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Insert SAMA Dec. 14, 2011 Workforce Assessment Meeting Executive Summary here.

San Antonio Manufacturers Association (SAMA)
Workforce Assessment Meeting
December 14, 2011

Session Objectives

On December 14, the San Antonio Manufacturers Association (SAMA) hosted a town hall type meeting to gage workforce needs. The meeting was facilitated by Donald Kenton, Sc.D., Chairman of the SAMA Education Committee. *The following assessment of the meeting and analysis of the data provided has been prepared by Dr. Kenton and is approved by the San Antonio Manufacturers Association.*

The objectives of SAMA Workforce Assessment Meeting included:

1. Estimate existing shortages for new hires including growth and turnover
2. Estimate the workforce skills debit
3. Identify the most needed open potions
4. Identify skills required for most needed potions
5. Provide suggestions for workforce training and education programs

General Observations

The December 14 session produced a few surprises and confirmed many of our previous findings for skills development programs. Manufacturers attending the meeting included large, medium and small employers, ranging from 2000+ to 30+ employees in size. From the open discussion, we arrived at a number of overall observations summarized below:

1. The ten manufacturers at the meeting projected a need to fill over 150 front line operations and supervisory positions during the next year. The manufacturers represented a good mix of larger employers and small specialty shops. Extrapolating this projected demand across the region, even without consideration of aerospace manufacturing, results in numbers significantly above those published by Workforce Solutions Alamo.
2. The demand findings do not include any allowance for the Eagle Ford Shale program or allowance for aircraft maintenance and repair operations (MRO).
3. Most needed positions fell into the usual categories:
    a. Production technicians
    b. CNC machinists/programmers
    c. Maintenance technicians
4. Significant demand existed in other specialties including welding, design, and quality assurance.
5. A large number of the identified vacant positions possessed common skills requirements, with only specialty occupational training needed for a specific position.
6. The Advanced Technology and Manufacturing Academy (ATMA) curriculum with incorporation of the Manufacturing Skill Standards Council (MSSC) certificates provides the foundation that addresses minimum technical requirements for almost all the needed positions.
7. The group strongly supported aptitude and personality testing before embarking on any training program.

8. The group supported strengthening the educational foundation programs that are included in the ACT Work Keys or similar assessment tools.

9. The higher-level technical positions needed additional math above eighth grade level, but not calculus. This is probably pre-calculus level but includes basic trigonometry, geometry, and algebra.
10. The group noted that most positions required the ability to analyze and solve problems on individual and team based levels.

Workforce Requirements

Through open discussion, the committee identified overall needs summarized in Table 1 matched to Standard Occupation Codes (SOC). Codes selected in the table most closely matched the general position descriptions discussed at the meeting. As shown in Table 1, approximately 50% of the total responses required maintenance and facility support personnel to support complex physical plants, machinery and controls. All of the required assembly team position needs required significant formal and on-the-job training. The manufacturers assembled on December 14th did not identify any vacancies that require dedicated welders, although many had existing positions that do require various levels of welding and brazing certifications. Meeting participants indicated a continuing demand for machinists with emphasis on CNC machining and programming. However, the manufacturers expected technicians fulfilling these roles be capable of performing other activities that required knowledge of machining.

Table 1. Open Position Preliminary Poll of Regional Manufacturers

SOC Code	Area/Description	No. Responses	Subtotal	Fraction (Obs. Freq.)
49-XXXX	**Maintenance**			
49-9042	Facilities Maintenance	5		
49-9041-42	Machinery Mechanics	8		
49-9041	Machinery Mechanics - Textile Equip	1		
49-9041	Machinery Mechanics - Tool and Die	1	15	0.3191
49-2094-9012	Industrial Instrumentation and Controls	7	7	0.1489
49-XXXX	***Total Maintenance***	***22***		
51-XXXX	**Production & Operations**			
51-2092-4121	Assemblers, General Technicians	6		
51-2092	Packaging Machinery Operators	1	7	0.1489
51-2023	Manufacturing Technologists	4		
51-2023	Electromechanical Assembly Tech	1	5	0.1064
51-4011-4031-4041	CNC Machinists & Programmers	7	7	0.1489
51-XXXX	***Total Production and Operations***	***19***		
17-XXXX	**Technical Support**			
17-3012-3013	Drafting and Design	4		
	Quality Assurance	2	6	0.1277
17-XXX	***Total Tech support***	***6***		***1.0000***

