

2009

# Using secondary data sources to identify industrial synergies among Precision Manufacturing firms in the Pioneer Valley

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Renski, Henry C., "Using secondary data sources to identify industrial synergies among Precision Manufacturing firms in the Pioneer Valley" (2009). *Center for Economic Development Technical Reports*. 188.

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# **Using secondary data sources to identify industrial synergies among Precision Manufacturing firms in the Pioneer Valley**

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Prepared on behalf of the  
Western Massachusetts Economic Development Council

## **Introduction**

The purpose of this memo is to report the findings from an exploratory analysis of trade and occupational relationships among businesses in the Pioneer Valley's Precision Manufacturing sector. The motivation for this work is the interest among economic development professionals in developing an information system that can identify local companies with common interest and needs by examining underlying commonalities in their workforce skills, technological foundations, markets and other types of complimentary attributes. These commonalities may then serve as a common platform upon which to build future inter-firm partnerships. One possible application for this information system is to design more effectively targeted business networking events. Another possible application is to produce lists of businesses that might benefit from participation in targeted support initiatives: such as new workforce training opportunities, technical assistance programs, or upcoming grant opportunities.

Most data source group similar companies based upon their primary product or service. However, many new market opportunities and innovations arise from the cross-fertilization of ideas among firms that may make different things, yet share other common characteristics. Research into inter-firm collaborations, networks, and cluster-based economic development emphasize common production technologies, trade (buyer-supplier) associations, and workforce skills as likely sources of complementary activities. Furthermore, local companies that offer similar products or services often belong to the same trade association and may already be aware of one another, reducing the need for an information system to help bring these companies together. Similarities among firms in different industries are often not as immediately apparent.

Armed with a database that matches firms based upon key characteristics, economic developers can more effectively fulfill their role as information brokers and network facilitators – improving the likelihood of bringing the right people together at the right time. Collecting this kind of information through surveys and interviews can be extremely time consuming, costly, and may be viewed as overly obtrusive by some businesses. There are publicly available data sources that, while imperfect, may reduce the burden of compiling this information. In April of 2009, Dr. Renski volunteered to conduct a preliminary analysis to assess whether publicly available datasets could be

used identify potential opportunities for fruitful collaborations among businesses. This memo reports the findings from my investigation.

### **National Data Sources**

I examined two publicly available data sources on inter-industry associations at the national level: (1) the Benchmark Input-Output Accounts of the U.S. Bureau of Economic Analysis and (2) the Industry by Occupation National Staffing Patterns Matrix of the U.S. Bureau of Labor Statistics. A more detail description of these data sources and their collection is available through the respective websites of each agency. Here, I will only provide a brief overview of each.

The Benchmark Input-Output (IO) Accounts are based on information collected through the U.S. Census Bureau's Economic Census, conducted every five years (e.g. 1997, 2002, 2007, etc.) The most recent year for which IO data is available is from the 2002 Economic Census. The IO accounts measure the volume of sales and purchases made by each industry for a detailed list of products and services. The information on products and services can then be associated with industries to measure the volume and/or percentage of sales from one industry to all other industries - commonly referred to as an industry transactions matrix. Most of the data in the IO accounts are reported at the four-, five- and six-digit NAICS-based industry codes.

The second major data source is the Industry by Occupation National Staffing Patterns Matrix of the U.S. Bureau of Labor Statistics. The Staffing Patterns Matrix is updated each year through data collected from its Occupational Employment Survey (OES).<sup>1</sup> The Staffing Patterns Matrix reports the number of workers employed and their annual/hourly earnings for each of roughly 800 occupational categories for each NAICS industry. Most industries are defined to the four- and five-digit level of specificity. From this data I calculate the shares of each occupation's in each industry to represent the relative importance of that occupation to each industry.<sup>2</sup>

### **Region & State Specific Data Sources**

The drawback of using national databases is that they only report inter-industry trade and staffing patterns for the nation as a whole. As national averages, the behavior of firms or industries in any particular region may differ greatly from these patterns. Therefore, the analysts must carefully scrutinize and verify the results from this analysis to ensure that the results coincide with region-specific conditions.

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<sup>1</sup> The OES uses a rolling sampling method where 1/3rd of the total sample is resurveyed every year.

<sup>2</sup> Hypothetically, one could develop other measures of the relative importance of each occupation to a specific industry, such as a weighted share of wages, or how concentrated the occupations is to each industry (i.e. do many industries have workers in this occupation, or is it specific to a relative few). Future analysis would explore these alternate measures.

One alternative is to develop estimates based upon more region-specific data sources. However, such data is rare and often do not report data for industries and occupations if doing so reveals confidential information about a small number of employers or workers. I explore two additional sources in this paper: regionalized IO tables that I derived from data provided as part of the IMPLAN economic impact modeling software, and a state-level Industry by Occupation staffing patterns matrix produced by the Massachusetts Department of Labor.

IMPLAN is a proprietary software package that economists use to measure the direct and indirect economic impacts of new plant openings, expansions, and closures on economic activity within a region. IMPLAN uses a regional IO transactions matrix to estimate how changes for demand for commodities in one industry influence the sales in their local suppliers. To create a regional IO matrix, IMPLAN does not conduct its own survey of inter-industry trade but rather adjusts the national IO estimates to account for each region's specific industry mix. For example, processed aluminum is a key input used by Machine Shops in the Pioneer Valley but regional manufacturers import aluminum because there are no local suppliers. In these types of cases, IMPLAN would adjust the volume of within-region purchases of aluminum to account for the absence or scarcity of local suppliers.

The second local data source is the Massachusetts Industry Staffing patterns matrix. Like the national staffing patterns matrix, the Massachusetts matrix is based upon data from the Occupational Employment Survey. Although offering a more accurate representation of employment patterns the commonwealth, the state matrix also contains a larger number of suppressed data cells in industries and occupations with small sample sizes. Thus, it may not be suitable for use in all industries.<sup>3</sup>

The IO accounts and Staffing Patterns matrices can be used to investigate relationships among nearly all industries listed at the four-, five, and sometimes six- digit level of NAICS specificity. I use four-digit NAICS codes for this analysis. This was the most detailed level of detail that was common and complete for all datasets.<sup>4</sup>

### **The Study Industry**

In this study, I restrict my investigation to a single sector: Precision Manufacturing. I began with a list of Precision Manufacturing firms located in the three counties of the Pioneer Valley.<sup>5</sup> I use this list to identify the dominant NAICS codes within the Precision Manufacturing Sector. As shown in Figure 1 the largest number of Precision

