

## Strategic Targeting of Occupations for Near-Term Action

The Workforce Boards of Metropolitan Chicago determined that a shorter, more targeted list of occupations is preferable over the longer list generated through the analysis of the preceding chapters. Their decision to narrow the list was based on two criteria. First, there is a need to focus on occupations for which the workforce system has experience addressing. In the case of manufacturing, this means occupations that are directly related to production, such as shop floor positions, maintenance, production planning and production management. Second, they desire to focus on occupations that will help the greater Chicago economy gain an advantage in the economic recovery of 2004 - 2006. Here, it is expected, in the wake of the economic downturn of 2000 - 2003, the U.S. economy is now facing a business cycle upturn. Traditionally, it is at this time in the business cycle that greater Chicago and similar Mid-west manufacturing economies strengthen and position themselves for healthy economic progress throughout the ensuing business cycle. In particular, for the greater Chicago economy to be boosted by its advanced manufacturing sector over the next couple of years, much attention needs to be paid to its direct production activities due to the following facts:

1. Manufacturing employment has been in steady decline in the United States for over two decades, greater Chicago and similar Mid-west economies reflect if not magnify, this national trend. While at the same time employment has dropped, productivity has increased quite remarkably. Consequently, manufacturing pay in compensation for higher productivity has generally been quite attractive. While manufacturing doesn't offer substantial new job creation, it is extremely important for sustaining existing good jobs. These jobs are not only in direct production, but in services related to direct production, such as research and development, administration, sales, after-market repair and maintenance, etc.
2. Repeatedly in the CSSI focus groups, employers and employees expressed concern about outsourcing and offshoring. The transition and challenges facing manufacturing is such that in many cases, employers are not confident to specify the kinds of jobs or workers they need even a few years out. This makes for a sector in transition for a number of years to come. Low cost manufacturing will probably continue to be lost from Chicago, while advanced manufacturing requiring higher skills, technology and agility will likely prosper, especially if metro Chicago possesses the appropriate talent pool. Chicago shows promise to be a center of excellence in some exciting new fields of manufacturing, such as nanomanufacturing. Consequently, it is hard to talk about "one industry" in this time of change. While some segments are in decline, others look particularly strong. Boosting these centers of excellence with well-prepared workers becomes very important to the future economic prosperity of the region.
3. There is broad consensus that productivity improvements will continue. Consequently, incumbent workers in manufacturing will be expected to constantly increase performance. This performance is a function of work organization, available technology / equipment, and worker skill. Many interviewees in the focus groups pointed to the increasing demands placed on manufacturing workers for output. That being the case, advanced skills will be constantly required as increased technology and work organization adds potential for productivity improvement, but only if workers have the skills to take advantage thereof.
4. New entrants to the workforce will fill available positions primarily as a result of replacement. These new workers are required to have higher levels of preparation than in the past and there is much talk about entry-level certifications to improve the quality of the manufacturing labor force in general. Again, strategically, the next few years appear to be crucial in terms of preparing those who desire to enter manufacturing with the best skills, work ethic and outlook.

For all these reasons, it makes sense for the workforce system in metro Chicago to focus on production and production-related occupations, especially over the next couple of years. This is not to say that this should be the only long-term target, but rather a way of helping boost the industry at a time of significant stress and opportunity. Within a year or two, further examination of the economic health of manufacturing might lead to the targeting of additional occupations, possibly with different solutions. Consequently, the search for solutions in the solutions report to follow should focus on flexibility to address immediate industry repositioning, while at the same time recognizing that some longer-term solutions deserve planning attention now.

To narrow down the base list of critical occupations generated earlier in this report, first all non-production occupations were eliminated. Even arriving at a short list of targeted occupations from the base list of production and production-related occupations is not easy. The manufacturing sector, as defined in this project, is by no means monolithic. Rather, it is a set of interacting and interdependent industries with different histories, cultures, organizational structures, growth paths, and prospects. Two approaches were therefore applied to narrow the focus of this effort: the *organization function* approach and the *occupational title* approach.

In the functional approach, the base list of 60 production and production-related occupations are clustered at the 3-digit SOC level (Figure 14). Broad critical skill shortage “functions” can be observed: production management, shop floor production, first–line supervision, technicians, engineers/scientists and maintenance / repair. Future solutions planning could focus on these “critical functions” by finding ways they play out in different manufacturing industries in different parts of the region.

