PRECISION MACHINING OCCUPATIONS IN BERKS AND SURROUNDING COUNTIES

Berks County
Workforce Investment Board

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Summary:

Precision Machining was identified as one of Pennsylvania's top "occupational growth areas" in the Center for Advanced Manufacturing Careers Analysis Report, November, 2010.

In September, 2014, the Berks County Workforce Investment Board determined to investigate if this was still the case in Berks and the surrounding counties of Chester, Lancaster, Lebanon, Lehigh, Montgomery, and Schuylkill.

The following narrative will demonstrate that the critical need for these skilled occupations exists and a long term strategy of expanding a "talent pipeline' to meet this need is paramount to the sustainability of a key regional manufacturing sector.

Increasingly, our industry partners are expressing a need for skilled Machinists and Computer Numerically Controlled (CNC) Machine Operators, ideally, with programming knowledge. Finding qualified candidates for these key positions is a challenge for any manufacturing organization.

The shortfall in capable Machinist and CNC Operator applicants creates even more challenges when employers look to hire workers proficient, specialized, and ready to plug in "out of the gate."

Paradoxically, area Career and Technology Centers and other educational providers continue to struggle with enrollment at 50% of enrollment capacity or less.

Traditional "machinist" training programs can take up to 2 to 4 years to complete.

The primary employers of these skilled occupations are Machine Shops, Primary Battery Manufacturers, and Surgical and Medical Instrument manufacturing.

This report will present statistics on the current state of regional precision machining occupations, information on the shortfall, and potential cost-effective strategies with long-term solutions.

Most precision machining occupations are found in manufacturing firms where the personnel are responsible for performing highly diversified and precise work in the manufacture of parts and items from castings, forgings, and other raw stocks made of various metals, metal alloys, plastics and other materials. They are also often responsible for the machining operations required in the repair of such items.

Historically, this work has been accomplished through the skilled use of manual machine tools, but it has become the norm in precision machining occupations to employ highly-sophisticated computer numeric control (CNC) work centers that control the machine tools and attachments. In addition, the skills, knowledge and abilities of the employees in these occupations are critical to the continuous improvement of enterprise-wide productivity, quality, safety and cost metrics. Precision machine workers have been most often referred to as machinists, tool & die makers, CNC operators or CNC programmers. However, advances in technology are leading some organizations to merge the CNC Programmer, Machinist and CNC Operator roles into a single position referred to as CNC Machinist.

Computer-Controlled Machine Tool Operators, Metal & Plastic, Computer Numerically Controlled Machine Tool Programmers, Metal & Plastic, and Machinists are consistently identified as High Priority Occupations by the PA Department of Labor & Industry in Berks County and state-wide. Tool & Die Maker jobs have dwindled due to the incorporation into other machining capabilities but are included here as a traditional machining occupation.

Center for Advanced Manufacturing Careers Precision Machining Occupations – General Description, rev. 3/11/2011

1. Regional Employment Trends:

Data obtained from Economic Modeling Specialists International (EMSI) indicates that the need for qualified Precision Machinists is on the rise in new and replacement job employment opportunities.‡

By 2020, Berks County and the 6 surrounding counties will account for almost 24% of the Commonwealth of Pennsylvania's employment in the four precision machining occupations.

Analysis shows that the largest regional growth in precision machining occupations during the time period 2014 through 2020 will occur in the Computer Controlled Machine Tool Operators and Machinists jobs. The highest percentage of need in these two occupations will be in Berks, Lebanon, and Schuylkill Counties with slight growth in three of the remaining four counties in the region.

2014-2020 Precision Machining Growth by Occupation in Berks County

SOC	Description	2014 Jobs	2020 Jobs	% Growth
51-4011	Computer-Controlled Machine Tool Operators, Metal and Plastic	410	457	11.5%
51-4012	Computer Numerically Controlled Machine Tool Programmers, Metal and Plastic	52	63	21%
51-4041	Machinists	734	800	9%
51-4111	Tool and Die Makers	155	163	5%
	Total	**1351**	**1483**	**9.7%**

2014-2020 All Precision Machining Occupation Growth in 6 Surrounding Counties

Region	2014 Jobs	2020 Jobs	Change	% Change
Chester County,	935	984	49	5%
Lancaster County	1,365	1,428	63	5%
Lebanon County	409	454	45	11%
Lehigh County	1,115	1,196	81	7%
Montgomery County	2,055	1,971	-84	-4%
Schuylkill County	404	459	55	14%

See ***Appendices A & B*** for employment and projected change by county *and* occupation.

‡ Source: EMSI data based primarily on the Quarterly Census of Employment and Wages (QCEW) from the Bureau of Labor Statistics (BLS) and the Bureau of Economic Analysis (BEA).

Location Quotient Breakdown - 2014 National LQ

While precision machining jobs represent only 5% of total manufacturing employment in the seven county region, the multi-county versus national Location Quotient (LQ) for these four occupations is 1.16 indicating a relatively strong occupational presence within the region. The region is historically rich with a large Metals & Metal Fabrication manufacturing base anchored by Berks and Lebanon Counties with a LQ for these occupations at 1.73 and Schuylkill County at a LQ of 1.69, well above the national average, demonstrating that this remains a key industry sector occupation.

