



# FINGER LAKES ADVANCED MANUFACTURING STRATEGIC SECTOR PLAN

## ABSTRACT

This report documents the Finger Lakes Advanced Manufacturing Strategic Sector Plan developed to improve the regional advanced manufacturing middle skills workforce

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## Introduction

The purpose of the grant was to fund an initiative to develop a comprehensive regional advanced manufacturing industry sector strategy center around the following expectations.

- Analyze existing workforce data to be used to make decisions during regional sector partnership meetings
- Schedule regional partnership meetings with industry champions and engage a diverse group of business leaders
- Propose workforce solutions centered around career pathways that are responsive to the needs of business and workers in targeted industry sectors
  - Career Pathway map and tools to market advanced manufacturing careers to adults and youth will be key element of project
- Propose a plan to provide financial stability and continuous improvement of industry sector strategy
- Build organizational capacity and align policies and resources to continually support sector strategy outcomes
  - Workforce policy recommendations to city and county governments and the three workforce boards

From February 2017 thru June 2017 a team of educators, business leaders and local government officials met to examine the current workforce challenges in the advanced manufacturing sector within the Finger Lakes Region. Our objective was to develop an Advanced Manufacturing Sector Strategy that contained actionable objectives that would allow the sector to maximize its economic impact in the region.

## Research on the Significance of Advanced Manufacturing

We did initial research on the significance of the Advanced Manufacturing Sector to the US economy and evaluated global trends that could potentially become headwinds limiting our local effectiveness. The results of this research were very encouraging!

According to Deloitte's 2016 Global Manufacturing Competitive Index,

- "China is the most competitive manufacturing nation...for now."
- "The United States is expected to take over the number one position from China by the end of the decade while Germany holds firm at number three."
- "CEOs say advanced manufacturing technologies are key to unlocking future competitiveness."
- "Shift to higher value, advanced manufacturing tilts the advantage to developed nations in the future."
- "Top drivers of manufacturing competitiveness"
  - "Talent remains number one: Consistent with the 2010 and 2013 Global Manufacturing Competitiveness Index studies, manufacturers continue to rank talent as the most critical driver of global manufacturing competitiveness."

## Assessment of Sector Workforce

Based on the Deloitte report’s conclusions:

1. US manufacturers using advanced manufacturing technologies are well positioned to thrive in the fourth industrial revolution.
2. Talent remains the critical driver of global manufacturing competitiveness.

We focused our efforts on understanding the current state of our advanced manufacturing workforce in the Finger Lakes Region. If the Finger Lakes Region is going to participate in the resurgence of US manufacturing, developing a local workforce is essential for our region to share in the resulting prosperity.

Using local Labor Market data available through the Economic and Workforce Development Center at Monroe Community College, we examined the demand for middle skill workers in the manufacturing sector versus the current supply. The results of that analysis are quite disturbing. As shown in the screen shot below there is a significant gap between the demand for middle level skill workers and the number of learners completing relevant middle-skills training or education program within our region.

### GAP ANALYSIS.

#### Regional program completions vs. estimated annual openings.

This measurement aims to provide a regionally based supply and demand report, comparing the total estimated number of learners completing a relevant middle-skills training or education program within a region, against estimated industry demand for those middle-skills workers that have been included for purposes of this analysis in a specific occupational group or workforce cluster. Detailed regional completion data is available here: [New York Finger Lakes Region](#); [Central New York Region](#); [Western New York Region](#). Additional source information is available in [Data Sources](#).

Middle-Skill Education Provider	July 2014 - June 2015 Completions	Estimated Annual Job Openings	Estimated Gap (Δ)
Aggregate Middle-Skills Education Providers	261	610	-349
<b>Total</b>	<b>261*</b>		

Data is estimated, not predictive. Source: Includes associates degrees; awards of at least 1 but less than 2 academic years; awards of less than 1 academic year; and non-credit awards of 1 academic year or less from Integrated Postsecondary Education Data System (IPEDS).

2017 Total Workforce: 22,529  
Aggregate Cluster – Manufacturing Workers.



10-year aging out projection: 25.4% are approaching retirement age.

\* The 261 annual regional completions represent a supply of 42.8% new advanced manufacturing trained workers produced locally against an estimated annual demand of 1,963 openings.