Analysis of Meeting Input on Workforce Needs:

Distribution Comparison to Published Data:

Workforce Solutions-Alamo, the regional office of the Texas Workforce Commission (TWC), published demand data for the region including San Antonio and surrounding counties with reference to the SOC codes. Two points were assessed as a result of data collected from the December 14th meeting:

1. Did the position demand distribution derived from the meeting generally match the published data for these SOC codes?
2. Did the total demand derived from the meeting agree with that published by Workforce Solutions - Alamo?

We can address the question of distribution by comparing the expected frequency of open positions with the observed frequency and fitting relative comparison to a mathematical function called Chi Square. Table 2 summarizes the open positions published by Workforce Solutions-Alamo and converts the number of openings into a fraction, designated the expected frequency. Previously Table 1 had converted the number of responses for each identified position into a fraction, designated the observed frequency.

Table 2. Alamo Region Open Position Demand

SOC Code	Description	Annual Requirement	Sub total	Fraction (Expect. Freq.)
49-1011	!st Line Supervisors Maint.	120		
49-9041	Industrial Machinery Mechanics	55		
49-9042	Maintenance & Repair Workers General	310	365	0.5000
49-2094	Electrical Electronics Repairers	15		
49-9012	Control & Valve Installers & Repairers	10	25	0.0342
51-2092	Team Assemblers	140		
51-4121	Welders, Cutters, Brazers	110	250	0.3425
51-2022	Electrical - electronic Equip Assemblers	20		
51-2023	Electromechanical Equipment Assemblers	5	25	0.0342
51-4011	CNC Machine Tool Operators	10		
51-4031	Cutting, Punching, & Press Machine Ops	15		
51-4041	Machinists	20	45	0.0616
17-3012	Electrical and Electronic Drafters	5		
17-3013	Mechanical Drafters	15	20	0.0274

Total		730		1.0000

Table 3 portrays the computations for computing the Chi Square function value. We find that the distribution of required positions discussed at the SAMA Workforce Assessment meeting on December 14th do not differ significantly from the data published by Workforce Solutions-Alamo.

Table 3. Chi Square Computations

SOC Code	Description	Observed Frequency, Fo	Expected Frequency, Fe	Fo-Fe	(Fo-Fe)^2	((Fo-Fe)^2)/Fe
49-9041-42	Maintenance - Facilities & Machinery	0.3191	0.5000	-0.1809	0.032725	0.065450
49-25094-9012	Maintenance Industrial Instr. and controls	0.1489	0.0340	0.1149	0.013202	0.388294
51-2092-4121	Team Assemblers and Operators	0.1489	0.342	-0.1931	0.037288	0.109028
51-2023	Manufacturing Technologists & Electro-Mechanical Technicians	0.1064	0.034	0.0724	0.005242	0.154169
51-4011-31-41	CNC Machinists, Machinists, CNC Programmers	0.1489	0.062	0.0869	0.007552	0.121800
17-3012-3013	Drafting, Design, QA	0.1277	0.027	0.1007	0.010140	0.375574
	Degrees of Freedom = 5					1.214315
	Required value at 0.05 probability level (95% confidence)					11.07

Notes to Table 3

1. Observed frequencies are not significantly different statistically from expected freq.
2. Chi Squared Factor from Mason, Robert D, Statistical Techniques in Business and Economics, Appendix VIII, Richard D. Irwin, Homewood, Illinois, © 1974

Position Demand Comparison to Published Data:

A poll of manufacturers attending the December 14th meeting determined this representative group of manufactures projected a requirement for 153 new hire and turnover replacement in 2012. The same group projected a continuing training or education need utilizing resources outside the company for 114 people. Statistical techniques can extrapolate this information to the broader region with some qualifying assumptions and limitations:

1. The December 14th poll does not include Eagle Ford Shale or Aerospace MRO demands
2. Excluding Eagle Ford Shale and Aerospace MRO firms, the Alamo region hosts approximately 1,000 manufacturers.