LOCATION QUOTIENT (LQ) IS A RATIO THAT COMPARES A REGION TO A LARGER REFERENCE REGION ACCORDING TO SOME CHARACTERISTIC OR ASSET. LQ IS A VALUABLE WAY OF QUANTIFYING HOW CONCENTRATED A PARTICULAR INDUSTRY, CLUSTER, OCCUPATION, OR DEMOGRAPHIC GROUP IS IN A REGION AS COMPARED TO THE NATION. IT CAN REVEAL WHAT MAKES A PARTICULAR REGION "UNIQUE" IN COMPARISON TO THE NATIONAL AVERAGE.

Precision Machining LQ by County

Occupation	Description	Berks County	Chester County	Lancaster County	Lebanon County	Lehigh County	Montgomery County	Schuylkill County
51-4011	Computer-Controlled Machine Tool Operators, Metal and Plastic	2.35	1.19	1.36	1.84	1.06	1.24	2.37
51-4012	Computer Numerically Controlled Machine Tool Programmers, Metal and Plastic	1.71	0.41	1.46	1.33	1.17	0.50	3.10
51-4111	Tool and Die Makers	1.59	0.69	1.68	2.01	0.85	0.69	1.60
51-4041	Machinists	1.53	0.72	1.17	1.66	1.50	0.87	1.37
	Total	**1.73**	**0.81**	**1.29**	**1.73**	**1.31**	**0.92**	**1.69**

Source: QCEW Employees - EMSI 2014.3 Class of Worker

2. Regional Job Listings by Occupation (January, 2015)

In a 2014 survey conducted by the Greater Reading Chamber of Commerce & Industry appraising the ease in finding required talent or skills based on a scale of 1 to 5, 1 being worst and 5 being best, 84% of 45 responding manufacturing employers rated "Technical Positions" with a 3 or less indicating that there is difficulty in recruitment. Precision machining was repeatedly identified as the skill set lacking in the region.

Job postings in January, 2015 for each precision machining occupation in the region were:

- Computer Controlled Machine Tool Operators – 199 (59 unique postings*)
- CNC Machine Tool Programmers – 33 (13 unique postings*)
- Machinist – 294 (76 unique postings*)
- Tool & Die Maker – 13 (8 unique postings*)

**EMSI's de-duplicated job postings. Multiple postings that list the same job, same company, and same region are reduced to 1 unique posting.*

3. Regional Age Demographics by Occupation

"New skilled workers will be needed not only to keep pace with expected growth in U.S. manufacturing production but also to replace professionals who are expected to retire from the U.S. labor force…it can be assumed that around [27% of current] machinists will retire before 2020." †

Bureau of Labor Statistics *Quarterly Census of Employment and Wages* (*QCEW*) data confirms that the regional workforce for these occupations is becoming increasingly lop-sided when considering the age demographic. 56.1% of the current regional workforce occupying precision machining occupations is 45 years or older compared to 46% of the regional workforce in all industries.

By 2020, 26.6% of the current precision machining workforce in the seven county region will be near, at, or above retirement age. **This will result in nearly 2,000 precision machining jobs that could be affected and in need of replacement.** Add to this the 340 new jobs expected by 2020 and an effective succession of 32% of the regional precision machining workforce will be required. **The critical need for an expanded pipeline is evident.**

	Age	2014 Jobs	2014 Percent
●	14-18	39	0.5%
●	19-24	539	7.1%
●	25-34	1,255	16.4%
●	35-44	1,520	19.9%
●	45-54	2,249	29.5%
●	55-64	1,637	21.4%
●	65+	396	5.2%
	Total	7,635	

† Source: Excerpts from "The U.S. Skills Gap: Could It Threaten a Manufacturing Renaissance?" H. Sirkin, M. Zinser, & J. Rose. The Boston Consulting Group.

4. Pipeline

In September, 2014 a survey of Berks County educational providers was conducted to gauge the enrollment in precision machining programs. According to the two Berks County Career & Technology Centers, 68 adult and secondary school students are currently enrolled with 26 due to graduate by June, 2015.

Reading Area Community College (RACC) reports graduating on average 20 CNC Operator Certificate program completers annually but this number has fluctuated based on unemployment levels and financial aid availability. Future numbers could be negatively impacted by the lack of subsidizing grant funds and company tuition assistance.

Please note: *Where projections are indicated, numbers are based on current enrollment trends.*

Berks County Precision Machining Programs Graduates

School	2015	2016	2017	2018	2019	2020
Berks CTC	15	11*	8*	10*	11*	12*
Reading Muhlenberg CTC	11	7*	10*	11*	13*	13*
RACC (CNC)	8*	10*	12*	14*	16*	16*
Total	34	32	30	35	40	41

**projected*

Regional Career & Technology Precision Machining Program Graduates

Chester County's Technical College High Schools do not offer programs in precision machining.

Lancaster County Career & Technology Center has discontinued its precision machining program. The most recent available information indicates that Thaddeus Stevens College of Technology awarded 26 certificates to the completers of the 2 year Machine Shop Technology program in 2013.

Lebanon County Career & Technology Center offers a program in Industrial Machine Technology that is articulated to both Thaddeus Stevens' and Harrisburg Area Community College's credit programs. 20 secondary school students are currently enrolled with 7 expected to graduate in June, 2015. An annual projection of 8 graduates is expected through 2020.