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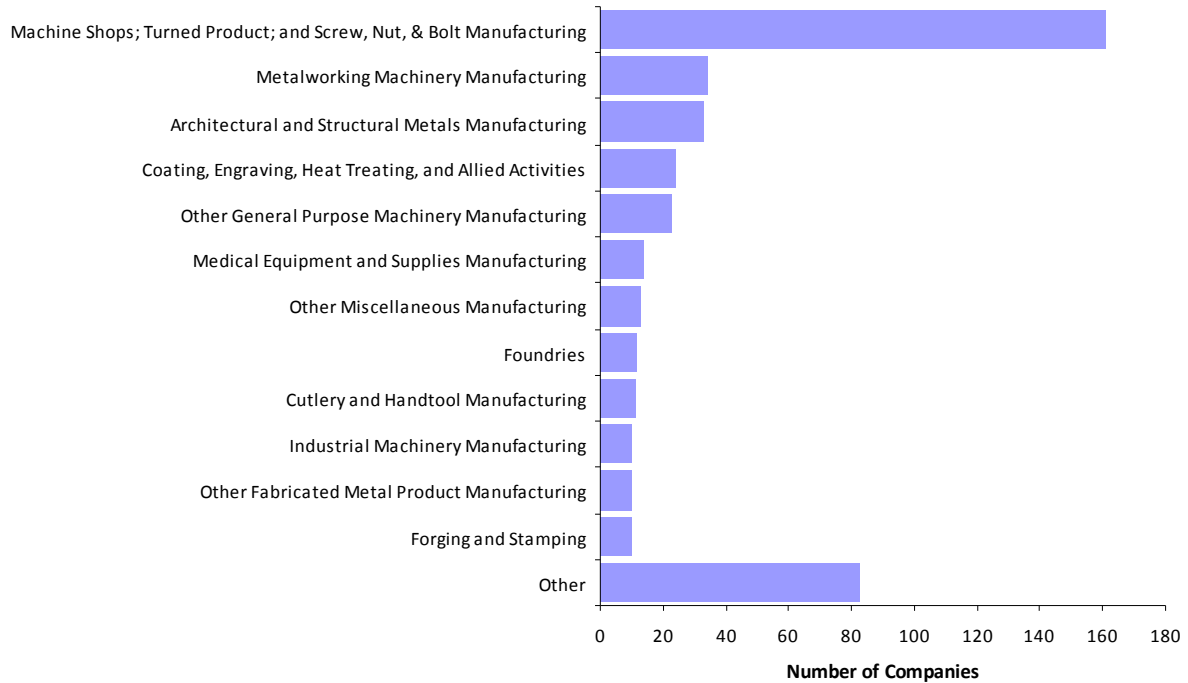
<sup>3</sup> The small sample sizes also mean that no sub-state data is available at a sufficient level of industrial disaggregation.

<sup>4</sup> It is possible to develop a more sophisticated database that uses the most detailed level of industrial aggregation available from any particular data source. Using more detailed industry data would produce superior matches, but developing this database is considerably more complicated and requires further investigation.

<sup>5</sup> The list of precision manufacturing companies was originally developed by UMASS Amherst doctoral student, Bernie Schliemann.

Manufacturing companies are listed under NAICS 3327 – Machine Shops; Turned Product; and Screw, Nut, & Bolt Manufacturing (machine shops, for short). I use the machine shops industry as my study industry.

**Figure 1**  
Industries represented in the Pioneer Valley’s Precision Manufacturing sector



**Results I: Related Industries, National-Level Transactions**

With the study industry identified, the next step is to identify the dominant inter-industry associations between the machine shops industry and all other industries as revealed through the national IO accounts and the staffing patterns matrix. There are just under 300 industries defined at the NAICS 4-digit level.<sup>6</sup> Although I computed measures of association for each for these 300, I only report results for the ten industries identified as having the closest association with the machine shops industry under each measure of association.

Tables 1 and 2 respectively show the ten industries that have the largest share of sales to (i.e. suppliers) and the largest share of purchases from (i.e. markets) the machine shops industry, according to the national sales patterns reported in the IO accounts. The machine shops industry’s dominant suppliers and markets are generally other manufacturing industries, reflecting its position as a value-added processor of fabricated metals and a key intermediate goods supplier to other producers. Twenty-five percent of the domestic inputs purchased by the machine shops industry come from the iron and steel mills industry, followed by another 11% of purchases from the

<sup>6</sup> There are some industries where data was not available at the 4 NAICS digit level. In these situations, I use whatever information is available at next highest level of industrial disaggregation.

aluminum products industry. Neither of the two top national suppliers have a particularly strong presence in the Pioneer Valley. However, many of the remaining top suppliers do. Industry shares of the remaining purchases are modest, with no particular industry comprising over 1% of the total purchases made by the precision manufacturing industry.

**Table 1**

Top Ten Industries Selling to Machine Shops (Suppliers), United States

NAICS Title	Share of Purchases
3311 Iron and Steel Mills and Ferroalloy Manufacturing	0.253
3313 Alumina and Aluminum Production and Processing	0.119
3327 Machine Shops; Turned Product; and Screw, Nut, and Bolt Manufacturing	0.087
3312 Steel Product Manufacturing from Purchased Steel	0.076
3329 Other Fabricated Metal Product Manufacturing	0.074
3323 Architectural and Structural Metals Manufacturing	0.063
3314 Nonferrous Metal (except Aluminum) Production and Processing	0.062
3321 Forging and Stamping	0.056
3324 Boiler, Tank, and Shipping Container Manufacturing	0.054
3259 Other Chemical Product and Preparation Manufacturing	0.051

*Source: Author's calculations based upon 2007 U.S. Benchmark Input-Output Accounts U.S. Department of Commerce, Bureau of Economic Analysis*

*\*Note: Wholesale Trade (NAICS 42) and Management of Companies and Enterprises (NAICS 55) originally appeared in the top ten of industries selling to Machine Tools, but were excluded because of their excessively high level of industrial aggregation and fairly ubiquitous products and services for many industries.*

The machine shops industry's primary domestic intermediate markets are railroad rolling stock manufacturing, fabricated metals, and navigational, measuring, electro-medical and controlling instruments (Table 2). Again, while the railroad rolling stock industry has little to no presence in the Pioneer Valley, we are home to many businesses in other key markets. There is some overlap among the top downstream and upstream trade partners of the machine shops industry. The other fabricated metals and the machine shops industry appears in both lists as key suppliers and markets. Furthermore, several of the industries identified as key suppliers and/or markets were previously identified as including firms that are at least nominal members of the Pioneer Valley's precision manufacturing sector, including: other fabricated metal product manufacturing; forging and stamping; machine shops and architectural and structural metals manufacturing.

**Table 2**

Top Ten Industries Purchasing from Machine Shops (Markets), United States

<b>NAICS</b>	<b>Title</b>	<b>Share of Sales</b>
3365	Railroad Rolling Stock Manufacturing	0.339
3329	Other Fabricated Metal Product Manufacturing	0.113
3345	Navigational, Measuring, Electromedical, and Control Instruments Manufacturing	0.057
3362	Motor Vehicle Body and Trailer Manufacturing	0.057
3112	Grain and Oilseed Milling	0.054
3339	Other General Purpose Machinery Manufacturing	0.051
3363	Motor Vehicle Parts Manufacturing	0.047
3399	Other Miscellaneous Manufacturing	0.046
3327	Machine Shops; Turned Product; and Screw, Nut, and Bolt Manufacturing	0.044
3331	Agriculture, Construction, and Mining Machinery Manufacturing	0.042

*Source: Author's calculations based upon 2007 U.S. Benchmark Input-Output Accounts  
U.S. Department of Commerce, Bureau of Economic Analysis*

Tables 3 and 4 examine the IO accounts from a different perspective. Rather than look up and down the machine shop industry's purchasing and sales patterns for dominant trade partners, the analysis summarized in Tables 3 and 4 compares the machine shop industry's entire purchasing/sales profile to that of all other industries listed in the IO accounts. The rationale is that industries with similar inputs and/or markets frequently use similar production techniques and technologies, which, in turn, may provide a common platform for collaboration or common support programs.