Table 4 presents the high and low manufacturing position vacancy demands as identified by the manufacturers attending the December 14th meeting.

Table 4. Open Position Demand Range

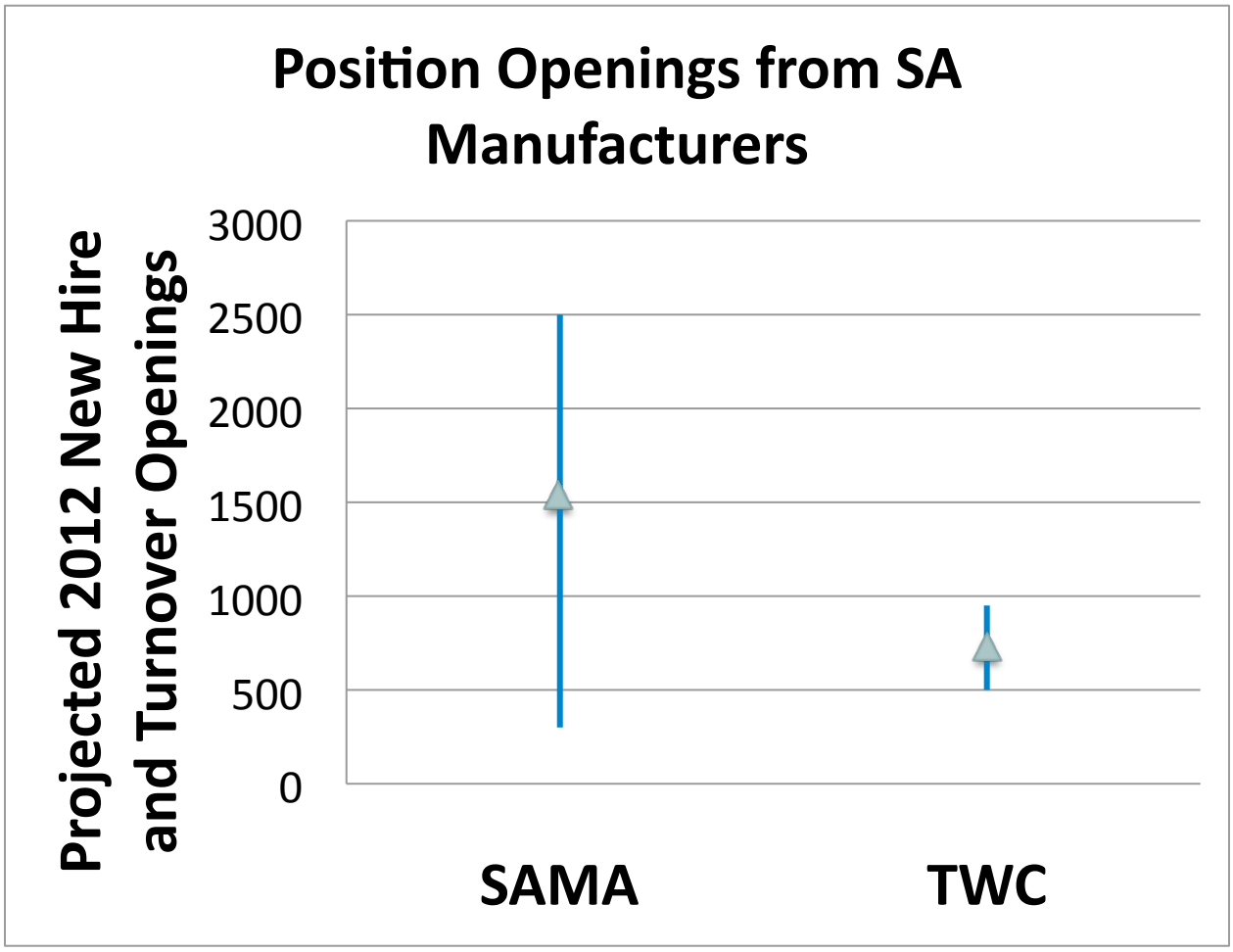
Parameter	12/14/11 Meeting Results
12-14-11 Meeting Manufacturer Participants:	10
Total Vacancies Identified - 12-14-11 Meeting Participants:	153
Minimum Vacancies Projected - 12-14-11 Meeting Participants:	3
Maximum Vacancies Projected - 12-14-11 Meeting Participants:	25
Average Vacancies Projected - 12-14-11 Meeting Participants:	15.3
Approximate Number of Alamo Region Manufacturers, Excluding Eagle Ford Shale and Aerospace MROs:	1,000