Figure 14. - Manufacturing Critical Occupations by 3 digit SOC Grouping  
(*Bold occupations are major occupation groups, non-bold are sub groups*)

SOC	Occupation
<b>111021</b>	<b>General and Operations Managers</b>
<b>113051</b>	<b>Industrial Production Managers</b>
<b>Engineers</b>	
172041	Chemical Engineers
172071	Electrical Engineers
172111	Health and Safety Engineers, Except Mining Safety Engineers and Inspectors
172112	Industrial Engineers
172141	Mechanical Engineers
<b>Drawing, Engineering, &amp; Mapping Technicians</b>	
173023	Electrical and Electronic Engineering Technicians
173026	Industrial Engineering Technicians
<b>192031</b>	<b>Chemists</b>
<b>Life, Physical, &amp; Social Science Technicians</b>	
194011	Agricultural and Food Science Technicians
194031	Chemical Technicians
<b>271024</b>	<b>Graphic Designers</b>
<b>Other Installation, Maintenance, &amp; Repair</b>	
499021	Heating, Air Conditioning, and Refrigeration Mechanics and Installers
499041	Industrial Machinery Mechanics

SOC	Occupation
499042	Maintenance and Repair Workers, General
499043	Maintenance Workers, Machinery
<b>Assemblers &amp; Fabricators</b>	
512022	Electrical and Electronic Equipment Assemblers
512090	Miscellaneous Assemblers & Fabricators
512091	Fiberglass Laminators and Fabricators
512092	Team Assemblers
<b>Food Processing Workers</b>	
513011	Bakers
513023	Slaughter and Meat Packers
513090	Miscellaneous Food Processing Workers
513092	Food Batchmakers
513093	Food Cooking Machine Operators and Tenders
<b>Metals Workers &amp; Plastic Workers</b>	
514011	Computer-Controlled Machine Tool Operators, Metal and Plastic
514020	Forming Machine Setters, Operators, & Tenders, Metal & Plastic
514021	Extruding and Drawing Machine Setters, Operators, and Tenders, Metal and Plastic
514023	Rolling Machine Setters, Operators, and Tenders, Metal and Plastic
514031	Cutting, Punching, and Press Machine Setters, Operators, and Tenders, Metal and Plastic
514033	Grinding, Lapping, Polishing, and Buffing Machine Tool Setters, Operators, and Tenders, Metal and Plastic
514034	Lathe and Turning Machine Tool Setters, Operators, and Tenders, Metal and Plastic
514041	Machinists
514051	Metal-Refining Furnace Operators and Tenders
514072	Molding, Coremaking, and Casting Machine Setters, Operators, and Tenders, Metal and Plastic
514081	Multiple Machine Tool Setters, Operators, and Tenders, Metal and Plastic
514111	Tool and Die Makers
514121	Welders, Cutters, Solderers, and Brazers
514193	Plating and Coating Machine Setters, Operators, and Tenders, Metal and Plastic
514199	Metal Workers and Plastic Workers, All Other
<b>Printing Workers</b>	
515011	Bindery Workers
515012	Bookbinders
515021	Job Printers
515022	Prepress Technicians and Workers
515023	Printing Machine Operators
<b>Textile, Apparel, &amp; Furnishings Workers</b>	

SOC	Occupation
516031	Sewing Machine Operators
516091	Extruding, Forming, Pressing and Compacting Machine Setters, Operators, and Tenders
<b>517011</b>	<b>Cabinetmakers and Bench Carpenters</b>
<b>Other Production Occupations</b>	
519023	Mixing and Blending Machine Setters, Operators, and Tenders
519032	Cutting and Slicing Machine Setters, Operators, and Tenders
519061	Inspectors, Testers, Sorters, Samplers, and Weighers
519111	Packaging and Filling Machine Operators and Tenders
519121	Coating, Painting, and Spraying Machine Setters, Operators, and Tenders
519190	Miscellaneous Production Workers
519191	Cementing and Gluing Machine Operators and Tenders
519195	Molders, Shapers, and Casters, Except Metal and Plastic
519196	Paper Goods Machine Setters, Operators, and Tenders
519198	Helpers – Production Workers
519199	Production, Planning and Expediting Clerks
<b>537064</b>	<b>Packers and Packers, Hand</b>
<b>First Line Supervisors</b>	
491011	First-Line Supervisors/Managers of Mechanics, Installers, and Repairers
511011	First-Line Supervisors/Managers of Production and Operating Workers
531021	First-Line Supervisors/Managers of Helpers, Laborers, and Material Movers, Hand