\*\* This suggests that in this occupational group, about 57.2% of aggregate cluster – manufacturing related jobs may go unfilled each year in the region due to an insufficient number of graduates produced locally.

**Source:** IPEDS and noncredit self-reported data from application education providers.

Figure 1 – Advanced Manufacturing Skills Gap

The region’s lost economic value for each unfilled middle skills job in Advanced Manufacturing was estimated at \$141,000 annually. With the current gap at 349 workers, we determined the region is currently losing approximately \$49 million of economic value every year. **Given the financial significance of this gap, we focused our analysis on understanding the root cause of the gap and approaches we should take to rapidly close the gap.** Our focus is synergistic with the Finger Lakes Regional Economic Development Council URI plan to leverage development of the Eastman Business Park as one of the most significant engines to drive economic growth in the region. Growing the middle skills manufacturing workforce is the key to addressing both objectives.

Annual Middle Skills Worker Gap	349		
Average Yearly Salary	\$33,000		estimate
Company Revenue versus Payroll	3.3:1		ratio
Economic Value versus Company Revenue	1.3:1		ratio
Lost Economic Value for each unfilled position	\$141,570		
Annual Lost Economic Value	\$49,407,930		

Table 1 – Economic Impact of Middle Skills Workforce Gap on Region’s Economy

Assessment of the Finger Lakes Region Advanced Manufacturing Middle Skills Workforce Gap

To better understand the current middle skills advanced manufacturing workforce gap, we compared the local Advanced Manufacturing Sector’s workforce to other local sector workforces to identify a root cause. Table II compares the workforce data from 4 local industry clusters.

Cluster	Jobs	Nearing retirement	Hourly Wage 10 <sup>th</sup> Percentile	Median Hourly Wage	Hourly Wage 90 <sup>th</sup> Percentile	Demand	Trained	Gap	Gap %
Advanced MFG	22,529	25.90%	\$14.35	\$21.27	\$30.06	610	261	349	57.21%
Health Care	44,713	19.00%	\$15.33	\$20.07	\$27.77	1991	1238	753	37.82%
Applied Technology	26,175	17.90%	\$14.93	\$21.88	\$31.65	839	181	658	78.43%
IT	17,723	15.40%	\$19.15	\$30.80	\$47.32	573	146	427	74.52%

Table II – Finger Lakes Region Middle Skills Sector Comparison

Some significant observations:

- There is NO correlation between salary ranges and the workforce gap!
  - IT has the highest salary range but has one of the highest workforce gaps.
  - Adv. Mfg. and Health Care have similar salary ranges.
  - However, Health Care is significantly more successful at meeting the middle skills demands even though demand in Health Care is more than 3 times the demand in Adv. Mfg.

Our conclusion:

- Other factors besides salary and opportunity determine a learner's interest in different career options.
- The team felt strongly that the Manufacturing Sector continues to suffer from a poor image and perception.
  - While lacking specific evidence to support this conclusion, there was a consensus that:
    - The recent history of lost manufacturing jobs both here in The Finger Lakes and in the United States is a significant factor.
    - During the past 50 years, millions of low skilled jobs have been eliminated due to automation and offshoring.
- The future manufacturing sector in the US and in the Finger Lakes Region will no longer be a source of low skilled jobs.
  - Next generation manufacturing positions will require workers with post high school credentials acquired through Career and Technical Education and apprenticeships
- These factors discourage Generation X, Millennials, and Centennials from considering manufacturing as a viable career option.

Based on these conclusions, we identified the centerpiece of our sector strategy should be a marketing and education campaign to engage and educate students, parents and educators that manufacturing in the US and the Finger Lakes region is alive and well. It is essential in the internet age that the community control the message potential workforce receives regarding manufacturing as a career choice. We need to demonstrate that a manufacturing career is a viable pathway to the middle class and a career choice that will allow workers to share in the future prosperity of our region.

We cannot afford to ignore this challenge. Our region can either aggressively embrace the opportunities presented by the Fourth Industrial Revolution or it will pass us by and we will be left reflecting on our past manufacturing glory.

## Recommendations

Implement a multiyear marketing effort to promote Adv. Mfg. careers in the region. The minimum duration of the campaign should be 5 years. This is necessary to make a significant impact on the size of middle skills Adv. Mfg. workforce.