**Table 3**

Top Ten Industries, Most Similar Suppliers w/ Machine Shops, United States

<b>NAICS</b>	<b>Title</b>	<b>Correlation</b>
3324	Boiler, Tank, and Shipping Container Manufacturing	0.943
3329	Other Fabricated Metal Product Manufacturing	0.941
3326	Spring and Wire Product Manufacturing	0.907
3328	Coating, Engraving, Heat Treating, and Allied Activities	0.898
3325	Hardware Manufacturing	0.885
3323	Architectural and Structural Metals Manufacturing	0.885
3332	Industrial Machinery Manufacturing	0.850
3314	Nonferrous Metal (except Aluminum) Production and Processing	0.799
3331	Agriculture, Construction, and Mining Machinery Manufacturing	0.789
3336	Engine, Turbine, and Power Transmission Equipment Manufacturing	0.780

*Source: Author's calculations based upon 2007 U.S. Benchmark Input-Output Accounts  
U.S. Department of Commerce, Bureau of Economic Analysis*

As found in my analysis of direct purchasing patterns, the machine shops industry has the most in common with other manufacturers. In Table 3, industries with similar suppliers to machine shops receive a higher correlation coefficient. The machine shops

industry's purchasing patterns are most similar to those of boiler, tank, and shipping container manufacturing; other fabricated metal product manufacturing; and spring and wire product manufacturing – all with extremely high correlation coefficients above .90. Like machine shops, the top matching industries all tend to purchase a large share of processed and fabricated metals.

Table 4 lists the industries with markets that are most similar to the machine shops industry. Again, the ten industries selling to similar markets as machine shops are all manufacturers. Forging and stamping and foundries both have very high correlations (> .90) with the machine shops industry. The next four highest scoring industries – coating, engraving, heat treating, and allied activities; leather and hide tanning and finishing; iron and steel mills and ferroalloy manufacturing; and steel product manufacturing from purchased steel – have moderately strong correlations between .68 and .76. While these industries may seem diverse, they are all intermediate goods suppliers with high sales to finished product manufacturers.

**Table 4**

Top Ten Industries, Most Similar Markets w/ Machine Shops, US

NAICS	Title	Correlation
3321	Forging and Stamping	0.930
3315	Foundries	0.914
3328	Coating, Engraving, Heat Treating, and Allied Activities	0.795
3161	Leather and Hide Tanning and Finishing	0.778
3311	Iron and Steel Mills and Ferroalloy Manufacturing	0.699
3312	Steel Product Manufacturing from Purchased Steel	0.677
3262	Rubber Product Manufacturing	0.544
3329	Other Fabricated Metal Product Manufacturing	0.507
3335	Metalworking Machinery Manufacturing	0.492
3322	Cutlery and Handtool Manufacturing	0.477

Source: Author's calculations based upon 2007 U.S. Benchmark Input-Output Accounts  
U.S. Department of Commerce, Bureau of Economic Analysis

As found in my analysis of top trade *partners*, the list of industries with similar trade *patterns* often includes industries in common with precision manufacturing (see Figure 1 for the list of precision manufacturers). These common industries include: other fabricated metal product manufacturing; forging and stamping; architectural and structural metals manufacturing; coating, engraving, heat treating, and allied activities; foundries; cutlery and handtool manufacturing; and metalworking machinery manufacturing. While there are some similarities between the list of machine shops industry suppliers/ markets and industries with similar suppliers/ markets to machine shops, in general the differences far outweigh any similarities. This provides some support for analyzing the IO accounts data using multiple measures – both approaches have theoretical backing and produce plausible results, yet produce different outcomes.



The final measure of compares the machine shops industry to other industries according to their occupational profiles (Table 5). In general, the correlation coefficients based on occupation shares tend to be lower than those produced through the supply-chain analysis (Tables 3 and 4), but this has more to do with the finely detailed occupational categories of the staffing patterns matrix and not because industries are necessarily more weakly linked by occupations.<sup>7</sup> The occupational profile of the machine shops industry has the most in common with metalworking machinery, industrial machinery, and cutlery and handtool manufacturing. Some of these matching sectors also appear among the top precision manufacturing industries shown in Figure 1 (i.e. metalworking machinery manufacturing, cutlery and handtool manufacturing; other fabricated metal product manufacturing; forging and stamping).

**Table 5**

Top Ten Industries, Most Similar Occupational Mix w/ Machine Shops, United States

NAICS	Title	Correlation
3335	Metalworking Machinery Manufacturing	0.837
3332	Industrial Machinery Manufacturing	0.699
3322	Cutlery and Handtool Manufacturing	0.607
3336	Engine, Turbine, and Power Transmission Equipment Manufacturing	0.596
3339	Other General Purpose Machinery Manufacturing	0.589
3331	Agriculture, Construction, and Mining Machinery Manufacturing	0.551
3329	Other Fabricated Metal Product Manufacturing	0.550
3365	Railroad Rolling Stock Manufacturing	0.478
3326	Spring and Wire Product Manufacturing	0.437
3321	Forging and Stamping	0.409

*Source: Author's calculations based upon 2007 U.S. National Industry by Occupations Staffing Patterns Matrix U.S. Department of Labor, Bureau of Labor Statistics*

## Results II: Related Industries, Regional/State-Level Transactions

I repeated my analysis of national transactions using the two regional data sources, the regional IO accounts derived from IMPLAN data and the Massachusetts Industry Staffing Patterns matrix. By and large, results for the regionalized IO transactions are, in many ways, similar to the national transactions. On the one hand, the regionalized transactions produce more realistic pairings. On the other hand, the results also point to some of the inherent weaknesses of taking a strictly regional view – namely that it will fail to identify key suppliers and markets outside of the region.

The regional IO analysis produces a more intuitively appealing list of key supplier industries within the Pioneer Valley (Table 6). The machine shops industry primary purchases products and services from other machine shops and metalworking machinery manufacturers. Beyond these two most closely related industries, local

<sup>7</sup> The Industry by Occupation Staffing patterns matrix lists approximately 800 different occupations, compared to just under 300 industries listed in the IO accounts.

purchases of non-durable goods and services (e.g. electricity, professional services, real estate, banking, and transportation) tend to be more important than purchases of manufactured commodities or raw materials. The regional list of top suppliers list does not include the raw and processed metals and materials suppliers that dominated the national transactions but have virtually no local presence.

