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Manufacturing Connect: A New Prototype for Career and Technical Education

Introduction

Manufacturing Renaissance (MR) is an organization committed to a vision of development that is economically, socially, and environmentally sustainable and restorative. We see rebuilding and transforming our manufacturing sector as central to achieving that objective. Success requires an educational infrastructure aligned with the requirements of 21st Century manufacturing. Our work in education is guided by that vision.

The work of Manufacturing Renaissance in Career and Technical Education (CTE) related to manufacturing is recognized for its innovative character and quality. The Century Foundation, a leading national think tank, has described our program as a “national best practice.” Our programmatic work is guided by our policy framework Inclusion and Industry 4.0. Inclusion and Industry 4.0 embraces the investment in and use of advanced technologies but insists that an equivalent investment must be made in inclusion—a commitment to the broad participation of all social groups, particularly communities of color that have suffered from de-industrialization and exclusion. A transformation of our education system particularly in CTE related to manufacturing:

- Expands the pool of talent and creativity needed by our manufacturing sector if we are to be competitive in the global economy;
- Will dramatically expand career paths for all of our youth; and
- Will provide a real alternative to violence and incarceration that too often is a pathway for our inner-city youth.

The Need for a New CTE Prototype

By the 1990s, the traditional vocational education system (VES) was seen as a failure by manufacturers, school systems, parents, students, and educational leaders. The programs were not keeping pace with the shift to new technologies in manufacturing. As a result, VES came to be seen as education for slow learners, students with less ambition and capacity. VES was seen as means to track students of color into menial, dangerous, and dirty jobs. VES focused only on positions in production and wasn't linked to higher level careers such as engineering, product development or business development. Public education became focused on college enrollment as the only pathway to a successful career. As a result, vocational schools and programs related to manufacturing were phased out beginning in the 1970s, and by 2000 only a handful remained in the Chicago area. However, our education system related to manufacturing needs to be challenged and changed, not abandoned. This can only be



accomplished by the creation of a new prototype in education that is effectively connected to advanced manufacturing

In 2001, with the support of a grant from the US Department of Labor, MR was able to do an extensive study on the relationship between the public education system in Chicago and the manufacturing sector.¹ We found a deep disconnect resulting in a failure to meet the changing needs of our manufacturing sector and, therefore, denying public school students great career opportunities in manufacturing. We looked to international best practices for ways in which we could reform our educational system—particularly the experience of Germany and the Basque Country in Spain. This report and the discussions it generated gave rise to the creation of the Chicagoland Manufacturing Renaissance Council (CMRC) through the efforts of the Chicago Federation of Labor, the Illinois Manufacturers Association and Manufacturing Renaissance. The first initiative of the CMRC was to propose a new model for CTE education. to the then CEO of Chicago Public Schools Arne Duncan. We proposed the creation of a new public high school—Austin Polytech—that was to be the context for the creation of a new prototype in CTE/Manufacturing Education—Manufacturing Connect.

What is the prototyping model?

The Prototyping Model is a systems development method in which a prototype (an early approximation of a final system or product) is built, tested, and then reworked as necessary until an acceptable prototype is finally achieved from which the complete system or product can now be developed. This model works best in scenarios where not all of the project requirements are known in detail ahead of time. It is an iterative, trial-and-error process that takes place between the developers and the users.²

*In other words, a **prototype** is an early sample, model, or release of a product built to test a concept or process or to act as a thing to be replicated **or learned from**.*

Manufacturing Connect is a new prototype in CTE that will meet the needs of manufacturers as well as communities and can be taken to scale. A strong prototype is shaped by constant and critical feedback from the potential users of the model. In developing a new model, quality is the foundation for success in scalability and offers the potential of exponential growth. [The advantage of this approach is that it assumes adaptation will always be part of the DNA of the program.](#) MC, when applied to new locations, may have to be altered to fit the local circumstances, but its core mission of using education linked to all aspects of manufacturing as a tool for improving student outcomes and helping communities will remain.

The following are key distinctive features of the MC prototype

- We are guided by a deep commitment to a public education system linked to advanced manufacturing. Advanced manufacturing holds the greatest promise of any sector for re-

¹ *Creating a Manufacturing Career Path System in Cook County*, Manufacturing Renaissance and the Chicago Federation of Labor, 2001.