One must treat these data with some caution because of the small sample size; however, even with the limited number of attendees at the December 14th meeting, the above assessment of the open position demands identified by those attending manufacturers indicates that a significant number of skilled manufacturing vacancies exist within the Greater San Antonio region. Extrapolating the responses from the meeting attendees, we can project that the average number of skilled manufacturing vacancies currently in the Greater San Antonio region is approximately 1530 positions, with a minimum of 300 and a maximum of 2500 vacancies. As displayed in Figure 1, this data suggests shows a much greater demand for skilled manufacturing positions than the approximately 700 vacancies identified in data published by the Texas Workforce Commission.

This demand can put significant strain on the available training and education resources unless all stakeholders undertake collaborative planning to identify the most needed training efforts. In the next section, we explore the preliminary consensus developed on December 14th for the technical training, education, and on the job training required for each of the identified high demand positions.

Figure 1. Open Position Demand Compared to Workforce Solutions-Alamo Data

Figure 1 shows the graphical comparison with published data taken from Table 2.



High Demand Position Education and Training Requirements:

Table 5 summarizes the preliminary findings on education and training requirements for each identified high demand position discussed at the December 14th SAMA Workforce Assessment meeting. While there are a number of specific certifications applicable to each position, one can identify a number of commonalities from Table 5.

1. The manufacturers strongly support candidate aptitude and personality testing prior to starting formal training programs.
2. The manufacturers support the requirement for ACT Work Keys certificates or the equivalent as a prerequisite for any training program.
3. The manufacturers require completion of all four MSSC certificates as a basic foundation.
4. The manufacturers accept the ATMA program with MSSC certificates as an alternative, equivalent to standalone MSSC certificates.
5. Depending on the position vacancy, the manufacturers approve of the these AAS programs:
    a. Advanced Manufacturing Technology Associate Program now delivered by Bluegrass Community College
    b. Industrial instrumentation and controls program delivered by the Alamo colleges
    c. CNC machinist program delivered by the Alamo colleges
6. The manufacturers support a number of higher level certificates, which may or may not be included within ATMA or AAS programs:
    a. Industrial mathematics
    b. Blue print reading including schematic diagrams
    c. Basic quality systems principles
    d. Electrical maintenance
    e. Heat Vent and Air Conditioning
    f. Programmable Logic Controllers, PC controllers and associated controlled devices
    g. Hydraulic – pneumatic equipment certification
    h. Maintenance welding
    i. Tool and die maintenance
    j. AWS certifications
    k. NIMS certifications