Enrollment Year	Total Students Enrolled	Total Students Graduated
2014-15	20	7
2015-16 (Projected)	18	8
2016-17 (Projected)	18	8
2017-18 (Projected)	18	8

Lehigh Career & Technical Institute offers a program in CNC/Precision Machine Tool Technology. 72 secondary school students are currently enrolled with 13 expected to graduate in June, 2015. Additionally, 12 adult learners are expected to complete the program in 2015. Annual graduate rates are expected to remain constant through 2020.

Enrollment Year	Total Students Enrolled	Total Students Graduated
2014-15	84	25
2015-16 (Projected)	80-85	32
2016-17 (Projected)	80-85	35-40
2017-18 (Projected)	80-85	35-40

Northern Montgomery County Technical Center offers a precision machining program and anecdotal information suggests that enrollment had been underpopulated but has increased two-fold since 2013. Currently, 4 adult and 37 secondary school students are enrolled.

Enrollment Year	Total Students Enrolled	Total Students Graduated
2014-15	41	11
2015-16 (Projected)	35	20
2016-17 (Projected)	35	20
2017-18 (Projected)	35	20

Note: NMCTC reports that all enrollments are expected to dip beginning 2015-16 due to sponsoring school districts downsizing the 9th grade student population sent in order to focus on student preparation for the PA Department of Education required Keystone Exams. Consequently, student entrance into the program will be delayed until 10th grade.

Schuylkill Technology Center offers a Machine Trades program with 21 10th to12th grade secondary school students currently enrolled. It is expected that the enrollment/graduation numbers will be at or slightly greater than 10 per annum through 2020.

Enrollment Year	Total Students Enrolled	Total Students Graduated
2014-15	21	3
2015-16 (Projected)	19	9
2016-17 (Projected)	20	10
2017-18 (Projected)	20	10

On average, with projected regional precision machining program graduation of 100-110 per annum and estimated annual precision machining openings for the seven county region projected to be 222 per year, **the regional demand appears to outpace the anticipated pipeline supply by over two to one.**

The Good News: The CTCs have the open seat capacity to avert this shortfall crisis with full enrollment.

5. Employer Feedback

Interviews with Berks County employers provided feedback via survey or face to face. In a preliminary survey of a roughly 10% representative sample of Berks manufacturers that employ skilled precision machinists, the consensus response is that the projected demand numbers identified by both EMSI and the Center for Workforce Information and Analysis are likely on the low side. Of the nine employers responding, a total of 80 openings in precision machining jobs were expected in the period 2014 through 2018. Most of the anticipated openings will be in CNC Machine Tool Operator positions due to production expansion driven by added tool acquisition and replacement of employees leaving through normal attrition.

Three examples:

1. Employer A is adding 16 CNC Swiss Lathes to its production capabilities which will require the immediate hiring of 10 new CNC operators. “This growth, coupled with a decline in available talent, has required us to train within which is cause for concern due to a decline in a technical talent level.” Employer A’s need for CNC operators is so

immediate that it has relaxed a corporate recruiting policy mandating 3+ years of experience as a requirement for hiring consideration.

2. Employer B is experiencing rapid growth in new markets for its products that is forcing the small 55 employee company to expand its precision machinist employment from 28 CNC operators and machinists in late 2014 to 60 by the end of 2016.

3. Employer C (50+ employees) states “Month long recruiting produces very few candidates and most lack the needed skills. Mean age is 47 years old. Anticipate future openings based on retirements, but even more based on future growth opportunities.”

Aggregated anecdotal opinion by the nine respondents is that the Berks County CTCs cannot support employer demand due to enrollment challenges. Completers are being recruited for open positions as soon as the students graduate and many employers are left to recruit outside the region, lure incumbents from colleagues, settle for less qualified candidates, or have positions go unfilled for extended periods.

In early 2015, the Berks WIB/Chamber of Commerce co-sponsored a broader Precision Machining employer survey (see Exhibit 1) which showed:

- 84% of Berks employers responding indicated that the projected pipeline for precision machining occupations **will not support their needs during the next 4-5 years**.
- 58.8% responded that anticipated openings will be due to replacement while 76.5% indicated that anticipated openings will also be due to new hires to support production growth in the same 4-5 year period.
- Responses confirm the age demographics identified by our research, with respondents indicating 27% of their current machining employees occupy the 55-64 year old average age category.

6. Conclusion

Our investigation confirms that current precision machining skills shortages will continue to grow for Berks and the surrounding region through 2020. This worsening shortfall carries a significant risk to the success of a key manufacturing sector in the region. The economic consequences of failing to find effective solutions are magnified by the concentration of machining employment in the seven county regional manufacturing sector, and the primary importance of this sector to our regional economy. Employers unable to recruit and develop the necessary talent will forfeit the opportunity for growth in customer orders or not receive appropriate return on investment.

“The U.S. high-skill manufacturing workforce is concentrated within a handful of professionals: 90 percent include only ten types of workers. The top five – machinists, welders, industrial-machinery mechanics, industrial engineers, and operators of computer-controlled machine tool – account for two thirds of skilled manufacturing work.

Although there is limited evidence of a skills crisis today, we believe that long-term concerns…could be more serious – if companies do not do more to develop future talent. “ †

† Source: Excerpts from “The U.S. Skills Gap: Could It Threaten a Manufacturing Renaissance?” H. Sirkin, M. Zinser, & J. Rose. The Boston Consulting Group.