² <https://searchcio.techtarget.com/definition/Prototyping-Model>



developing communities and building a broad-based middle class. Without a new model of CTE related to manufacturing, it will not be possible to be competitive in the global economy.

- We are committed to demonstrating the power of this model in low income communities of color to demonstrate that manufacturing can be a “tide that lifts all boats” and particularly focusing on communities that were hit the hardest by de-industrialization.
- We are guided by a deep commitment to meet the standards of production and leadership in advanced manufacturing. We expect our students to receive nationally recognized industrial credentials such as those from the National Institute for Metalworking Skills (NIMS). As a result, over 130 manufacturing companies have partnered with the MC program providing financial support, and in-kind contributions including hosting tours, job shadowing, internships, summer jobs, and opportunities for full time employment.
- Our approach is evidenced-based and borrows deeply from the European experience. These systems meet the needs of the advanced manufacturing sector and embody the social values that we share.
- We promote education that offers a full range of careers in manufacturing and is not limited to traditional and exclusive focus on positions in production as is the case with the traditional vocational model. We promote opportunities in production, but also engineering, product development, management, and ownership.
- We have focused on MC in secondary education, but we see the design of MC appropriate for all levels of training and education from pre-school to retirement. We have had experience in elementary education, in adult training, in support services for older youth in manufacturing—the Young Manufacturers Association, in community colleges, and in the firm. Each of these educational levels have the same basic features of the MC model.
- We provide comprehensive wrap-around services to ensure that our graduates not only secure career path jobs but retain those jobs.
- In order to have teachers who are technically, culturally, and pedagogically competent we have partnered with the Chicago Teachers Union Foundation/Quest Center and the National Institute for Metalworking Skills (NIMS) and created the Instructor’s Apprenticeship for Advanced Manufacturing.
- Our model is based on promoting inclusion of people of color and women in manufacturing at all levels of the firm. Without formal policies and investment promoting inclusion, advanced manufacturing will give rise to greater income inequality³ and exclusion. For example, 99% of manufacturing companies are owned by whites—a reality that MC seeks to reverse.

³ World Economic Forum founder, Klaus Schwab, commented on the dangers in advanced manufacturing saying, “...my biggest concern is that the fourth industrial revolution will increase the inequality which we have.”



- We involve the broader community including manufacturers, labor and teacher’s unions, community-development, and community-based organizations, the faith community and the other parts of civil society in developing our prototype. Fundamental reform in education requires the participation and input of all the key players in the design of new models as well as in their implementation. This must be a true public/private partnership.

The Numbers

As a result of MC’s work, as of December 2018:

- 497 youths have completed work experiences in manufacturing;
- 306 industry credentials have been earned by 207 individuals;
- 86 individuals have been placed in 123 manufacturing jobs averaging nearly a year of retention;
- 130 manufacturing companies have partnered with the Manufacturing Connect program;
- 175 students are currently enrolled in MC programs in three high schools; and
- The Young Manufacturers Association has 250 members.

While our numbers are relatively small in light of the needs of the manufacturing sector as well as the scale of investment we and our partners have made, they believe they compare favorably with other efforts to attract young adults from hard-hit inner-city communities to the manufacturing sector. These numbers are far larger than any other CTE program in the state. As a result, Chicago Public Schools is formalizing our relationship and will expand the use of our prototype in other Chicago Public Schools. MC compares very favorably to post-secondary programs in the region. For example, City Colleges of Chicago has been the beneficiary of millions of dollars of investment, and, according to a recent presentation by Penny Pritzker, only has around 200 students enrolled in their manufacturing program.

Our numbers are deeply influenced by our insistence in initiating this program first in communities challenged by deep poverty. By design, we chose to launch our first initiative in one of the most challenged communities in Chicago—the Austin community on Chicago’s West Side. As a result, MC students come from schools that struggle academically and have had very little exposure to the world of manufacturing. In the prototyping phase, the focus must be on the quality and scope of the program and the commitment to engage and respond to the comments of potential customers, critics, and competitors. This is particularly the case in creating a prototype that will be of interest to school districts that share the features of our Chicago program. We expect our numbers to dramatically improve as the Manufacturing Connect program is fully embraced by school district leaders, principals, parents, and teachers and, in addition, is fully funded.