Table 5. High Demand Position Education and Training Requirements

SOC Code	Description	Pre Req. Screen	Basic Skills	Intermediate Level	AAS	OJT or Apprentice (months)	Specialized Cert's
Assembly and Production Operations							
51-2092-4121	Assemblers, General Technicians	Aptitude and Profile Screen	ACT Work Keys or Equivalent	MSSC Certificates		3 (OJT)	Blue Print Reading
			Problem Solving	ATMA alt to MSSC			Quality Principles
51-2092	Packaging Machinery Operators	Aptitude and Profile Screen	ACT Work Keys or Equivalent	MSSC Certificates		6 (OJT)	Blue Print Reading
			Problem Solving	ATMA alt to MSSC			Quality Principles
							Certified Operator
51-2023	Manufacturing Technologists	Aptitude and Profile Screen	ACT Work Keys or Equivalent	MSSC Certificates	Opt Adv. Mfg. Tech.	Opt - 24	Blue Print Reading
			Problem Solving	ATMA alt to MSSC			Quality Principles
							AWS opt
							NIMS opt
51-2023	Electromechanical Assembly Tech	Aptitude and Profile Screen	ACT Work Keys or Equivalent	MSSC Certificates	Adv. Mfg. Tech.	Opt - 24	Blue Print Reading
			Problem Solving	ATMA alt to MSSC			Quality Principles
							PLC Cert.
							PC Controls Cert
Machinists, CNC Machinist, CNC Programmers							
51-4011-4031-	CNC Machinists & Programmers	Aptitude and Profile Screen	ACT Work Keys or Equivalent	MSSC Certificates	Adv. Mfg. Tech.	Opt - 24	Industrial Math

SOC Code	Description	Pre Req. Screen	Basic Skills	Intermediate Level	AAS	OJT or Apprentice (months)	Specialized Cert's
4041							
			Problem Solving	ATMA alt to MSSC	CNC Machining Alt		Blue Print Reading
							Quality Principles
							NIMS opt
Maintenance - Facilities, Machinery, Instrumentation, Controls							
49-9041-42	Machinery Mechanics	Aptitude and Profile Screen	ACT Work Keys or Equivalent	MSSC Certificates	Adv. Mfg. Tech.	Opt - 18	Industrial Math
			Problem Solving	ATMA alt to MSSC	Inst. & Control Alt.		Blue Print Reading
							Electrical
							Hydraulics/ pneumatics
							PLC & controls
							Maint. Welding
49-9041	Machinery Mechanics-Textile Equipment	Aptitude and Profile Screen	ACT Work Keys or Equivalent	MSSC Certificates	Adv. Mfg. Tech.	Opt - 18	Industrial Math
			Problem Solving	ATMA alt to MSSC	Inst. & Control Alt.		Blue Print Reading
							Electrical
							PLC & controls
							Maint. Welding
							Textile Equip.
49-9041	Machinery Mechanics - Tool and Die	Aptitude and Profile Screen	ACT Work Keys or Equivalent	MSSC Certificates	Adv. Mfg. Tech.	Opt - 18	Industrial Math
			Problem Solving	ATMA alt to			Blue Print Reading

SOC Code	Description	Pre Req. Screen	Basic Skills	Intermediate Level	AAS	OJT or Apprentice (months)	Specialized Cert's
				MSSC			
							Electrical
							Hydraulics/ pneumatics
							PLC & controls
							Maint. Welding
							Tool & Die Maintenance
49-9042	Facilities Maintenance	Aptitude and Profile Screen	ACT Work Keys or Equiv.	MSSC Certificates	Adv. Mfg. Tech. Opt	Opt. 18	Industrial Math
			Problem Solving	ATMA alt to MSSC			Blue Print Reading
							HVAC
							Electrical
							Plumbing
							Environment
49-2094-9012	Indust. Instrumentation & Controls	Aptitude and Profile Screen	ACT Work Keys or Equivalent	MSSC Certificates	Adv. Mfg. Tech.	Opt - 24	Industrial Math
			Problem Solving	ATMA alt to MSSC	Inst. & Control Alt.		Blue Print Reading
							Electrical
							Hydraulics/ pneumatics
							PLC & controls
							Instrumentation
							Maint. Welding