The data contained in this document supports the following key findings:

- Workforce and economic development agencies must continuously and systematically analyze the availability of key manufacturing skills in the region by engaging the involvement and input of employers through Manufacturing Sector Industry Partnerships.
- An insufficient regional pipeline exists to fill current openings and future replacement openings for precision machining occupations.
- While the region is moderately well-off in training programs and providers, enrollment challenges and method of delivery flexibility issues exist with regard to quality and quantity. Solutions should be driven by the following…
    - Development of a more cohesive employer/educator involvement in career promotion to fill current open capacity with more and better matched students/trainees.
    - Development of alternative training solutions, such as shorter-term training leading to NIMS credentialing, hybrid educational systems (technical academies), and apprenticeships, will be required.
- Companies, large and small, need to become more proactive in addressing skills gaps and planning for future HR needs. A return to the historical practice of investing in internal training in order to build the worker competencies that are required to remain competitive *AND* match younger talent with experienced employees is needed.

Failure to take immediate steps to initiate long-term solutions will result in a further widening of the critical skills hiring gap and threaten the region's existing manufacturer's capability to compete and expand. Economic development in this manufacturing sector will stagnate as potential US and international companies will consider the region as unappealing talent-wise.

Why Focus on Precision Machining Careers?

These professions are consistently identified by the PA Dept. of Labor & Industry as "High Priority Occupations" which are in demand by employers, have higher skill needs, and provide family sustaining wages.

As this report points out, employment opportunities for new entrants into precision machining occupations are evident. Many employers are recruiting candidates directly from the CTC and RACC programs as they graduate and are willing to provide on the job upskilling immediately upon hiring.

Our research shows that local entry-level wages for precision machining occupations (25th percentile) can be $16 to $18 per hour or approximately $35, 000 per year in wages. This compares to $32,114 that is considered a family sustaining wage in PA.

Precision Machining careers follow well-established career paths and/or ladders that can result in greater job responsibility and wages approaching $30 per hour in time.

7. Recent Actions and Next Steps to Engage Employers in Cooperative Solutions

Individual employers in the region have not been successful in meeting their needs for skilled precision machining talent on their own and are unlikely to do so in the near future. The Berks Advanced Materials/Diversified Manufacturing Industry Partnership (AMDM IP) is well positioned to assist employers in coming together to work on cooperative solutions.

1. On February 6, 2015, the Berks AMDM IP held an employer response forum with a total of 55 attendees and 20 employers represented. Attending employers voiced agreement with the critical need for a significantly enhanced talent pipeline initiative. As an outcome of this assessment, the Berks AMDM IP has entered into an enterprise to address incumbent worker and pipeline issues through the creation of two work groups. The ongoing work of both groups under the guidance of the AMDM IP has already begun.
    - The ***"Grow Your Own Talent"*** Work Group met on February 25 to review, critique, and recommend revisions to the RACC Machine Tool Technology A.A.S Degree and Apprenticeship curricula. Tactical and strategic incumbent worker training needs were addressed by six employer members of the work group. Approval of the revised programs is expected by the RACC Faculty Senate by June, 2015.
    - The ***"Fill the Talent Pipeline"*** Work Group met on February 26 and unanimously recommended the development of a RACC/CTC Precision Machining Technical Academy. The proposed target date for rollout of the program to sponsoring school districts is January, 2016. The group also committed to partnering in a Berks Business and Education Coalition in-school internship program and two Reading/Muhlenberg CTC career exploration events targeted, in part, to students interested in manufacturing careers.
2. The Greater Reading Economic Partnership's highly successful "Careers in Two Years" (Ci2Y) program is being updated to version 2.0. The marketing campaign will be rolled out in April, 2015. ***Ci2Y 2.0*** is aimed at attracting out of school youth and returning veterans into advanced manufacturing career paths, highlighting precision machining.
3. The Berks WIB will endorse a state-wide Mechatronics and Precision Machining Apprenticeship Grant proposal in pursuit of federal American Apprenticeship Grant funding that is being developed by the *PA Workforce Development Association (PWDA)* on behalf of partnering WIBs. The application submission closing date is April 30, 2015.

The following tables show employment and projected change by county and occupation…

Computer Controlled Machine Tool Operator (SOC 51- 4011)

County	County Name	2014 Jobs	2020 Jobs	2014 - 2020 Change	2014 - 2020 % Change
42091	Montgomery County, PA	620	585	-35	-6%
42011	Berks County, PA	410	457	47	11%
42071	Lancaster County, PA	323	346	23	7%
42029	Chester County, PA	306	321	15	5%
42077	Lehigh County, PA	201	225	24	12%
42107	Schuylkill County, PA	126	143	17	13%
42075	Lebanon County, PA	97	111	14	14%
		2,083	2,187	104	5%

CNC Machine Tool Programmers (SOC 51- 4012)

County	County Name	2014 Jobs	2020 Jobs	2014 - 2020 Change	2014 - 2020 % Change
42071	Lancaster County, PA	60	65	5	8%
42011	Berks County, PA	52	63	11	21%
42091	Montgomery County, PA	44	46	2	5%
42077	Lehigh County, PA	39	44	5	13%
42107	Schuylkill County, PA	29	35	6	21%
42029	Chester County, PA	18	21	3	17%
42075	Lebanon County, PA	12	14	2	17%
		254	288	34	13%