The initial cost of MC is substantial when compared to the costs of a traditional CTE program, but the return on investment is far greater and easily justifies the initial investment. This investment in MC is strategic as it permits our country to successfully compete in the global economy in the sector that has a



huge benefit for society in its wage levels, in its ripple effect in creating other jobs in the economy, and in the social capital it creates. Most important is that a prototype can set the stage for policy and legislation at the city, state, and federal level that allows society as a whole to bear the full costs of a critically important education system deeply linked to the manufacturing sector. In reality, the MC program is extremely cost effective in light of the costs associated with violence, incarceration, and the shredding of the family structure and the social safety net. As they say, “a good job is the best way to stop a bullet.” Moreover, the level of investment in the development of a new prototype in education or any other sector is a process that requires constant feedback and adjustment. Therefore, as the prototype is more widely employed, economies of scale will cause the per pupil cost dramatically to decrease.

Additionally, a high level of investment by the public sector creates the opportunities for in-kind and financial investment in public education by the private sector. For example, one hundred and twenty nine companies have partnered with Manufacturing Connect and made substantial financial and in kind investments because of the confidence they have in this new CTE model to generate the talent they need to be competitive.

Successfully introducing a new prototype into an established education system has its challenges

Resistance to the high standards of production in advanced manufacturing: Traditional VES/CTE programs simply were credits toward part of securing a high school diploma. As we learned from our study of programs in Europe in 2001, international best practices are anchored in national skill standards and certifications. We were relatively unique outside of a trade association like Technology & Manufacturing Association and the Manufacturing Institute in insisting on nationally recognized skill standards like the National Institute for Metalworking Skills as a standard in the public education system. We faced early resistance by Chicago Public Schools and City Colleges of Chicago to adopt this standard as the norm. They initially argued that high school diplomas and associate degrees from their schools were sufficient evidence of competence. Our program has been more successful than any other in the State in preparing students to secure industrial credentials. Manufacturing Connect participants have earned over 300 credentials from NIMS—the highest standard in manufacturing and our machining program at the Austin Campus is accredited by NIMS—one of only a handful in the state. Most important is the fact that Chicago Public Schools and City Colleges of Chicago have adopted national skill standards like NIMS as the standard for their performance.

Community Skepticism and Resistance: Many leaders in the Austin community initially opposed or were skeptical about the mission of what is now the MC program. They didn’t see a future in manufacturing that was relevant to Austin residents. The experience of Black people in manufacturing was that they were to be relegated to the lowest paid, dirtiest, and most dangerous jobs in manufacturing. We persisted, and now scores of young adults and adults have secured family-supporting jobs in manufacturing. Manufacturing companies, foundations, and government have invested over \$5 million in public education related to manufacturing on Chicago’s West Side. Austin Coming Together is a strong partner of MC. The Safer Foundation is the largest service provider for people with convictions in the country. MR introduced them to the potential in manufacturing for their returning citizen clients through a joint pilot project that was funded by the Chicago Community Trust in 2013 and was very



successful⁴. Since then, over 200 Safer clients have secured jobs in manufacturing and have a recidivism rate of 12% or below. Victor Dickson, CEO of Safer has joined MR's Board of Directors. Elected officials from the West and South sides of Chicago have aggressively promoted the MC prototype in the state legislature. And local ministers have formed "Ministers for Manufacturing" as an advocacy group for programs like Manufacturing Connect. Ministers for Manufacturing now has 20 active members and over 50 supporters. We need to recognize the importance of this kind of education in our most challenged inner-city communities that, ironically, provided a significant percentage of the labor that made the American industrial economy the strongest in the world in the 20th Century. A failure to provide education linked to 21st century manufacturing guarantees that these communities will not participate in the growth of the manufacturing sector and represents a policy of 21st century segregation. Our prototype has created the opportunities to secure the skilled positions in companies--winning support for MC one job at a time.