**Table 6**

Top Ten Industries Selling to Machine Shops (Suppliers), Pioneer Valley

<b>NAICS Title</b>	<b>Share of Purchases</b>
3327 Machine Shops; Turned Product; and Screw, Nut, and Bolt Manufacturing	0.077
3335 Metalworking Machinery Manufacturing	0.065
5419 Other Professional, Scientific, and Technical Services	0.051
2211 Electric Power Generation, Transmission and Distribution	0.045
531 Real Estate	0.044
523 Securities, Commodity Contracts, and Other Financial Investments and Related Activities	0.038
484 Truck Transportation	0.030
5415 Computer Systems Design and Related Services	0.028
5221 Depository Credit Intermediation	0.027
722 Food Services and Drinking Places	0.023

*Source: Author's calculations based upon 2007 IMPLAN data regionalized for the Pioneer Valley*

*\*Note: Wholesale Trade (NAICS 42) and Management of Companies and Enterprises (NAICS 55) originally appeared in the top ten of industries selling to Machine Tools, but were excluded because of their excessively high level of industrial aggregation and fairly ubiquitous products and services for many industries.*

The analysis of key regional markets also produces generally feasible, although somewhat diverse, results (Table 7). As found for suppliers, many of our local machine shops provide intermediate inputs to manufacturers that are outside of the Pioneer Valley – such as the defense and aerospace industries. Although important, these industries do not appear in our list of top regional markets because they have little to no local presence. The most likely local markets for area machine shops are other machine shops, followed by a diverse range of other types of equipment, metals, and non-durable goods manufacturing.

Tables 8 compares the machine shop industry's regional purchasing profile to that of all other industries in the Pioneer Valley. As found at the national scale, the regional machine shops industry has the most in common with other manufacturers (Table 8). The basic similarity is that all of these industries tend to be relatively large purchasers of precision machinery and professional services (typically engineering services), and use a high volume of local supplied electricity and transportation services.

**Table 7**

Top Ten Industries Purchasing from Machine Shops (Markets), Pioneer Valley

NAICS	Title	Share of Sales
3327	Machine Shops; Turned Product; and Screw, Nut, and Bolt Manufacturing	0.094
3329	Other Fabricated Metal Product Manufacturing	0.090
3399	Other Miscellaneous Manufacturing	0.088
3222	Converted Paper Product Manufacturing	0.060
3336	Engine, Turbine, and Power Transmission Equipment Manufacturing	0.055
3261	Plastics Product Manufacturing	0.038
3334	Ventilation, Heating, Air-Conditioning, & Commercial Refrigeration Equipment Manufacturing	0.037
485	Transit and Ground Passenger Transportation	0.036
3339	Other General Purpose Machinery Manufacturing	0.035
3323	Architectural and Structural Metals Manufacturing	0.034

Source: Author's calculations based upon 2007 IMPLAN data regionalized for the Pioneer Valley

**Table 8**

Top Ten Industries, Most Similar Suppliers w/ Machine Shops, Pioneer Valley

NAICS	Title	Correlation
3329	Other Fabricated Metal Product Manufacturing	0.829
3323	Architectural and Structural Metals Manufacturing	0.829
3325	Hardware Manufacturing	0.827
3321	Forging and Stamping	0.813
3322	Cutlery and Handtool Manufacturing	0.812
3335	Metalworking Machinery Manufacturing	0.797
3332	Industrial Machinery Manufacturing	0.796
3334	Ventilation, Heating, Air-Conditioning, and Commercial Refrigeration Equipment Manufacturing	0.790
3326	Spring and Wire Product Manufacturing	0.786
3339	Other General Purpose Machinery Manufacturing	0.780

Source: Author's calculations based upon 2007 IMPLAN data regionalized for the Pioneer Valley

My analysis of industries with similar local markets produces both intuitive as well as some seemingly odd results (Table 9). Several of the top industries selling to similar markets as machine shops are equipment and tool manufacturers. However, the list also includes some seemingly dissimilar matches: logging; coating, engraving and allied activities, foundries, several health-care related industries, and metals processing. Forging and stamping and foundries both have very high correlations (> .90) with the machine shops industry. With the exception of health care, most of these industries are similar to machine shops in that they are all intermediate goods suppliers with high sales to finished product manufacturers.

**Table 9**

Top Ten Industries, Most Similar Markets w/ Machine Shops, Pioneer Valley

NAICS	Title	Correlation
1133	Logging	0.851
3328	Coating, Engraving, Heat Treating, and Allied Activities	0.812
3315	Foundries	0.802
622	Hospitals	0.797
6215	Medical and Diagnostic Laboratories	0.662
6211	Offices of Physicians	0.662
3322	Cutlery and Handtool Manufacturing	0.639
3313	Alumina and Aluminum Production and Processing	0.618
3312	Steel Product Manufacturing from Purchased Steel	0.610
3335	Metalworking Machinery Manufacturing	0.607

Source: Author's calculations based upon 2007 IMPLAN data regionalized for the Pioneer Valley

The final measure uses the Massachusetts industry transactions matrix to identify industries with a similar occupation mix as the state's metal shops industry.<sup>8</sup> Overall, the occupational analysis produces feasible matching industries with considerable overlap between the state-level and national lists.

**Table 10**

Top Ten Industries, Most Similar Occupational Mix w/ Machine Shops, Massachusetts

NAICS	Title	Correlation
3336	Engine, Turbine, and Power Transmission Equipment Manufacturing	0.773
3335	Metalworking Machinery Manufacturing	0.620
3329	Other Fabricated Metal Product Manufacturing	0.499
3332	Industrial Machinery Manufacturing	0.486
3364	Aerospace Product and Parts Manufacturing	0.455
3279	Other Nonmetallic Mineral Product Manufacturing	0.381
3322	Cutlery and Handtool Manufacturing	0.367
4235	Metal and Mineral (except Petroleum) Merchant Wholesalers	0.362
8113	Commercial and Industrial Machinery and Equipment (except Automotive and Electronic) Repair and Maintenance	0.347
3391	Medical Equipment and Supplies Manufacturing	0.294

Source: Author's calculations based upon 2007 U.S. National Industry by Occupations Staffing Patterns Matrix  
U.S. Department of Labor, Bureau of Labor Statistics

<sup>8</sup> Some suppressed data values in the matrix were excluded from the calculations, and may affect the results. But because these suppressed cells are in industries with few workers in a specific occupations, I expect any bias to be minimal.

### Results III: A Composite Index

The obvious difficulty with multiple indicators is that they provide a considerable amount of information that can be difficult to process. As an alternative, I produced a composite score that combines the scores of the different measures into a single value. Not only would this make it easier to process the results, but it might also reduce the number of spurious matches, because the index could balance industries receiving high scores on a single indicator (say national suppliers) with those that scoring moderately on multiple indicators. However, it also reduces the information content available to the analysts. There may be occasions where the analyst is interested in distinguishing companies that match highly on different criteria, say occupational profiles versus direct purchases.<sup>9</sup>

**Table 11**

Top twenty industries most closely related to Metalworking,  
Based on a composite score of 10 indicators