In the occupational title approach, the following steps were taken:

1. The production and production-related occupations were ranked by order of projected short-term (two year) and long-term (six year) job openings (replacement and growth openings combined).
2. The Manufacturing Sector Council was surveyed to provide industry validation of the highly ranked occupations according to openings, opportunity, and the potential for enhancing regional competitiveness.
3. The criteria for the cut-off between Tier 1 and Tier 2 were:
  - No more than 25% of the whole list should be included in Tier 1.
  - Tier 1 occupations should be generic to a broad base of manufacturing industries and have broad area-wide impact.

Figure 15 shows the composite results of the steps outlined above. These lists, particularly Tiers 1 and 2, will guide the focus of the Root Causes and Regional Solutions reports to follow.

Figure 15. - Tiers 1, 2, and 3: Targeted Manufacturing Critical Occupations

SOC	Occupation	Top Occupation Identified by Industry	Short Term Regional Projected Openings <sup>1</sup>	Long-Term Regional Projected Openings <sup>2</sup>	Tier Selection
519199	Production, Planning and Expediting Clerks		6386	19158	1
111021	General and Operations Managers	X	4844	14532	1
537064	Packers and Packagers, Hand		2666	7998	1
519198	Helpers – Production Workers		1988	5964	1
511011	First-Line Supervisors/Managers of Production and Operating Workers	X	1328	3984	1
499042	Maintenance and Repair Workers, General	X	1304	3912	1
512092	Team Assemblers		1296	3888	1
514121	Welders, Cutters, Solderers, and Brazers	X	1220	3660	1
519111	Packaging and Filling Machine Operators and Tenders	X	1124	3372	1
491011	First-Line Supervisors/Managers of Mechanics, Installers, and Repairers	X	792	2376	1
519061	Inspectors, Testers, Sorters, Samplers, and Weighers	X	756	2268	1
514041	Machinists	X	742	2226	1
512022	Electrical and Electronic Equipment Assemblers		606	1818	1
514011	Computer-Controlled Machine Tool Operators, Metal and Plastic	X	588	1764	1
173023	Electrical and Electronic Engineering Technicians		580	1740	1

<sup>1</sup> Captures growth and replacement openings. This figure was arrived at by taking the average annual total job openings and multiplying by two, for a projection of the total openings generated in two years, or through 2006.

<sup>2</sup> Captures growth and replacement openings. This figure was arrived at by taking the average annual total job openings and multiplying by six, for a projection of the total openings generated in six years, or through 2010.

SOC	Occupation	Top Occupation Identified by Industry	Short Term Regional Projected Openings <sup>1</sup>	Long-Term Regional Projected Openings <sup>2</sup>	Tier Selection
172141	Mechanical Engineers	X	580	1740	2
514031	Cutting, Punching, and Press Machine Setters, Operators, and Tenders, Metal and Plastic	X	500	1500	2
514199	Metal Workers and Plastic Workers, All Other		482	1446	2
499041	Industrial Machinery Mechanics	X	440	1320	2
271024	Graphic Designers		428	1284	2
515023	Printing Machine Operators		400	1200	2
192031	Chemists		338	1014	2
514111	Tool and Die Makers	X	312	936	2
514034	Lathe and Turning Machine Tool Setters, Operators, and Tenders, Metal and Plastic	X	302	906	2
513011	Bakers	X	300	900	2
515011	Bindery Workers		300	900	2
519023	Mixing and Blending Machine Setters, Operators, and Tenders	X	294	882	2
514072	Molding, Coremaking, and Casting Machine Setters, Operators, and Tenders, Metal and Plastic		292	876	2
531021	First-Line Supervisors/Managers of Helpers, Laborers, and Material Movers, Hand	X	288	864	2
514023	Rolling Machine Setters, Operators, and Tenders, Metal and Plastic	X	280	840	2
113051	Industrial Production Managers	X	244	732	3
519121	Coating, Painting, and Spraying Machine Setters, Operators, and Tenders		230	690	3
515022	Prepress Technicians and Workers		222	666	3
519196	Paper Goods Machine Setters, Operators, and Tenders		214	642	3
194031	Chemical Technicians		192	576	3