The campaign should target:

1. Career Influencers including:
  - a. Teachers
  - b. Guidance counselors
  - c. Career counselors
  - d. and other “influencers”.
2. Students at the middle school, high school, and their parents
3. Adults

We have established the following goal for the campaign: **“Close the Advanced Manufacturing Middle Skills Gap in the Finger Lake’s Region by December 31, 2023.”**

To achieve this goal, we have identified the following initiatives

### Recommendation 1: Develop Career Pathway Maps

We created marketing collateral in the form of several career pathway maps to serve as aids in guiding prospective students and parents on the career opportunities that exist within each industry cluster. The career pathways are not intended to be comprehensive in the sense that they describe every possible position in a career ladder within a segment. Rather they are intended to show that entry-level, middle skill positions in manufacturing organizations can be treated as a starting point for other positions in multiple departments within a manufacturing organization.

As a first step, we inventoried the region’s Advanced Manufacturing middle level skills education resources, including local CTE programs, certificates, associate degree programs and engineering degree programs. We then mapped the education resources to the position on each of the career pathway maps so that a student, parent or adult could identify what training is available locally to get the credentials they need for each position. In general, the pathway maps promote the concept that with the right combination of talent, education and desire there are multiple paths to an exciting and rewarding career in advanced manufacturing.

Career pathway maps for the following industry clusters are available as separate documents.

- a. Clusters
  - i. Next Generation Manufacturing and Technology
  - ii. Optics, Photonics, and Imaging
  - iii. Agriculture and Food Production

The chosen clusters align with the three industry pillars identified in Finger Lakes Regional Economic Development Council URI plan

## Recommendation 2: Create a Full Time Advanced Manufacturing Navigator Position

Our region already has many dedicated educators, industry leaders, government officials and organizations that support advanced manufacturing workforce development. As a region, we are fortunate to have many of the puzzle pieces in place. However, in most cases these individuals support the sector's workforce development on a part-time basis. Their efforts are diluted because it represents a small part of their broader responsibility. No one person is responsible for achieving the goals we have outlined.

If this initiative is to be successful, we need a dedicated resource focused exclusively on this segment. Success in this position should be defined by measuring on a quarterly basis the progress we have made in engaging the community. The middle level skills gap will NOT be solved in a year or even two years. It will take a long-term focus. The expectations for this position should be tied to the intermediate steps, progress and milestones along this journey.

Initially, this individual's efforts should be measured by examining the trajectory of the workforce development effort, not the actual employment results. The strategic focus of this role is to be an advocate for the manufacturing sector, recruiting support for this effort from key career influencers, and developing and expanding the portfolio of resources to help students and parents make good career choices based on their interests and talents and not the history of the last century.

## Recommendation 3: Deploy eduFACTOR Licenses for all Middle Schools and High Schools in the 9-county area

Achieving the goal of eliminating the middle skills gap will require a significant investment in marketing collateral to promote manufacturing as a career option. We considered this a make or buy decision regarding the content. We considered using either local resources to create it or partnering and outsourcing the content to an organization that has already developed content designed to help communities promote manufacturing careers. We requested Edge Factor prepare a proposal for licensing its educational content to all the middle and high schools in the region. The Edge Factor content is licensed as a subscription service. The consensus was leveraging Edge Factor's experience and content has significant advantages over building it locally.

1. It would be available sooner, reducing the time it would take for the community to begin seeing results.
2. It would be more comprehensive and professional than what could be quickly designed locally.
3. It has been designed using streaming video content targeted at the internet generation.
4. It is story-based content proven to engage middle and high school students and their families.
5. It includes built-in dashboards that would allow usage and acceptance rates to be tracked so we could continue to analyze the level of engagement within the community.
6. Customization of content is available as a future option to consider once we see progress.

## Recommendation 4: Organize a Yearly Manufacturing Design Competition between teams of high school and middle school students

The final recommendation is to create a yearly manufacturing design competition that can be leveraged to galvanize the community around manufacturing as a career. The consensus of our team was that we should partner with Edge Factor to help us manage a Reality Re-Design competition between teams of

middle and high school students throughout the region. Edge Factor would provide project management resources to lead a Finger Lakes Region Reality Re-Design Competition.