Institutional Resistance: Any new prototype—by definition—starts at the periphery of an institution or market and has to gain enough strength to survive the resistance that pushes back against significant change from those who benefit from the status quo. Many of those seeking changes in public education have turned to the charter option because of the resistance they faced in promoting needed reforms in a school district. When we proposed the launch of Austin Polytech, we were asked by CPS and the City to develop the program as a charter school. We rejected the charter route for two reasons. In 2005, charter schools were seen as non-union. Excluding one of our key partners wasn't an option for us. But an equally important if not a bigger issue was our commitment to scale. If we were to meet the talent needs of the manufacturing sector, we needed a prototype that could lead to thousands of qualified students to fill the thousands of jobs that were going unfilled. We needed the same scale that was enjoyed by the traditional vocational education model of the past. We needed to transform the public education system—not step around it—in order to achieve scale.

This decision to commit to public school education resulted in multiple difficulties. The problem with operating within the public school system was that we had no legal or management authority over principals and teachers. As we quickly found out, there were deep reservations in the teaching community about manufacturing. Progressive teachers were often our greatest critics—creating difficulties for us as we sought to recruit and generate enthusiasm among students. These teachers feared we were trying to replicate the old vocational education system that was often used to track students of color into menial, dirty, and dangerous jobs in manufacturing. They were suspicious of our partnerships with companies or "corporate America" rather than seeing the enormous opportunities for private sector partnerships present in the "skills gap." These teachers had very little understanding of the opportunities in modern manufacturing. They were skeptical of our claims that through our programs, students could get great jobs, be introduced to careers in engineering, and possibly become an owner of a manufacturing company in the future. Very few guidance counselors today will suggest a student pursue a manufacturing career. We weren't teachers, so some teachers resented the intervention of non-teachers in terrain that was normally theirs and theirs alone. As we began to succeed and generate publicity, we were resented by some of those who felt they should be receiving

⁴ "Update on the Return Advantage Program," Manufacturing Renaissance, Dan Swinney, March 25, 2014.



credit and saw themselves in a zero-sum conflict with us rather than recognizing that through joint work and cooperation, we could expand the resources for everyone.

We patiently persisted in face of this resistance in reaching out to educators, in delivering on our promises to secure career jobs, in leveraging additional private and public resources for the public school where we worked, establishing a dual enrollment program permitting our students to earn college credits while in high school, and by maintaining a positive approach in winning over teachers and other educators. We remained true to our design—to contribute to public education rather than undermine it. We now enjoy the generous financial support and active partnership with the Chicago Teachers Union, have created the Instructor’s Apprenticeship for Advanced Manufacturing in partnership with the Chicago Teachers Union Foundation, and the start of an active and very important partnership with Chicago Public Schools and the City Colleges of Chicago.

Next Steps:

With the main elements of a new prototype in CTE related to manufacturing in place, we are now taking the preliminary steps in taking MC to a larger scale.

- **Continued Refinement:** We will continue to refine our design in discussions and exchange with others in the field including our colleagues in Chicago Public Schools and in the school districts in the region; with the Technology & Manufacturing Association; with national partners affiliated with the High Wage America coalition; and with the Basque Country Vocational Education Ministry.
- With the support of the MacArthur Foundation and in partnership with the American Institutes for Research, we are developing a business plan for replicating the MC approach in other school systems in the region and elsewhere. In this plan, we will address the issues of data collection and evaluation, marketing, and pricing.
- We will explore partnerships with other schools and other school districts in the Chicago region. In Chicago, we are now operating the MC program in the Austin College and Career Academy, the Prosser Career Academy; and Bowen High School.
- We will seek legislative support for schools that adopt the MC program in the state of Illinois. We inspired the passage of House Bill 5062 in the Illinois State Legislature by a bi-partisan vote of 79 to 31. This bill seeks to expand the MC program in 12 Illinois high schools and provide \$36 million in support. We expect this bill to pass the Senate in the spring of 2020.
- We will work with The Century Foundation, the Urban Manufacturing Alliance, and others to advance the national industrial policy discussion to include the support for the expansion of the MC approach; as well as identify opportunities to develop the MC approach in rural communities.

Conclusion



For decades, there has been the need for a model of CTE education to fill the void created by the collapse of the vocational education system in our country. MR has focused on filling this void and in creating a prototype for education that meets the requirements of 21st century manufacturing and of communities aspiring to be healthy and sustainable.

Patently developing a prototype in a way that gained customer support took longer than we expected but has now created the potential of going to scale. Qualitative growth has created the foundation for quantitative growth. We are confident that our MC prototype is gaining the position and reputation needed for the embrace of other school districts in the region, the state, and around the country.