SOC	Occupation	Top Occupation Identified by Industry	Short Term Regional Projected Openings <sup>1</sup>	Long-Term Regional Projected Openings <sup>2</sup>	Tier Selection
499043	Maintenance Workers, Machinery	X	190	570	3
514033	Grinding, Lapping, Polishing, and Buffing Machine Tool Setters, Operators, and Tenders, Metal and Plastic		180	540	3
172071	Electrical Engineers		174	522	3
499021	Heating, Air Conditioning, and Refrigeration Mechanics and Installers		168	504	3
517011	Cabinetmakers and Bench Carpenters		168	504	3
514021	Extruding and Drawing Machine Setters, Operators, and Tenders, Metal and Plastic		162	486	3
513092	Food Batchmakers	X	158	474	3
172112	Industrial Engineers		158	474	3
514193	Plating and Coating Machine Setters, Operators, and Tenders, Metal and Plastic	X	154	462	3
514081	Multiple Machine Tool Setters, Operators, and Tenders, Metal and Plastic	X	148	444	3
173026	Industrial Engineering Technicians		120	360	3
515021	Job Printers		100	300	3
516031	Sewing Machine Operators		94	282	3
519195	Molders, Shapers, and Casters, Except Metal and Plastic		74	222	3
512091	Fiberglass Laminators and Fabricators		72	216	3
519032	Cutting and Slicing Machine Setters, Operators, and Tenders		68	204	3
172041	Chemical Engineers		60	180	3
514051	Metal-Refining Furnace Operators and Tenders		48	144	3
395094	Slaughter and Meat Packers		42	126	3
513093	Food Cooking Machine Operators and Tenders	X	36	108	3

<b>SOC</b>	<b>Occupation</b>	<b>Top Occupation Identified by Industry</b>	<b>Short Term Regional Projected Openings<sup>1</sup></b>	<b>Long-Term Regional Projected Openings<sup>2</sup></b>	<b>Tier Selection</b>
172111	Health and Safety Engineers, Except Mining Safety Engineers and Inspectors		36	108	3
194011	Agricultural and Food Science Technicians	X	34	102	3
519191	Cementing and Gluing Machine Operators and Tenders		30	90	3
516091	Extruding, Forming, Pressing and Compacting Machine Setters, Operators, and Tenders		12	36	3
515012	Bookbinders		8	24	3

## Conclusion

The Workforce Boards selected the manufacturing sector, and more specifically the industry groups shown below, as one of the three shortage sectors in which to focus planning efforts because:

- Recent slippage in competitiveness of the manufacturing sector region-wide signals a need for immediate response to retain current employers and bolster competitive advantage
- Vulnerability exists in the manufacturing sector due to competition in areas of labor availability, skill and cost
- Current dynamism is occurring within some manufacturing industries: those building off existing strengths and those taking advantage of new technologies and emerging market opportunities, especially in small to mid-size businesses.
- Shift in demand is occurring toward workers who are multi-skilled, good critical thinkers, and are prepared with some post-secondary schooling /credentialing

Final Industry Group Selections
<b>Durable Goods</b>
Primary Metals Products
Fabricated Metals Products
Industrial Machinery and Equipment
Electrical Equipment
Electronics Equipment
Medical Equipment and Supplies
<b>Non-durable Goods</b>
Food and Kindred Products
Confectionary Products & Bakeries
Printing, Publishing and Allied Products
Chemical & Allied Products
Petroleum Refining and Related Products
Rubber and Miscellaneous Plastics Products

A two-pronged approach was used to identify a base list of critical shortage occupations within the manufacturing sector. First, IDES conducted an employer survey of the selected manufacturing industry groups. Second, the Workforce Boards contracted with Hudson Institute to apply its JOWE® database to manufacturing occupations in the region. Both approaches were compared and contrasted with validation and feedback from industry representatives and local stakeholders. From this base list the Workforce Boards of Metropolitan Chicago chose to move forward with occupations directly related to production. This led to a second phase of diagnosis and targeting: What critical occupations should be targeted within the base list of production occupations?

Stakeholder representation in the selection of critical occupations took two forms. First, on behalf of the Workforce Boards, the Corporation for a Skilled Workforce held a series of focus groups and individual employer interviews on manufacturing workforce issues. Topics for the focus groups included the identification of critical occupations. Second, members of the Manufacturing, Leadership and Regional councils reviewed the combined lists and offered additional feedback.