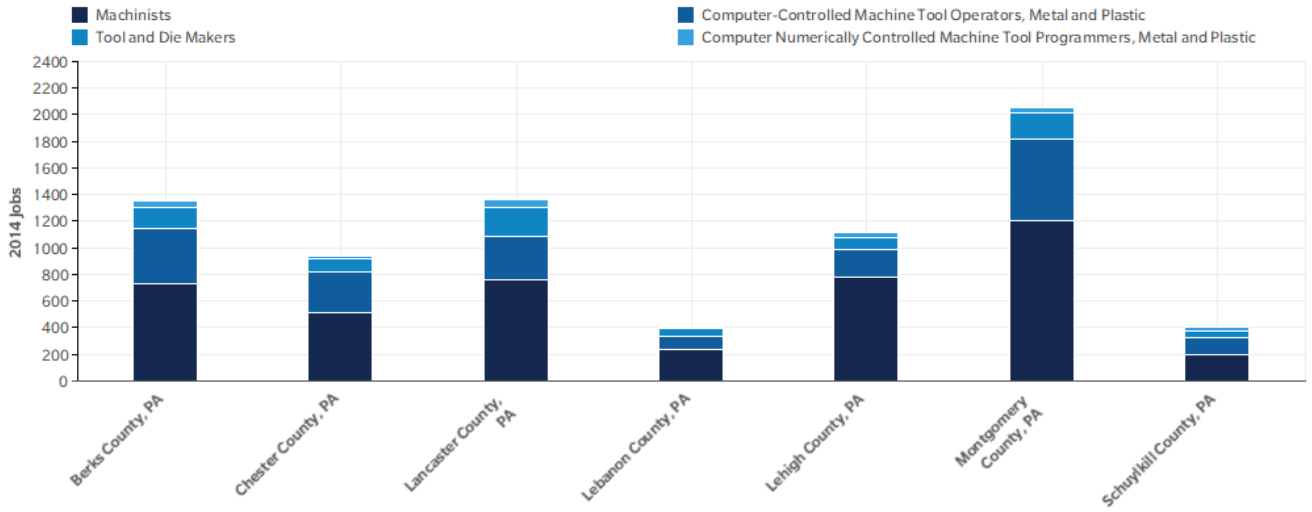
Machinist (SOC 51- 4041)

County	County Name	2014 Jobs	2020 Jobs	2014 - 2020 Change	2014 - 2020 % Change
42091	Montgomery County, PA	1,200	1,169	-31	-3%
42077	Lehigh County, PA	785	829	44	6%
42071	Lancaster County, PA	759	800	41	5%
42011	Berks County, PA	734	800	66	9%
42029	Chester County, PA	513	540	27	5%
42075	Lebanon County, PA	240	270	30	13%
42107	Schuylkill County, PA	202	230	28	14%
		4,433	4,638	205	5%

Tool & Die Maker (SOC 51- 4111)

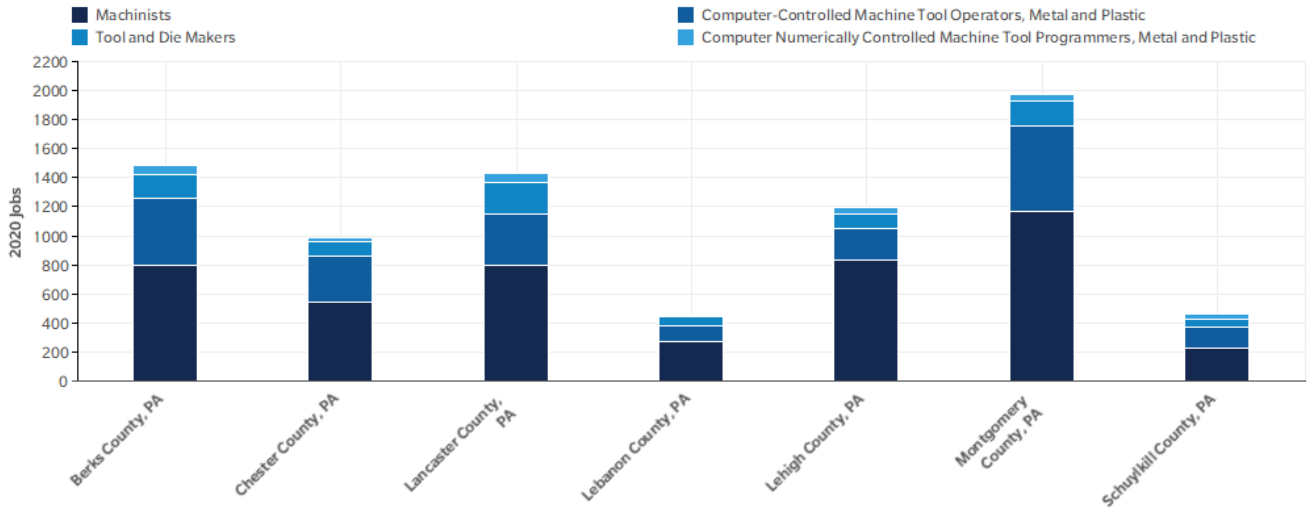
County	County Name	2014 Jobs	2020 Jobs	2014 - 2020 Change	2014 - 2020 % Change
42071	Lancaster County, PA	222	217	-5	-2%
42091	Montgomery County, PA	191	171	-20	-10%
42011	Berks County, PA	155	163	8	5%
42029	Chester County, PA	99	102	3	3%
42077	Lehigh County, PA	90	98	8	9%
42075	Lebanon County, PA	59	60	1	2%
42107	Schuylkill County, PA	48	50	2	4%
		864	860	-4	0%