As described in their proposal to our team,

“An opportunity for High School & Middle School students to get their creative juices flowing and become a character in the new TV show entitled: “Reality Redesigned”. We want the most creative with the wildest imaginations... but, we also need to know that you can solve a problem and work on a team. Reality Redesigned is a design competition that allows any age student to participate in the audition. Storytelling and innovation, engineering and making all merge in this cross-disciplinary educational competition. “

Supported by local public relations activities we can put a fresh and exciting face on our students’ wrapping their arms around and solving real world problems. These are the type of advanced manufacturing stories that we need to read about in the paper, hear on the radio and see on TV. A requirement for Edge Factor’s support of this competition is that the region commits to a minimum of a two-year license of eduFactor. To be clear, if we want to do the Reality Re-Design competition we must also commit to an eduFACTOR License.

## ROI Analysis

We evaluated the estimated annual costs of our recommendations over a five-year period and compared those costs to the incremental economic value if we met our goal of eliminating the advanced manufacturing middle skills gap by the end of 2023.

### Assumptions

Average Yearly Salary	\$33,000		estimate
Company Revenue versus Payroll	3.3:1		ratio
Economic Value versus Company Revenue	1.3:1		ratio
Lost Economic Value for each unfilled position	\$141,570		

Table IV – Middle Skills Workers Salary and Relationship to Income and economic Value

As shown below we projected that over the next 5 years we would be able to close the current middle skills advanced manufacturing workforce gap of 350 workers annually. Our projection shows it slowly builds until in FY 2022 when we achieve the goal of 350 additional trained workers.

For each year we calculate the total salary of these new workers and their impact on company revenue and regional economic value using the ratios shown in Table IV. We assumed that there is a delay between the time a worker receives their credentials and when they begin to add value. We also assumed a 2.5% salary increase each year for workers who stayed in their positions.

Assuming we fund all the recommendations made in this report through 2023.

- Total Costs of Program                      \$2.348 million
- Number of additional workers              900
- Cost for each additional worker            Less than \$3,000 per worker

### Other metrics

- For every dollar spent                      We create                      \$28                      new payroll
- For every dollar spent                      We create                      \$93                      new revenue for employers
- For every dollar spent                      We create                      \$120                      new economic value

The committee felt that this represented an exceptional return on the community's investment.

		2018	2019	2020	2021	2022	2023		
Additional Graduate	Year 1	50							Initial Impact FY 2019
Additional Graduate	Year 2		100						Initial Impact FY 2020
Additional Graduate	Year 3			150					Initial Impact FY 2021
Additional Graduate	Year 4				250				Initial Impact FY 2022
Additional Graduate	Year 5					350			Initial Impact FY 2023
							350		No Impact until next year
Yearly Payroll			\$ 1,650,000	\$ 4,991,250	\$ 10,066,031	\$ 18,567,682	\$ 30,581,874		
Yearly Revenue			\$ 5,445,000	\$ 16,471,125	\$ 33,217,903	\$ 61,273,351	\$ 100,920,184		
Yearly Economic Impact			\$ 7,078,500	\$ 21,412,463	\$ 43,183,274	\$ 79,655,356	\$ 131,196,240		
Cummulative Economic Impact			\$ 7,078,500	\$ 28,490,963	\$ 71,674,237	\$ 151,329,592	\$ 282,525,832		
Expenses									
Navigator		\$ 100,000	\$ 102,500	\$ 105,063	\$ 107,689	\$ 110,381	\$ 113,141		
eduFacor License		\$ 135,000	\$ 135,000	\$ 135,000	\$ 135,000	\$ 135,000	\$ 135,000		
Reality Redesign		\$ 150,000	\$ 150,000	\$ 150,000	\$ 150,000	\$ 150,000	\$ 150,000		
Yearly Costs		\$ 385,000	\$ 387,500	\$ 390,063	\$ 392,689	\$ 395,381	\$ 398,141		
Cummulative Cost		\$ 385,000	\$ 772,500	\$ 1,162,563	\$ 1,555,252	\$ 1,950,633	\$ 2,348,774		
Number of New Jobs							900		
Cost Per Job							\$ 2,609.75		
Payroll versus cost							28		ratio
Revenue versus Cost							93		ratio
Economic Impact versus cost							120		ratio

Table V – Return on Investment Analysis

## Risks

There are several risks in this program

1. The rate at which we add additional workers is lower than projected
2. The new workers do not stay in their positions as projected
3. Multiple advanced manufacturers close facilities and eliminate positions within the region
4. Additional Costs incurred by educational institution to expand training capacity

The implications with all the first three risks is that we will have less than 350 additional workers in the work force and as a result we create less economic value.