NAICS	Title	Score
3329	Other Fabricated Metal Product Manufacturing	61.3
3335	Metalworking Machinery Manufacturing	59.1
3327	Machine Shops; Turned Product; and Screw, Nut, and Bolt Manufacturing	56.6
3336	Engine, Turbine, and Power Transmission Equipment Manufacturing	46.8
3365	Railroad Rolling Stock Manufacturing	45.5
3311	Iron and Steel Mills and Ferroalloy Manufacturing	45.1
3322	Cutlery and Handtool Manufacturing	43.8
3323	Architectural and Structural Metals Manufacturing	43.2
3339	Other General Purpose Machinery Manufacturing	43.1
3328	Coating, Engraving, Heat Treating, and Allied Activities	42.8
3332	Industrial Machinery Manufacturing	41.7
3324	Boiler, Tank, and Shipping Container Manufacturing	40.0
3399	Other Miscellaneous Manufacturing	40.0
3321	Forging and Stamping	39.9
3326	Spring and Wire Product Manufacturing	39.6
3315	Foundries	39.4
42	Wholesale Trade	39.3
3325	Hardware Manufacturing	38.7
3312	Steel Product Manufacturing from Purchased Steel	38.1
3331	Agriculture, Construction, and Mining Machinery Manufacturing	36.3

*Source: Author's calculations based upon 2007 U.S. National Industry by Occupations Staffing Patterns Matrix  
U.S. Department of Labor, Bureau of Labor Statistics*

I construct my composite index using a simple technique. Each of the ten measures was first converted into common units and then rescaled to range from 0 to 100. I calculate the index scores as the simple average of the ten measures. Each measure receives equal weight in the average. However, a weighted average could also be developed

<sup>9</sup> A more sophisticated information system could offer the analyst the option of selecting particular criteria (say intermediate supply chains and occupations) and then have the software automatically generate a customized composite index as the foundation for a customized company search.

that gives more or less emphasis to different indicators. For example, if you wanted occupational similarities to count more than buyer-supplier associations you could give them double the weight in calculating the average.

Table 11 shows the twenty industries with the strongest ties to machine shops according to the composite index. Overall, the composite measure identifies a reasonable set of matching industries. Most of the top scoring industries – for instance, fabricated metal products metalworking machinery manufacturing, and machine shops – scored moderately high on multiple indicators. There are a small number of instances where high scoring industries – such as railroad rolling stock manufacturing and iron and steel mills and ferroalloy manufacturing – scored extremely high on a single or small number of indicators, but the measure more often favor industries that score well over a range of measures.

#### **Results IV: Pioneer Valley Businesses in Closely Related Industries**

As a final product of my study, I produced a list of Pioneer Valley businesses that are in industries that most closely match the machine shops industry. The purpose of this list is to provide concrete examples of the types of firms that might be identified as potential matches to machine shops in the region. To keep the list to a reasonable length, I restricted my search to industries that were among the top X matching industries as determined by the composite index. The matching businesses are listed in Appendix B. The names, addresses and other businesses information are from the ReferenceUSA™ database, which I was able to access through the UMASS Amherst library services.<sup>10</sup>

#### **Conclusions**

This study demonstrates the process of matching firms through existing public data sources. Due to limited time and resources, I limited my analysis to a single industry (machine shops) within the precision manufacturing sector. A full-scale economic information system could cover nearly all industries for which the requisite data is available.<sup>11</sup> However, by performing this analysis for a single industry, I hope to inform the ongoing dialog among the economic development community of Western Massachusetts on whether such an information system is worth further exploration.

In my view, a regional economic development information system built on publicly available secondary data is certainly feasible and may well have some real value to inform practice. However, this type of analysis is best use as a compliment to expert judgment in guiding decisions on identifying potential collaborating partners. My

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<sup>10</sup> ReferenceUSA™ reports up to five NAICS codes for companies that might offer products and services that span more than one market. For the sake of parsimony, I only include companies whose primary NAICS code matched the target industry.

<sup>11</sup> The IO accounts, in particular, do not provide the necessary detail of information needed to conduct this type of analysis on retail, construction, wholesale trade, farming, or public sector industries.

exploratory analysis was successful in producing plausible lists of industries and companies that are related through associations and connections that are not immediate apparent from searching within a single industry. However, industry categories can also be rather coarse and secondary only provide an approximation of regional specializations within each industry.

The next step is for the economic development community to decide whether it wants to pursue this work further. For this study, I have developed a basic template for building such a decision-support system as a proof of concept. However, building a user-friendly version that covers all industries would require additional work and support. This entails funds to support additional research into methods and data options as well as the expertise of a programmer who can turn this raw information into working prototype for end-users. Therefore, the primary questions to consider moving forward are:

- (1) is there sufficient interest in developing an information system and the institutional support to ensure its continued development and use;
- (2) are their available financial resources that may support the development of a prototype and what steps are necessary to successfully pursue these resources; and
- (3) what is a realistic cost estimate and time frame for developing a prototype.

## Appendix B

### Companies Identified under a ReferenceUSA search of NAICS 3329

#### Other Fabricated Metal Product Manufacturing

NAME	CITY	ZIP	NAICS	NAICS DESCRIPTION
Allied Pattern Co Inc	Westfield	01085	332997	Industrial Pattern Manufacturing
Bete Fog Nozzle Inc	Greenfield	01301	332919	Other Metal Valve & Pipe Fitting Manufacturing
Contech Construction Products	Palmer	01069	332996	Fabricated Pipe & Pipe Fitting Manufacturing
Heritage Sales Inc	Agawam	01001	332999	Misc Fabricated Metal Prod Manufacturing
Hydrant Services Inc	Wilbraham	01095	332911	Industrial Valve Manufacturing
Kollmorgen Electro-Optical	Northampton	01060	332999	Misc Fabricated Metal Prod Manufacturing
Ksm Enterprises Inc	Bondsville	01009	332913	Plumbing Fixture Fitting & Trim Manufacturing
New England Metal Processing	Florence	01062	332999	Misc Fabricated Metal Prod Manufacturing
New England Tooling & Casting	Chicopee	01013	332997	Industrial Pattern Manufacturing
Northeast Metal Co	Ludlow	01056	332999	Misc Fabricated Metal Prod Manufacturing
PFE Rolls	Orange	01364	332999	Misc Fabricated Metal Prod Manufacturing
Renovator's Supply Inc	Millers Falls	01349	332913	Plumbing Fixture Fitting & Trim Manufacturing
ROAD Safe Traffic Safety	Springfield	01104	332999	Misc Fabricated Metal Prod Manufacturing
Smith & Wesson Academy	Springfield	01104	332994	Small Arms Manufacturing
Smith & Wesson Corp	Springfield	01104	332994	Small Arms Manufacturing
Suffield Pattern Works	Springfield	01109	332997	Industrial Pattern Manufacturing
Titeflex Corp	Springfield	01104	333999	Misc General Purpose Machinery Manufacturing
Whole Specialists Inc	Ware	01082	333999	Misc General Purpose Machinery Manufacturing