Occupation Breakdown - 2014 Jobs



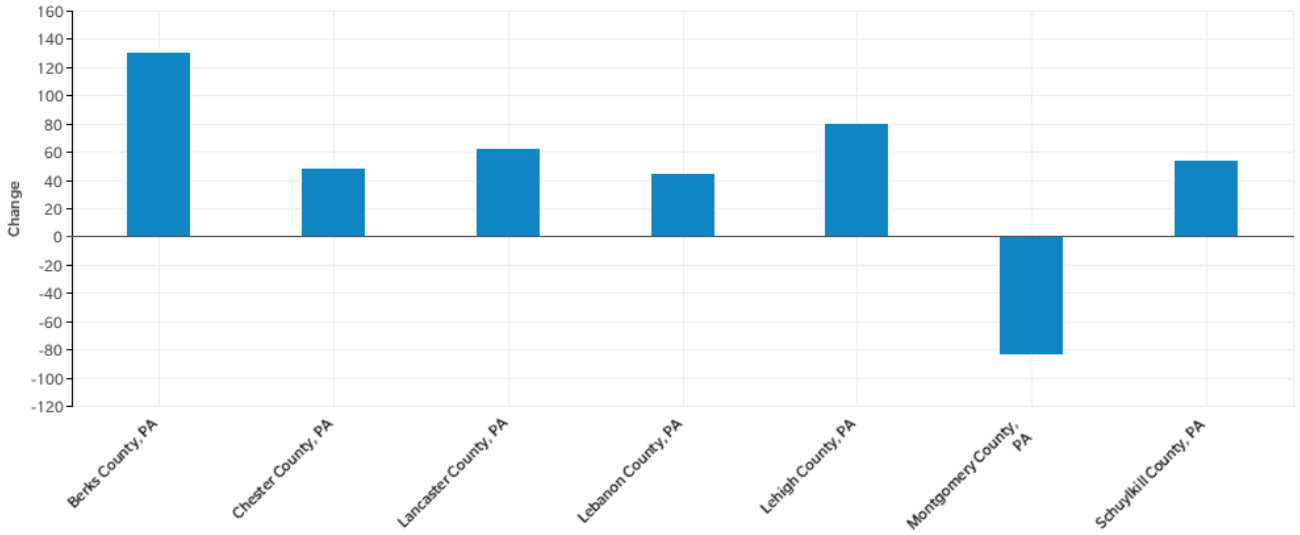
Occupation	Description	Berks County	Chester County	Lancaster County	Lebanon County	Lehigh County	Montgomery County	Schuylkill County
51-4041	Machinists	734	513	759	240	785	1,200	202
51-4011	Computer-Controlled Machine Tool Operators, Metal and Plastic	410	306	323	97	201	620	126
51-4111	Tool and Die Makers	155	99	222	59	90	191	48
51-4012	Computer Numerically Controlled Machine Tool Programmers, Metal and Plastic	52	18	60	12	39	44	29
	Total	1,351	935	1,365	409	1,115	2,055	404

Occupation Breakdown - 2020 Jobs



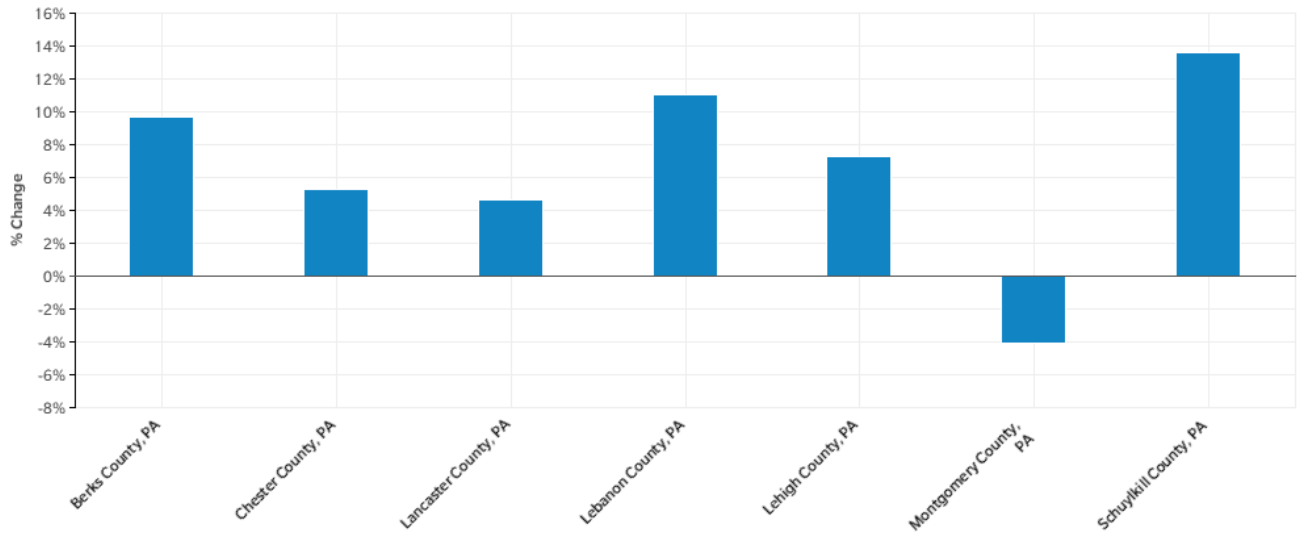
Occupation	Description	Berks County	Chester County	Lancaster County	Lebanon County	Lehigh County	Montgomery County	Schuylkill County
51-4041	Machinists	800	540	800	270	829	1,169	230
51-4011	Computer-Controlled Machine Tool Operators, Metal and Plastic	457	321	346	111	225	585	143
51-4111	Tool and Die Makers	163	102	217	60	98	171	50
51-4012	Computer Numerically Controlled Machine Tool Programmers, Metal and Plastic	63	21	65	14	44	46	35
	Total	1,482	984	1,428	454	1,196	1,971	459