Recommendations for Workforce Training and Education Programs:

As a result of the manufacturing industry members input during the December 14th meeting, SAMA recommends that a three-phased program be pursued to address the current and projected skilled workforce shortfalls. These programs should be developed to focus on (a) immediate workforce needs to address existing and near-term vacancies; (b) intermediate needs projected to occur within 2 to 5 years; and (c) long term workforce demands to ensure a viable source of skilled workers to support existing business activities, industry growth demands and the loss of skilled workers as a result of baby boomer retirements. The following are recommendations for addressing worker skills demands.

Training Programs for Existing Staff Requiring External Company Resources:

1. Identify high demand skills requirements deficiencies.
2. In conjunction with Alamo Colleges and Workforce Solutions-Alamo, identify and coordinate efforts to provide upgraded skills development programs for existing workforce candidates.
3. Provide opportunities for electromechanical training including:
    a. Pneumatics, Hydraulics, Pumps, Gear Drives
    b. Industrial controls and Industrial instrumentation
    c. PLC and PC based control programming
4. Introduce opportunities for formal training in quality systems.
5. Introduce a SAMA-led regional program to share best training practices.
6. Explore the training opportunities associated with Training Within Industry Programs sponsored by TMAC.
7. Create formal opportunities for college faculty to experience externships as a means of keeping their technical skills current.
8. Provide increased opportunities for leadership and communication skills training.
9. Explore opportunities offered by on line training programs, such as Tooling U.
10. Introduce opportunities for specific NIMS certifications.

Transitioning Incumbent Workforce

1. Introduce aptitude and personality (employability) testing predictive tools as prerequisites for entering formal technical training programs leading to technical positions in manufacturing and allied fields.
2. Include ACT Work Keys or an equivalent competency exam for educational foundation as part of the entrance requirements to formal technical training programs leading to technical positions in manufacturing and allied fields.
3. Channel those candidates with interest and aptitude for the field that did not score well on the educational foundation proficiency test into remedial or developmental programs prior to their entering a formal technical training program.
4. Channel qualified candidates with time and finances into programs leading to Associate Degrees in Applied Science or Depart of Labor approved apprenticeship programs.

5. Chanel qualified candidates that do not have a strong educational foundation or the ability to spend extended time in formal training programs into certificate based programs that will result in completion of the manufacturing MSSC certificates and OSHA safety certificates.
6. Channel more experienced workers meeting prerequisite requirements into programs that offer an Associate level degree or higher-level third party certificates such as NIMS or AWS.

Student and Young Adult Programs

1. Add predictive tools including aptitude and personality (employability) testing as a prerequisite for entering Academies and traditional workforce driven Associate level or Apprenticeship programs.
2. Include ACT Work Keys or an equivalent basic educational foundation competency exam as part of entrance requirements to Academies, traditional Associate degree program, or Apprenticeship programs.
3. Introduce a formal program of plant tours, career days, job following, etc. to afford students the opportunity to gage their interest in manufacturing and industrial technology.
4. Introduce group based learning programs, such as Project Lead the Way, in middle school and early high school
5. Consider introducing work-study cooperatives for students pursuing certificated technical skills.
6. As part of revamped CTE programs introduce a CTE track that includes obtaining the four manufacturing related MSSC certificates.
7. Strengthen the ATMA core foundation program by fully integrating the MSSC certification modules into the program.
8. Align the ATMA and the three currently available, or soon to be available, Associate level programs:
    a. Associate in Advanced Manufacturing Technology
    b. Associate in Machining Operations with emphasis on CNC machining Operations
    c. Associate in Welding and Joining Technology
9. Wherever practical, include relevant third party technical competency certificates such as NIMS, AWS, SME, ASQ, etc.

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Approved for release on March 6, 2012 by
The San Antonio Manufacturers Association (SAMA)