mass as growth is accelerated over the next five years.



EDUCATION

Young professionals hold a significant footprint within the Memphis regional population. In fact, per the most recent metro area population estimates, there are over 312,000 residents between the ages of 18-34. To gain an understanding of the college graduate labor market and the young and talented professional population within the Memphis MSA, one can look at two age range cohorts derived from the U.S. Census. The chart below highlights the population residing within the Memphis MSA who fall within the age ranges of 18-24 and 25-34 along, additionally respective college level educational attainment has been added for additional insight.



UNIQUE TALENT PIPELINE

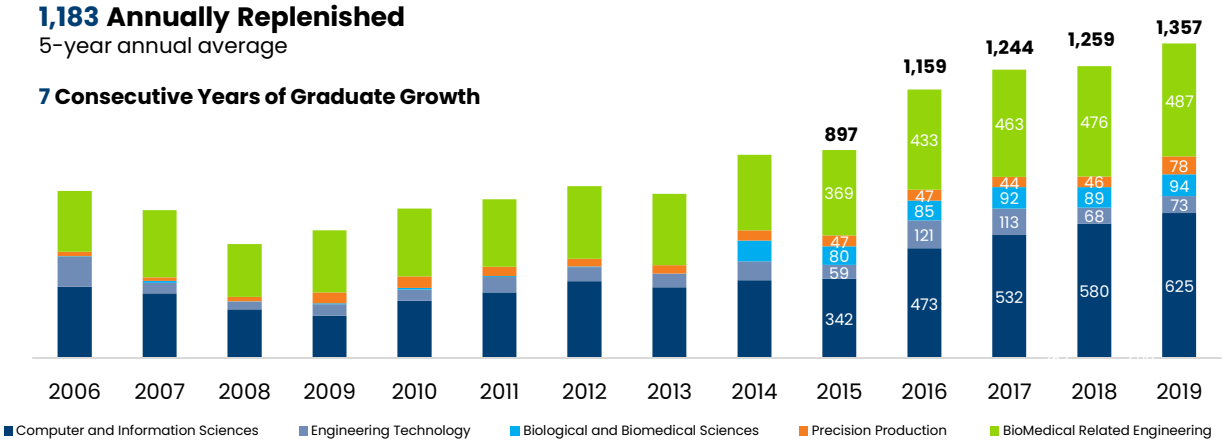
Related to biological and biomedical research, production and technology, the Memphis region is in close proximity (150-miles) to 39 colleges and universities offering programs within the life sciences. Of these institutions, Shelby County, Tennessee captures the **highest volume** of graduate output within biological and biomedical programs, making the Greater Memphis region a magnet for this renewable pool of talent.

TALENT SUSTAINABILITY: Historical Growth in Program Graduates

Biological/Biomedical, Production, and Technology: Institutions within the Memphis MSA

1,183 Annually Replenished
5-year annual average

7 Consecutive Years of Graduate Growth



Biomedical Related Engineering includes: Electrical, Biomedical/medical, Computer, Biochemical, and Chemical Engineering

EDUCATION SPOTLIGHT: University of Tennessee Health Science Center

College of Pharmacy
#20
Nationally in NIH Research Funding

Ranked
#17
Nationally Among Pharmacy Schools

Ranked
#24
Nationally among U.S. Doctor of Nursing Practice programs

100 programs certified by the Accreditation Council for Graduate Medical Education

Institutional Research Cores

Flow Cytometry & Cell Sorting
Medicinal Chemistry
Molecular Bioinformatics
Molecular Resource Center of Excellence

FEDEX INSTITUTE OF TECHNOLOGY

Innovation's Finest

Founded in 2003, **The FedEx Institute of Technology** is the leading emerging technologies research institution in Memphis. Home to the University's intellectual property and patent repository, it serves as the focal point of technology transfer and licensing operations. The Institute supports regional community efforts to increase both the size and technical sophistication of the regional technology workforce. Additionally, the University's Graduate School serves approximately 1,000 doctoral and 3,000 masters' students.

The Institute is the central hub for efforts to maintain a cutting-edge innovative environment in the Mid-South region. It also offers training and collaboration opportunities in emerging technologies and related breakthrough concepts.

RESEARCH SPOTLIGHT: Cluster for Biologistics

Biologistics can be defined as the management of the safe flow of high value, temperature sensitive and time-critical biological materials and biospecimen as they are delivered for patient care, analyzed for diagnostic purposes, processed to higher value products or stored to meet physical and data archival needs.

As a key research partner of an emerging regional biologistics economic development plan, the FedEx Institute is establishing **the FIT Biologistics Research Innovation Cluster**. The faculty affiliates of the Biologistics Cluster from Engineering, Marketing & Supply Chain, Biomedical Sciences and the Intermodal Freight Transportation Institute (IFTI), with support from the FIT, will collaborate to develop joint research projects to deliver novel solutions for joint research projects to deliver novel solutions for:

- Distribution and testing of biomedical products
- Supply-chain analysis / optimization
- Services Innovation
- Physical and chemical sensing technology for smart storage and transportation