Occupation Breakdown - Change



Occupation	Description	Berks County	Chester County	Lancaster County	Lebanon County	Lehigh County	Montgomery County	Schuylkill County
51-4041	Machinists	66	27	41	30	44	-31	28
51-4011	Computer-Controlled Machine Tool Operators, Metal and Plastic	47	15	23	14	24	-35	17
51-4012	Computer Numerically Controlled Machine Tool Programmers, Metal and Plastic	11	3	5	2	5	2	6
51-4111	Tool and Die Makers	8	3	-5	1	8	-20	2
	Total	131	49	63	45	81	-84	55

Occupation Breakdown - % Change



Occupation	Description	Berks County	Chester County	Lancaster County	Lebanon County	Lehigh County	Montgomery County	Schuylkill County
51-4012	Computer Numerically Controlled Machine Tool Programmers, Metal and Plastic	21%	17%	8%	17%	13%	5%	21%
51-4011	Computer-Controlled Machine Tool Operators, Metal and Plastic	11%	5%	7%	14%	12%	-6%	13%
51-4041	Machinists	9%	5%	5%	13%	6%	-3%	14%
51-4111	Tool and Die Makers	5%	3%	-2%	2%	9%	-10%	4%
	Total	10%	5%	5%	11%	7%	-4%	14%

Exhibit 1

February, 2015

Berks Employer Survey: Availability of Precision Machining Occupations

1. Computer-Controlled Machine Tool Operators (Non-Programming) - CNC Operator is generally the least-skilled of the precision machining occupations and frequently serves as an entry-point for further technical development. Please fill in the number of Computer Numerically Controlled (CNC) Machine Tool Operators (Non-Programming) for each category.

#	Current CNC Operators	Current Openings	2015 Projected Openings	2016 Projected Openings	2017 Projected Openings	2018 Projected Openings
1	1	0	0	1	1	1
2	7	4	6	2	2	2
3	0	0	0	0	0	0
4	3	0	0	1	0	1
5	0	1				
6	1	0	1	0	0	0
7	6	0	2	1	1	1
8	1	0	0	0	0	0
9	1	0				1
10	3		1	1	1	1
11	1	0	2	2	1	1
12	38	10	10	4		
13	6	2	2			
14	42	6	8	4	4	5
15	2	1	1	1	1	1
16	0	0	0	0	0	0
17	18	2	4	0	0	0
18	0	0	0	0	0	0
Totals	130	26	37	17	11	14

2. Computer Numerically Controlled Machine Tool Programmers/Operators - CNC Programmer is a specialized occupation that develops programs that run multiple CNC work centers. Please fill in the number of Computer Numerically Controlled (CNC) Machine Tool Programmers/Operators for each category.

#	Current CNC Prog/Opers	Current Openings	2015 Projected Openings	2016 Projected Openings	2017 Projected Openings	2018 Projected Openings
1	3	1	1	1	1	1
2	6	1	1	1	1	1
3	0	0	0	0	0	0
4	3	0	0	1	0	1
5	6	0				
6	1	0	0	0	0	0
7	6	1	2	1	1	2
8	1	0	0	0	0	0
9	1	0				
10	3	2		2	1	1
11	2	0	0	1	0	1
12	1	0	0	1		
13	5	2	2			

14	3	2	2	2	2	2
15	1	0	0	1	0	0
16	8	4	4	0	0	0
17	3	0	0	0	0	0
Totals	53	13	12	11	6	9

3. Machinists - Machinists are skilled technicians who use machine tools such as lathes, milling machines and grinders to make machined products that meet precise specifications. Please fill in the number of Machinists for each category.