On the other hand, the projection does not account for any new advanced manufacturing opportunities associated with the AIM Photonics program or success in recruiting new tenants for the Eastman Business park. Since talent is still the most significant factor in insuring manufacturing competitiveness, moving forward with the committee’s recommendations is likely to have a positive impact on the AIM Photonics and Eastman Business Park’s success.

Given the potential, we believe these are reasonable risks.

## Costs and Funding Approach

As identified in Table VI, the costs of implementing the recommendations starting in 2017 and continuing through 2023 are estimated at \$2.628 million

	2018	2019	2020	2021	2022	2023
Expenses						
Navigator	\$ 100,000	\$ 102,500	\$ 105,063	\$ 107,689	\$ 110,381	\$ 113,141
eduFactor License	\$ 135,000	\$ 135,000	\$ 135,000	\$ 135,000	\$ 135,000	\$ 135,000
Reality Redesign	\$ 150,000	\$ 150,000	\$ 150,000	\$ 150,000	\$ 150,000	\$ 150,000
Yearly Costs	\$ 385,000	\$ 387,500	\$ 390,063	\$ 392,689	\$ 395,381	\$ 398,141
Cummulative Cost	\$ 385,000	\$ 772,500	\$ 1,162,563	\$ 1,555,252	\$ 1,950,633	\$ 2,348,774

Table VI – Projected Yearly Cost

The costs assume the effort starts in 2017 and would continue at a minimum through 2023.

- The yearly costs for an Advanced Manufacturing Navigator (advocate) is estimated at approximately \$100,000 for the first year with a yearly 2.5 % increase
- The yearly costs of a eduFactor License for all middle and high schools in the 9-county region is projected to cost \$135,000 per year
- The yearly cost of Reality Redesign competition is projected to cost \$150,000 per year

Total yearly cost of implementing the recommendations is slightly less than \$400,000 per year.

While just starting to explore funding, our approach is to target different funding sources for each of the four initiatives.

*The Career Pathway Maps Funding*

Initial version of the maps has been developed using the funds from this initial grant. However, in the future additional funds may be required to convert the current document into HTML files for deployment on web sites. We recommend that organizations that want to host the content on their web site provide their own funding for incorporating the content onto their existing sites. The initial documents have been implemented using hyperlinks to make it relatively easy to host the content on a web site.

*Full Time Advanced Manufacturing Navigator- Funding*

As this will be a regional position we recommend that the three regional workforce boards share the cost of this new position.

*eduFACTOR License Funding*

The eduFACTOR content is licensed intellectual property available from eduFactor on a yearly or multi-year subscription. It is licensed based on the physical facility in which it is hosted. The goal of using this content is to make it available to include or supplement all CTE educational programs throughout the region. We recommend working with the 9-county BOCES administrators to fund the licenses for all the districts.

## Yearly Manufacturing Design Competition based on Edge Factor's Reality Re-Design Funding

The Reality Re-Design student competition is a manufacturing competition that is supported with content and staffing from Edge Factor. We have received a proposal from Edge Factor on the yearly cost of conducting the competition.

We recommend that we recruit local partners to fund this competition. Organizations that provide financial support would be identified as sponsors of the event. We propose approaching local community colleges, local industries, local government and other philanthropic organizations to solidify financial support.

We recommend using the remaining grant funds to begin the recruitment process of obtaining sponsors to support this initiative in 2018.

## Appendix A- Significant Activities

### Recruited Diverse Group of industry champions and business leaders

The following table identifies the stakeholders who participate in the work groups. Additionally, we would like to acknowledge GLOW Workforce Development Board Executive Director Jay Lazarony, Monroe County/Rochester Workforce Development Board Executive Director Peter Pecor, and Finger Lakes Workforce Investment Board Executive Director Karen Springmeier for their support of this project.