The list of critical production occupations is presented at three levels: Tier 1, Tier 2 and Tier 3. Of the total list of 60 production occupations, 15 were selected for Tier 1, 14 for Tier 2 and 31 for Tier 3. Tier 1 and 2 were selected primarily on their contribution to job growth in the region as a whole and their multi-industry impact. Because they were part of the base list, they also offered promise of good wages, long term career outlook, and opportunities for advancement in sector companies.

While the focus of the Workforce Boards of Metropolitan Chicago will be on Tiers 1 and 2, Tier 3 occupations are included because they may be “bridging” jobs to Tiers 1 or 2, or because of specialization or other factors, they may cause supply bottlenecks and/or short term skill gaps.

The next step in the CSSI project is to determine the root causes for shortages in these critical occupations, then to craft regional solutions.

Tier 1	
519199	Production, Planning and Expediting Clerks
111021	General and Operations Managers
537064	Packers and Packagers, Hand
519198	Helpers – Production Workers
511011	First-Line Supervisors/Managers of Production and Operating Workers
499042	Maintenance and Repair Workers, General
512092	Team Assemblers
514121	Welders, Cutters, Solderers, and Brazers
519111	Packaging and Filling Machine Operators and Tenders
491011	First-Line Supervisors/Managers of Mechanics, Installers, and Repairers
519061	Inspectors, Testers, Sorters, Samplers, and Weighers
514041	Machinists
512022	Electrical and Electronic Equipment Assemblers
514011	Computer-Controlled Machine Tool Operators, Metal and Plastic
173023	Electrical and Electronic Engineering Technicians

Tier 2	
172141	Mechanical Engineers
514031	Cutting, Punching, and Press Machine Setters, Operators, and Tenders, Metal and Plastic
514199	Metal Workers and Plastic Workers, All Other
499041	Industrial Machinery Mechanics
271024	Graphic Designers
515023	Printing Machine Operators
192031	Chemists
514111	Tool and Die Makers
514034	Lathe and Turning Machine Tool Setters, Operators, and Tenders, Metal and Plastic
513011	Bakers
515011	Bindery Workers
519023	Mixing and Blending Machine Setters, Operators, and Tenders
514072	Molding, Coremaking, and Casting Machine Setters, Operators, and Tenders, Metal and Plastic
531021	First-Line Supervisors/Managers of Helpers, Laborers, and Material Movers, Hand
514023	Rolling Machine Setters, Operators, and Tenders, Metal and Plastic

Tier 3	
113051	Industrial Production Managers
519121	Coating, Painting, and Spraying Machine Setters, Operators, and Tenders
515022	Prepress Technicians and Workers
519196	Paper Goods Machine Setters, Operators, and Tenders
194031	Chemical Technicians
499043	Maintenance Workers, Machinery
514033	Grinding, Lapping, Polishing, and Buffing Machine Tool Setters, Operators, and Tenders, Metal and Plastic
172071	Electrical Engineers
499021	Heating, Air Conditioning, and Refrigeration Mechanics and Installers
517011	Cabinetmakers and Bench Carpenters
514021	Extruding and Drawing Machine Setters, Operators, and Tenders, Metal and Plastic
513092	Food Batchmakers
172112	Industrial Engineers

Tier 3	
514193	Plating and Coating Machine Setters, Operators, and Tenders, Metal and Plastic
514081	Multiple Machine Tool Setters, Operators, and Tenders, Metal and Plastic
173026	Industrial Engineering Technicians
515021	Job Printers
516031	Sewing Machine Operators
519195	Molders, Shapers, and Casters, Except Metal and Plastic
512091	Fiberglass Laminators and Fabricators
519032	Cutting and Slicing Machine Setters, Operators, and Tenders
172041	Chemical Engineers
514051	Metal-Refining Furnace Operators and Tenders
395094	Slaughter and Meat Packers
513093	Food Cooking Machine Operators and Tenders
172111	Health and Safety Engineers, Except Mining Safety Engineers and Inspectors
194011	Agricultural and Food Science Technicians
519191	Cementing and Gluing Machine Operators and Tenders
516091	Extruding, Forming, Pressing and Compacting Machine Setters, Operators, and Tenders
515012	Bookbinders