### Companies Identified under a ReferenceUSA search of NAICS 3335

#### Metalworking Machinery Manufacturing

NAME	CITY	ZIP	NAICS	NAICS DESCRIPTION
Apple Steel Rule Die Co	Springfield	01104	333514	Special Tool Die Jig & Fixture Manufacturing
Atlas Die	Palmer	01069	333514	Special Tool Die Jig & Fixture Manufacturing
Burring, J M	Chicopee	01020	333512	Metal Cutting Machine Tool Manufacturing
Burr-N-Bench Inc	Westfield	01085	333512	Metal Cutting Machine Tool Manufacturing
Custom Carbide Corp	Springfield	01109	333512	Metal Cutting Machine Tool Manufacturing
Cycle Engineering Inc	Ware	01082	333514	Special Tool Die Jig & Fixture Manufacturing
DIE Ctr	Springfield	01104	333514	Special Tool Die Jig & Fixture Manufacturing
Diecutting Tooling Svc Inc	Holyoke	01040	333514	Special Tool Die Jig & Fixture Manufacturing
Dumont Co LLC	Greenfield	01301	333515	Cutting Tool & Machine Tool Accessory Mfg
F & D Tool Co	Three Rivers	01080	333512	Metal Cutting Machine Tool Manufacturing
General Burring Inc	Chicopee	01013	333512	Metal Cutting Machine Tool Manufacturing
Hassay-Savage Broach Co Inc	Turners Falls	01376	333512	Metal Cutting Machine Tool Manufacturing
Interstate Design	Chicopee	01020	333514	Special Tool Die Jig & Fixture Manufacturing
J B Precision LLC	Hatfield	01038	333512	Metal Cutting Machine Tool Manufacturing
J K Tool Co	Agawam	01001	333514	Special Tool Die Jig & Fixture Manufacturing
K C Burring	Chicopee	01013	333512	Metal Cutting Machine Tool Manufacturing
Kennametal Inc	Greenfield	01301	333515	Cutting Tool & Machine Tool Accessory Mfg
Kennametal Inc	South Deerfield	01373	333515	Cutting Tool & Machine Tool Accessory Mfg
Magnat-Fairview Inc	Chicopee	01022	333516	Rolling Mill Machinery & Equip Manufacturing
MICON Steel Rule Die	West Springfield	01089	333514	Special Tool Die Jig & Fixture Manufacturing
Mold-Tech	Chicopee	01013	333514	Special Tool Die Jig & Fixture Manufacturing
New England Broach Co	Whately	01093	333512	Metal Cutting Machine Tool Manufacturing
Ortiz Tool LLC	Springfield	01104	333512	Metal Cutting Machine Tool Manufacturing
Ortiz Tool LLC	Springfield	01104	333512	Metal Cutting Machine Tool Manufacturing
Performance Corrugated Tooling	West Springfield	01089	333514	Special Tool Die Jig & Fixture Manufacturing
Portuamerica	Ludlow	01056	333514	Special Tool Die Jig & Fixture Manufacturing
Rego & Roy LLC	Ludlow	01056	333514	Special Tool Die Jig & Fixture Manufacturing
Safe-T-Cut Inc	Monson	01057	333512	Metal Cutting Machine Tool Manufacturing
Seahorse Labware	Chicopee	01022	333514	Special Tool Die Jig & Fixture Manufacturing
Titan USA Enterprise Inc	West Springfield	01089	333512	Metal Cutting Machine Tool Manufacturing
Vogform Tool & Die	West Springfield	01089	333514	Special Tool Die Jig & Fixture Manufacturing
Wells Tool Co	Greenfield	01301	333515	Cutting Tool & Machine Tool Accessory Mfg



## Appendix B (cont)

### Companies Identified under a ReferenceUSA search of NAICS 3327

Machine Shops; Turned Product; and Screw, Nut, and Bolt Manufacturing

NAME	CITY	ZIP	NAICS	NAICS DESCRIPTION
A & D Machine Svc	Feeding Hills	01030	332710	Machine Shops
A & D Tool Co	Indian Orchard	01151	332710	Machine Shops
A J Precision	Westfield	01085	332710	Machine Shops
A-1 Screw Machine Products Inc	Chicopee	01020	332721	Precision Turned Prod Manufacturing
Ace Precision Inc	Agawam	01001	332710	Machine Shops
Advance Manufacturing Co Inc	Westfield	01085	332710	Machine Shops
Agawam Machine Co	East Longmeadow	01028	332710	Machine Shops
Amherst Machine Co	Amherst	01002	332710	Machine Shops
Angstrom Tool	Westfield	01085	332710	Machine Shops
Arrow Machine Co	Belchertown	01007	332710	Machine Shops
ATD Precision	Springfield	01108	332710	Machine Shops
Athol Screw Machine Products	Orange	01364	332721	Precision Turned Prod Manufacturing
Automatic Washing Machine Co	Chicopee	01020	332710	Machine Shops
Axis Precision	Westfield	01085	332710	Machine Shops
B & R Machine Inc	Ludlow	01056	332710	Machine Shops
Basic Precision	Palmer	01069	332710	Machine Shops
Bay State Machine Co	Easthampton	01027	332710	Machine Shops
Ben Franklin Mfg Co	Agawam	01001	332710	Machine Shops
Berkshire Industries Inc	Westfield	01085	332710	Machine Shops
Berkshire Precision Grinding	Westfield	01085	332710	Machine Shops
Bill't Well Mfg	Southwick	01077	332710	Machine Shops
Blueprint Auto Machine	Westfield	01085	332710	Machine Shops
Boulevard Machine & Gear Inc	Springfield	01104	332710	Machine Shops
Burd Manufacturing Co	East Longmeadow	01028	332710	Machine Shops
Burr-N-Bench Inc	Westfield	01085	332710	Machine Shops
C & G Co	Granby	01033	332710	Machine Shops
Center Machine	Ludlow	01056	332710	Machine Shops
Central Mass Machine Inc	Holyoke	01040	332710	Machine Shops
City Machine Corp	Holyoke	01040	332710	Machine Shops
CMG Precision	Ludlow	01056	332710	Machine Shops
CNC Specialties	Monson	01057	332710	Machine Shops
Commercial Machine	Ludlow	01056	332710	Machine Shops
Complete Precision LLC	Agawam	01001	332710	Machine Shops
Condon Manufacturing Co	Springfield	01129	332721	Precision Turned Prod Manufacturing
D & S Mfg Co	Southwick	01077	332710	Machine Shops
Davis, Christopher	Westfield	01085	332710	Machine Shops
Decker Machine Works Inc	Ashfield	01330	332710	Machine Shops
Delta Machine & Tool Inc	Palmer	01069	332710	Machine Shops
DFF Corp	Agawam	01001	332710	Machine Shops
Die Cast Connections	Chicopee	01020	332710	Machine Shops
Dougherty Precision Inc	Agawam	01001	332710	Machine Shops
Dyno Machine Inc	Springfield	01129	332710	Machine Shops
Eagle Precision	West Springfield	01089	332710	Machine Shops
Earlee Machine Inc	Westfield	01085	332710	Machine Shops
Easthampton Machine & Tool	Easthampton	01027	332710	Machine Shops
Easthampton Quality Machine Co	Easthampton	01027	332710	Machine Shops
EBA Inc	East Longmeadow	01028	332710	Machine Shops
Ely Tool Inc	Springfield	01104	332710	Machine Shops
Emco Tool & Gauge Corp	Ludlow	01056	332710	Machine Shops
Etoc & Co	Springfield	01109	332710	Machine Shops
Falcon Precision Machining Co	Ludlow	01056	332710	Machine Shops
Florence Precision	Leeds	01053	332710	Machine Shops
G & H Mfg	Montgomery	01085	332710	Machine Shops
G & L Tool Corp	Agawam	01001	332710	Machine Shops