Segment	Name	Organization
Educator	Andy Harlan	RIT
Educator	Todd Oldham	MCC
Educator	Robert Lasch	MCC
Educator	Reid Smiley	GCC
Educator	Keith Babuszcak	RCSD
Educator	Jill Slavny	Monroe 2-Orleans BOCES
Educator	Jeanine Galina	Monroe 2-Orleans BOCES
Educator	Sam Samanta	FLCC
Industry	Glenn Pearson	First Inspires
Industry	Tim Palmer	Eastman Business Park
Industry	David Phillips	GW Lisk / FAME
Industry	Tom Battley	Rochester Regional Photonics Cluster
Industry	Mike Mandina	Optimax / RTMA
Industry	Kevin Kelley	RTMA
Industry	Joe Wesley	Wegmans
Government	John Premo	RochesterWorks
Government	Karen Springmeier	Finger Lakes Works
Government	Lee Koslow	RochesterWorks
Consultant	Richard Fox	Self Employed

Table VII Stake Holders

### Scheduled multiple partnership meeting

The committee met multiple times between January 26<sup>th</sup>, 2017 through June 30<sup>th</sup>, 2017 including

- 5 regional Stakeholder meetings
  - Monthly starting in February
- 3 Industry feedback sessions with the RTMA Board
  - April, May and June
- 2 Additional presentations to a sub group of stakeholders by Edge Factor

## Identified and Used Labor Market Workforce Data

Leveraged these sources to help us make data informed decisions

- MCC Labor Market Data Beta Site
  - <http://mcclmi.com/>
- O\*Net On-Line
  - <https://www.onetonline.org/>
- New York State CareerZone
  - <https://www.careerzone.ny.gov>
- MCC Career Coach
  - <http://careercoach.monroecc.edu>

## Identified Three Target Industry Clusters for our focus including

- Next Generation Manufacturing and Technology
- Optics, Photonics, and Imaging
- Agriculture and Food Production

Target Clusters were selected within the Advanced Manufacturing sector based on their long-term strategic economic significance to the 9-county region

## Inventoried Regional Advanced Manufacturing Career Technical Education Resources

Using web sites of BOCES, FLCC, GCC and MCC as well as the engineering schools at Syracuse, Cornell, RIT, U of R, and UB we compiled a comprehensive list of CTE resources, certificate programs, associate degrees and BS degree in engineering that represents required credentials for positions in our pathway maps. Utilizing MCC's career coach we linked these training resources to positions identified in our career pathway maps.

MCC PROGRAMS	FLCC Programs	GCC PROGRAMS	BOCES CTE PROGRAMS
<a href="#">Applied Integrated Technology, AAS</a>	<a href="#">A.A.S. Mechanical Technology</a>	<a href="#">Computerized Drafting and Design</a>	<a href="#">Engineering and Metal Fabrication Academy</a>
<a href="#">Precision Machining, AAS</a>	<a href="#">A.A.S. Instrumentation &amp; Control Technologies</a>	<a href="#">Computerized Drafting and Design</a>	<a href="#">Heating, Ventilation and Air Conditioning (HVAC)</a>
<a href="#">Precision Machining - Optical Fabrication, Certificate</a>	<a href="#">Instrumentation &amp; Control Technologies Certificate</a>	<a href="#">Nanotechnology</a>	
<a href="#">Precision Machining, Certificate</a>	<a href="#">A.S. Engineering Science</a>		
<a href="#">Tooling And Machining, AAS</a>			
<a href="#">Air Conditioning Technology: Heating And Ventilation, AAS</a>			
<a href="#">Electrical Engineering Technology - Electronics, AAS</a>			
<a href="#">Electronics Technology, Certificate</a>			
<a href="#">Mechanical Technology, AAS</a>			
<a href="#">Precision Machining - Optical Fabrication, Certificate</a>			
<a href="#">Optical Systems Technology, AAS</a>			
<a href="#">Optical Systems Technology, Certificate</a>			
<a href="#">Tooling And Machining, AAS</a>			
<a href="#">Construction Electrician, Non-Credit</a>			
<a href="#">Mechanical Technology, AAS</a>			
<a href="#">Computer Aided Design And Drafting, Certificate</a>			