#	Current Machinists	Current Openings	2015 Projected Openings	2016 Projected Openings	2017 Projected Openings	2018 Projected Openings
1	2	1	1	1	1	1
2	1		0	1	1	1
3	28					
4	2	1	1	0	0	0
5	15	0	0	0	0	0
6	5	0	1	0	1	0
7	3	0				
8	0	0	0	0	0	0
9	6	1	1	2	2	1
10	1	0	0	0	0	0
11	1	0		1		
12	1		1			
13	1	0	1	0	0	0
14	2	1	1	1		
15	7	2	4			
16	10	2	2	2	2	2
17	8	2	1	2	1	2
18	1	0	0	0	0	0
19	5	0	0	0	0	0
Totals	99	10	14	10	8	7

4. Tool and Die Makers - Tool & Die Makers are highly-specialized machinists that craft and repair precision tools, dies and other devices that enable machines to produce a wide variety of products. Please fill in the number of Tool & Die Makers for each category.

#	Current Tool & Die Makers	Current Openings	2015 Projected Openings	2016 Projected Openings	2017 Projected Openings	2018 Projected Openings
1	0	0	0	0	0	0
2	20					
3	0	0	0	0	0	0
4	0	0	0	0	0	0
5	0	0	0	0	0	0
6	8	0				
7	0	0	0	0	0	0
8		0	0	0	0	0
9	1	0	0	0	0	0
10	10	1	1	1	1	1
11	0	0	0	0	0	0

12	0	0	0	0	0	0
13	0	0	0	0	0	0
14	0	0	0	0	0	0
15	10	0	1	3	3	3
16	3	1	1	1	1	1
17	0	0	0	0	0	0
18	0	0	0	0	0	0
Totals	**52**	**2**	**3**	**5**	**5**	**5**

5. Do you feel the projected pipeline for Precision Machining Occupations will support your need during the next 4-5 years?

Answer Options	Response Percent	Response Count
Yes	26.3%	5
No	84.2%	16
answered question		19
skipped question		1

6. What is the average age of your machining employees?

Answer Options	Response Percent	Response Count
under 44	18.2%	2
45 - 54	63.6%	7
55 - 64	27.3%	3
over 65	0.0%	0
answered question		11
skipped question		9

7. Do you anticipate precision machining positions to open within your company due to replacement openings or the need for new hires to support production growth?

Answer Options	Response Percent	Response Count
Replacement Openings	58.8%	10
New Hires	76.5%	13
Other (please specify)		2
answered question		17
skipped question		3

#	Other (please specify)
1	Don't anticipate any openings in the near future
2	Workforce getting too old

8. Please share any anecdotal information you may have on the recruitment issues you have faced (or anticipate facing) in new hire precision machinist recruitment and/or forecasted replacement due to retirements.

#	Response Text
1	Experienced people have positions and are difficult to find. Student co-ops have not been prepared for the world of work in soft skills or academics.
2	Cannot find people who possess the skills we need for large fabrications. Have hired two vo-tech graduates but have to spend time training.
3	We usually have either Coops or Tech students entering our company.
4	Just hired a part-time machinist in 2014. Becoming more difficult to find skilled individuals to fill these positions.
5	Have had problem in the recent past recruiting qualified people. As a result we've had a couple apprentices who started with no prior experience in the trade. Would like to see a more coherent apprenticeship program. Current program has some gaps and should be updated.
6	We need a person to be able to be given a job (material, program, tool list) on set up and run on CNC equipment. Then drill & polish ready for production. 46 years (mean age). No (replacement openings). It would be nice to have a new person in the shop since at times (very many) we are busy.
7	Month long recruiting produces very few candidates and most lack the needed skills. Mean age is 47 years old. Anticipate future openings based on retirements, but evn more based on future growth opportunities
8	At this point, as I have stated in in survey, there is no projected growth. Having said that, we are in the early stages of expansion in terms of adding a second CNC. Our initial plan is to run 2 CNCs with one operator. Obviously, workload could change this requirement in terms of manpower.
9	We have an even greater need for Machine Rebuilders, who in our shop, not only need to know how to operate various machine tools, but also understand the intricacies of how machine tools work, how to troubleshoot problems, how to service those problems, whether through repair, rebuilding, retrofitting, etc. The skills learned in CTC Machine Shop Technology/Precision Machining programs are essential and foundational to our work. Our company is also engaged in production/manufacturing work requiring precision machining, but this comprises approximately 50% of our overall work volume. Note: Within the next few years, we anticipate the retirement of at least 2 veteran rebuilders. Replacing that skill and knowledge is impossible; it is acquired and intuitive. These veterans tell us it takes a minimum of 5-7 years to approach the levels of experience and knowledge for basic competency. The best candidates we have found recently have been graduates of the BCTC Computerized/Precision Machining Technology program.
10	Every time we advertise for qualified machinist the people that answer are warehouse workers and forklift operators. Finding people with a basic understanding of machining and the passion for the industry (is difficult).
11	I have employed students from north Montco in the past. My involvement with them is the program needs to better prepare students for the workplace. My son, currently a Senior at BCTC, has worked for me for the past two summers. I am impressed with how well prepared he was after only his Junior year. I expect his Senior year to well prepare him for CNC experience.

12	We have seen a decline in viable candidates to fill our CNC Operator positions. The pipeline is a concern
13	There is a lack of good machinists coming from our trade schools, and if there was, there is no communication among the trade schools and potential employers. We need to educate our students that college is not the only avenue and the trades can offer a rewarding career as well. We need to build a strong middle class workforce. I feel you are either a doctor/lawyer or unskilled, no middle ground.
14	Parts we are mfg. are medium to large, job shop environment, short to single piece runs. This further reduces the candidate pool with relevant experience.