## Appendix B (cont)

### Companies Identified under a ReferenceUSA search of NAICS 3327

Machine Shops; Turned Product; and Screw, Nut, and Bolt Manufacturing (continued)

Gatehouse Machine & Welding Co	Holyoke	01040	332710	Machine Shops
General Machine Inc	Holyoke	01040	332710	Machine Shops
Gosselin Tool Co Inc	Feeding Hills	01030	332710	Machine Shops
GTECH Manufacturing Inc	Hampden	01036	332710	Machine Shops
Hole Specialists Inc	Ware	01082	332710	Machine Shops
Hoppe Tool Inc	Chicopee	01020	332710	Machine Shops
Hullihen Machine	Palmer	01069	332710	Machine Shops
Impala Manufacturing Inc	Agawam	01001	332710	Machine Shops
Industrial Precision Corp	Westfield	01085	332710	Machine Shops
Interstate Manufacturing Co	Agawam	01001	332710	Machine Shops
J & E Precision Tool Inc	Southampton	01073	332710	Machine Shops
J B Machine Co	Feeding Hills	01030	332710	Machine Shops
J P Precision Machine Co	Chicopee	01013	332710	Machine Shops
JRK Precision Machining	Agawam	01001	332710	Machine Shops
K & B Tool Inc	Westfield	01085	332710	Machine Shops
K & R Machine Co	Westfield	01085	332710	Machine Shops
Kame Tool Co	Chicopee	01020	332710	Machine Shops
Knight Machine & Tool Co Inc	South Hadley	01075	332710	Machine Shops
L B Mfg	Chesterfield	01012	332710	Machine Shops
Lee Tool Co	Ludlow	01056	332710	Machine Shops
LPI Inc	Westfield	01085	332710	Machine Shops
M G Machine	Chicopee	01013	332710	Machine Shops
M K Machine	Springfield	01104	332710	Machine Shops
Manufacturing Technologies	Westfield	01085	332710	Machine Shops
Mark Machine Co	Wales	01081	332710	Machine Shops
Marox Corp	Holyoke	01040	332710	Machine Shops
Martin David Inc	Holyoke	01040	332710	Machine Shops
Mechanical Drive Components	Chicopee	01013	332710	Machine Shops
Metal-Craft Mfg Inc	Springfield	01108	332710	Machine Shops
Millrite Machine Co	Westfield	01085	332710	Machine Shops
Mitchell Machine Inc	Springfield	01109	332710	Machine Shops
Moody, Richard E	Deerfield	01342	332710	Machine Shops
Mrd Design Mfg Corp	Indian Orchard	01151	332710	Machine Shops
Mutual Precision Inc	West Springfield	01089	332710	Machine Shops
MWI Inc	Agawam	01001	332710	Machine Shops
Nash Manufacturing & Grinding	Holyoke	01040	332710	Machine Shops
Nea-Machining	Holyoke	01040	332710	Machine Shops
Newjen Corp	Springfield	01129	332710	Machine Shops
Norgaard Machine Inc	Feeding Hills	01030	332710	Machine Shops
Northeast Metal Co	Indian Orchard	01151	332710	Machine Shops
Northeast Metal Co	Ludlow	01056	332710	Machine Shops
Northern Associates	West Springfield	01089	332710	Machine Shops
O-A Inc	Agawam	01001	332710	Machine Shops
Olympic Fastening Systems	Agawam	01001	332722	Bolt Nut Screw Rivet & Washer Manufacturing
Orchard Tool & Die	Indian Orchard	01151	332710	Machine Shops
Paragon Manufacturing Inc	Westfield	01085	332710	Machine Shops
Parkway Machining	Easthampton	01027	332710	Machine Shops
Parts Tool & Die Inc	Agawam	01001	332710	Machine Shops
PFR Machine Co	Westfield	01085	332710	Machine Shops
Pond Brook Machining Inc	Westfield	01085	332710	Machine Shops

## Appendix B (cont)

### Companies Identified under a ReferenceUSA search of NAICS 3327

Machine Shops; Turned Product; and Screw, Nut, and Bolt Manufacturing (continued)

Precision Billet Design	South Hadley	01075	332710	Machine Shops
Precision Manufacturing	West Springfield	01089	332710	Machine Shops
Pro Tool & Machine	West Springfield	01089	332710	Machine Shops
Professional Machine Svc	Holyoke	01040	332710	Machine Shops
Quabbin Inc	Orange	01364	332710	Machine Shops
Quality Machining Co	Westfield	01085	332710	Machine Shops
Quality Tool Co	Monson	01057	332710	Machine Shops
Qual'Tech Mfg Inc	Holyoke	01040	332710	Machine Shops
R & D Technologies	Indian Orchard	01151	332710	Machine Shops
R & M Machine	Chicopee	01022	332710	Machine Shops
R W Tool	Indian Orchard	01151	332710	Machine Shops
Rapid Precision Machining	Palmer	01069	332710	Machine Shops
Riverview Machine Co	Holyoke	01040	332710	Machine Shops
Robert's Machine Tool Design	Springfield	01108	332710	Machine Shops
Roberts Manufacturing Co	Springfield	01104	332710	Machine Shops
Rock Valley Tool Inc	Easthampton	01027	332710	Machine Shops
Rodney Hunt Co	Orange	01364	332710	Machine Shops
Roger's General Machining Inc	Chicopee	01020	332710	Machine Shops
Rose Industries Inc	Palmer	01069	332710	Machine Shops
Roselli's Machine Mfg Co	Westfield	01085	332710	Machine Shops
Royal Business Machine	Springfield	01104	332710	Machine Shops
RPM Technology	Ludlow	01056	332710	Machine Shops
S A Machine Co	East Longmeadow	01028	332710	Machine Shops
Samson Manufacturing Corp	South Deerfield	01373	332710	Machine Shops
Scorpio Manufacturing Inc	West Springfield	01089	332710	Machine Shops
Silverbrook Manufacturing Co	Palmer	01069	332710	Machine Shops
Sisson Engineering	Northfield	01360	332710	Machine Shops
Specials Inc	Westfield	01085	332722	Bolt Nut Screw Rivet & Washer Manufacturing
Tell Tool Inc	Westfield	01085	332710	Machine Shops
Thorn Industries Inc	Springfield	01104	332710	Machine Shops
Tri-State Precision Inc	Northfield	01360	332710	Machine Shops
True Precision Co	West Springfield	01089	332710	Machine Shops
Valley Metalworks	Orange	01364	332710	Machine Shops
Vanpelt Precision Machine Shop	Easthampton	01027	332710	Machine Shops
Vector Tool & Dye	Westfield	01085	332710	Machine Shops
Vertek Machine	Brimfield	01010	332710	Machine Shops
Vision Machining	West Hatfield	01088	332710	Machine Shops
Walker Machine Co	Monson	01057	332710	Machine Shops
Westfield Fasteners	Westfield	01085	332722	Bolt Nut Screw Rivet & Washer Manufacturing
Westfield Tool & Die Inc	Westfield	01085	332710	Machine Shops
Whalley Precision Inc	Southwick	01077	332710	Machine Shops
Woodlawn Tool & Gage Co	West Springfield	01089	332710	Machine Shops
WYZ Machine Co	Agawam	01001	332710	Machine Shops
Yankee Hill Machine Co	Florence	01062	332721	Precision Turned Prod Manufacturing
Z & Z Tool Mfg	Westfield	01085	332710	Machine Shops