Table VIII – Finger Lakes Adv. Mfg. CTE Educational Resources

RIT	University of Rochester	SUNY Buffalo	Cornell University	Syracuse University
<a href="#">Mechanical Engineering</a>	<a href="#">Mechanical Engineering</a>	<a href="#">Mechanical Engineering</a>	<a href="#">Mechanical Engineering</a>	<a href="#">Mechanical Engineering</a>
<a href="#">Electrical Engineering</a>	<a href="#">Electrical Engineering</a>	<a href="#">Electrical Engineering</a>	<a href="#">Electrical Engineering</a>	<a href="#">Electrical Engineering</a>
<a href="#">Industrial Engineering</a>	<a href="#">Optical Engineering</a>	<a href="#">Industrial Engineering</a>		
<a href="#">Microelectronics Engineering</a>				

Table IX - Finger Lakes Undergraduate Engineering Programs

### Created Career Pathway Maps for Target Clusters

Created detailed career pathway maps for middle level job in each of the targeted industry clusters. The Pathway maps identify available regional educational resources that can help students and adults obtain the middle level skills needs to enter and advance within each of these industry clusters.

Career pathway maps for the targeted industry clusters are available as separate documents.

## Appendix B – Excerpts from Edge Factor Proposal

Edge Factor exists to help bridge the gap between education and businesses. Thousands of companies, businesses and schools have successfully partnered with Edge Factor to leverage our tools in their efforts to reach their communities across North America. In this document, we outline what a partnership could look like in Rochester based on previous successes in other communities.

### Why Partner with Edge Factor?

We are thought leaders...we are passionate manufacturing advocates who travel around North America producing high impact media for TV and education as well as speaking at hundreds of events. We partner with extraordinary manufacturers, educators, students and their revolutionary programs. We have great clarity about a very real gap in communities - the disconnect between manufacturers and educators. Our methods, messaging, and in-house developed tools are used in thousands of communities across North America in order to address the gap and refill the empty employee pipeline. We are excited to explore ways to help Rochester pursue an employment renaissance.

It all starts with a good story. Since the company was founded, Edge Factor built its reputation on the power of storytelling as we look to communicate messages across generations. Edge Factor bridges the gap between the maker and the consumer. Complementing our films, Edge Factor has developed hundreds of related activities specifically designed to engage with students, parents, educators and business leaders.

The Challenge. So, exactly how do we reach students? How can we connect with their parents? How can industry engage with future employees and change their perception and break down old stereotypes? The struggle is real in Rochester because you understand the need for skilled a skilled workforce. The challenging question is this: how do we showcase our industry and region in a light that gets students excited and engaged to live and work in the Rochester community?

1. **eduFACTOR:** A turn key solution, a solid foundation: While every community is unique, the challenges they face are often similar to the ones being faced in other communities. Based off the significant successes in schools across the US and Canada, Edge Factor proposes that we put the power of the eduFACTOR educational platform to work in approximately 200 schools in the Rochester area. eduFACTOR is a Netflix-styled platform, an online library of streaming media and interactive resources that are used to inspire the next generation. Our platform is organized into zones, used by technology teachers, STEM teachers, guidance counselors and marketing teams to easily access the resources that best fit their needs. The following are a breakdown of the current zones inside the eduFACTOR platform.

**Watch Media Zone-** It all starts with a good story. Showing students, the amazing impact that technology and individuals have had is a great way to show the exciting world of manufacturing. With our high-level media productions students can see and feel the thrill of innovation.

**Career Exploration Zone** When we talk about careers in manufacturing we are talking positions from the front reception desk to the back-shipping dock. We have created tools to educate career influencers and provide tools for students to share their excitement about their pathway in manufacturing. With a well-rounded toolkit including short videos talking about real people, how they found their pathway in

manufacturing and what they love about their job, students can start to see themselves in those same pathways.

**Build a Project Zone** When students can see and feel the innovations - it's a game changer. We have turnkey projects including Amsterdam, Solid works and STEP files with quick tutorial videos to bring our stories to life. With both 3D printing project and CNC machining projects - you can wow your students with sprockets, miniature snow sleds and drum pedals, just to name a few.

**Explore Technology Zone** Want to Geek Out with students? We take complex technical terms and in less than 6 minutes have our subject matter experts Geek Out with us to explain the technology for your audience. Examples include: What is G Code? Rapid Prototyping vs. 3D printing? Physics in Welding. A great way to make technology relevant.

**Host an Event Zone** With our turnkey event resources you have a toolkit at your fingertips for events at your facility and while doing outreach in your community. The Interactive Perception Activity is a great way to gauge perceptions before events and looping videos are a great way to dispel myths about manufacturing in general.

**Teach STEM Zone** With our teach STEM moments we want to highlight to students how STEM comes to life in manufacturing. With them 15-minute activities we highlight questions for a conversation starter, provide a dynamic video to highlight the STEM moment, and then questions to close out the conversation. These tools are intended for use in Science, Math and Art classrooms as well as Technology classrooms.

**Take a Field Trip Zone** Can't get your students out into industry? You can take them on virtual field trips to show innovation at work. Visit IMTS, see a company that works in medical and aerospace. Or meet the Team behind the Machine with a STEAM tour of the Haas Factory in Oxnard, CA. CTE Strong. In partnership with ACTEA, Edge Factor has created a package including promotional resources, cinematic media and interactive tools that you can use to help raise awareness for CTE.

These tools equip you with resources to inspire and engage your community, as well as provide metrics to gauge the impact of your outreach. The CTE Strong Kit contains everything you need to promote, inspire, engage and follow-up with audiences.

**Success Factor: Co-op & Career readiness resources** -(Coming September 2017) So... How important is it that they show up? Shouldn't it seem logical that the Vice President position (and pay structure) should be given to a millennial? Track pants and a hoodie? Welcome to the new normal. How do we build the future with students that are not Monday ready....? Edge Factor is building a turnkey package of interactive tools that can be used in High School or as part of training when introducing new employees or co-op students to the workforce. These address key factors in launching a successful summer job, a meaningful co-op and eventually a career.

## 2. Edge Factor presents: Reality Redesigned - Stack the Deck

“An opportunity for High School & Middle School students to get their creative juices flowing and become a character in the new TV show entitled: “Reality Redesigned”. We want the most creative with the wildest imaginations... but, we also need to know that you can solve a problem and work on a team. Reality Redesigned is a design competition that allows any age student to participate in the audition. Storytelling and innovation, engineering and making all merge in this cross disciplinary educational competition. Auditioning your community: Students & Mentors

Would-be competitors will sign up online and build a team with their peers - a classroom, friends, family, mentors. Each team will be assigned a challenge using three decks of digital playing cards. Those cards - a person, a place, and a challenge - will inspire a ‘problem story’ which the team can creatively define through their own interpretation. From there, they design solutions to their problem story. Draw on a napkin. Use a CAD Program to draft a plan. Video an explanation. You will have access to the platform 24/7 to add digital assets to your profile until.... the day of reckoning. Procrastinators beware...

### “Day of Reckoning”

The profiles will now go into lockdown and the Judges get to work reviewing the audition assets and media. As our judges begin to comb through submissions, the public will be able to vote on their favorite projects. Only 3 winning teams will be chosen. The 3 teams will face-off on the finale, held at our host college, where they will take on a real-life challenge. The 84hr Challenge. - Lights Camera Action.

The pressure is on with the camera crew pointing the lens on the teams. They will be given a real-world challenge, a toolbox of resources and ONLY 84 hrs to dream, design, build and get ready to present their ideas. 3D Design and Machining, Welding and 3D Printing will all merge as the ideas flow from the head and hands of the teams as they seek to redesign reality. 84hrs is not a long time and the clock will not be on your side...

### Final Presentation

As the clock runs out, the contestant’s projects will be packed up, and brought into the studio. With a media recap of their journey over the last 84hrs, they’ll pitch their designs to the Judges in front of audience members from the community. Take a deep breath. Get in the limo....it’s time to party...

### Party with the Presidents:

While the Judges are in sequester, the contestant will all take a limo to a party with some of the most influential business leaders in the area...Because sometimes it is not only what you know, but who you know. Tune in to watch who will be crowned the winner of Reality Redesigned.

Time Investment: While Edge Factor will need assistance to ensure we stay on track, the bulk of the work will be done by our team. We will build, train and maintain this initiative. We will ask for introductions to be made, promotion press and some advertising to be done, attendance at update meetings and bums in the seats of the cheerleading bench when we launch.”