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## Appendix B (cont)

### Companies Identified under a ReferenceUSA search of NAICS 3336

Engine, Turbine, and Power Transmission Equipment Manufacturing

NAME	CITY	ZIP	NAICS	NAICS DESCRIPTION
Curtis Universal Joint Co	Springfield	01107	333613	Mechanical Power Transmission Equip Manufacturing
U S Tsubaki Inc	Holyoke	01040	333613	Mechanical Power Transmission Equip Manufacturing
Ron Chiasson & Son Diesel Svc	Ludlow	01056	333618	Other Engine Equip Manufacturing

### Companies Identified under a ReferenceUSA search of NAICS 3365

Railroad Rolling Stock Manufacturing

None

### Companies Identified under a ReferenceUSA search of NAICS 3311

Iron and Steel Mills and Ferroalloy Manufacturing

None

### Companies Identified under a ReferenceUSA search of NAICS 3322

Cutlery and Handtool Manufacturing

NAME	CITY	ZIP	NAICS	NAICS DESCRIPTION
Aube Precision Tool Inc	Ludlow	01056	332212	Hand & Edge Tool Manufacturing
BTD Precision Inc	Chicopee	01013	332212	Hand & Edge Tool Manufacturing
Joma Tool Co	East Longmeadow	01028	332212	Hand & Edge Tool Manufacturing
Lamson & Goodnow Mfg Co	Shelburne Falls	01370	332211	Cutlery & Flatware Except Precious Manufacturing
Larien Products	Northampton	01060	332214	Kitchen Utensil Pot & Pan Manufacturing
Lenox	East Longmeadow	01028	332213	Saw Blade & Handsaw Manufacturing
Mayhew Steel Products Inc	Shelburne Falls	01370	332212	Hand & Edge Tool Manufacturing
New England Optical Comparator	Springfield	01109	332212	Hand & Edge Tool Manufacturing
Patton Tool Co	Westfield	01085	332212	Hand & Edge Tool Manufacturing
Rren Manufacturing & Engineer	West Springfield	01089	332212	Hand & Edge Tool Manufacturing
Rugg Manufacturing Co	Greenfield	01301	332212	Hand & Edge Tool Manufacturing
Yankee Sharp Saw Co	Westfield	01085	332213	Saw Blade & Handsaw Manufacturing
YMW USA	Greenfield	01301	332212	Hand & Edge Tool Manufacturing

## Appendix B (cont)

### Companies Identified under a ReferenceUSA search of NAICS 3323

#### Architectural and Structural Metals Manufacturing

NAME	CITY	ZIP	NAICS	NAICS DESCRIPTION
A & D Metal Inc	Westfield	01085	332322	Sheet Metal Work Manufacturing
A G Miller Co Inc	Springfield	01109	332312	Fabricated Structural Metal Manufacturing
Accent On Indl Metal Inc	Springfield	01104	332322	Sheet Metal Work Manufacturing
Ace Metal Fabricators Inc	Springfield	01105	332322	Sheet Metal Work Manufacturing
American Iron Works Fabricate	South Hadley	01075	332312	Fabricated Structural Metal Manufacturing
Amherst Welding Inc	Amherst	01002	332312	Fabricated Structural Metal Manufacturing
Arrow Welding & Air Cond	Hatfield	01038	332312	Fabricated Structural Metal Manufacturing
Avid Ironworks Inc	Springfield	01104	332312	Fabricated Structural Metal Manufacturing
Barker Steel Co	South Deerfield	01373	332312	Fabricated Structural Metal Manufacturing
Bedard Sheet Metal Co	Westfield	01085	332322	Sheet Metal Work Manufacturing
Cedric Fabrication Co Inc	Monson	01057	332322	Sheet Metal Work Manufacturing
CGS Enterprises	West Springfield	01089	332322	Sheet Metal Work Manufacturing
Chicopee Engineering Assoc	Chicopee	01020	332322	Sheet Metal Work Manufacturing
Custom Metal Fabrication	Leeds	01053	332312	Fabricated Structural Metal Manufacturing
Deerfield Valley Re-Fab Inc	South Deerfield	01373	332312	Fabricated Structural Metal Manufacturing
Dublin Steel Corp	Palmer	01069	332312	Fabricated Structural Metal Manufacturing
Duc-Pac Corp	East Longmeadow	01028	332322	Sheet Metal Work Manufacturing
Fisher Sheet Metal & Roofing	Springfield	01105	332322	Sheet Metal Work Manufacturing
Francis Heating & Air Cond	Holyoke	01040	332322	Sheet Metal Work Manufacturing
Franklin County Fabricators	Greenfield	01301	332312	Fabricated Structural Metal Manufacturing
H L Foster Co	West Springfield	01089	332312	Fabricated Structural Metal Manufacturing
Industrial Sheet Metal	West Hatfield	01088	332322	Sheet Metal Work Manufacturing
J J & T Enterprises	South Deerfield	01373	332322	Sheet Metal Work Manufacturing
Jarvis Welding & Mfg Inc	Turners Falls	01376	332322	Sheet Metal Work Manufacturing
Ken Martin Heating & Air Cond	East Longmeadow	01028	332322	Sheet Metal Work Manufacturing
Kleeberg Sheet Metal Inc	Ludlow	01056	332322	Sheet Metal Work Manufacturing
Lyman Sheet Metal Co Inc	Southampton	01073	332322	Sheet Metal Work Manufacturing
Mestek Inc	Westfield	01085	332322	Sheet Metal Work Manufacturing
Metal Men	Chicopee	01020	332322	Sheet Metal Work Manufacturing
Metalmorfis	Springfield	01105	332312	Fabricated Structural Metal Manufacturing
MTG Inc	Westfield	01085	332322	Sheet Metal Work Manufacturing
Novel Iron Works Inc	Springfield	01109	332312	Fabricated Structural Metal Manufacturing
Philipp Manufacturing Co	Easthampton	01027	332321	Metal Window & Door Manufacturing
Progressive Tool Corp	Southwick	01077	332322	Sheet Metal Work Manufacturing
R & L Sheet Metal Fabricators	Easthampton	01027	332322	Sheet Metal Work Manufacturing
R R Leduc Corp	Holyoke	01040	332322	Sheet Metal Work Manufacturing
Republic Iron Works	Chicopee	01020	332312	Fabricated Structural Metal Manufacturing
Scott's Metal Fabrication	Ludlow	01056	332322	Sheet Metal Work Manufacturing
Tech Fab	South Hadley	01075	332322	Sheet Metal Work Manufacturing
W T Bolduc & Son Co Inc	Orange	01364	332322	Sheet Metal Work Manufacturing
Westfield Heating & AC INC	Westfield	01085	332322	Sheet Metal Work Manufacturing