I. Goals and Objectives

1. What are the department’s annual goals?
   How do they align with the college mission statement and the Santa Ana College Strategic Plan?

Following the mission of Santa Ana College, the Santa Ana College Manufacturing Technology Program strives to meet the needs of our diverse students in preparation for employment. This program emphasizes problem solving and communication, information and technology competency, as well as ethical and environmental responsibility in career training. Safety and lifelong learning are also stressed as critical components of a career in an ever changing field.

Aligned with the college mission statement and the Santa Ana College Strategic Plan, emphasis is placed on student success and retention, access for all students including disabled and disadvantaged, technology resources and use, diversity and student satisfaction.

Another key objective of the Manufacturing Technology Program is the need to keep the whole of the program continually updating to meet the changing needs of industry. Manufacturing Technology is constantly becoming more complex and computer driven. Numerous improvements must continually occur to keep up with these changes. Faculty must maintain operational skills and attend industry training for new technologies. Machine tools and software must be maintained at an industrial state of the art level. The equipment is updated through CTEA and other grants. Curriculum and equipment updates are approved by advisory committee members. Strong relationships with industry must continue and further develop. The need for life-long learning and continual personal development are continually stressed.

2. What progress has been made toward the department’s goals in the last four years?

Primary goals have been to upgrade the quality of the machines used by students in the machine tool lab to levels of technology used by industry. This has been done through the use of CTEA grant funds.

### GOALS/TASKS/ACTIVITIES | ESTIMATED TIMELINE/COMPLETION | PROGRESS
--- | --- | ---
Machinery replacement
   1. Request quotations from vendors to replace two engine lathes. Work with purchasing to complete bids and delivery. | Sept. 2014 | In progress
<table>
<thead>
<tr>
<th>Task Description</th>
<th>Action</th>
<th>Due Date</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Replace two worn out CNC milling machines</td>
<td>Request bids to replace machines</td>
<td>Sept. 2014</td>
<td>In Progress</td>
</tr>
<tr>
<td>Maintain accessibility for non-traditional students</td>
<td>Schedule classes to make them accessible to students with jobs, childcare concerns, etc.</td>
<td>On going</td>
<td>In Progress</td>
</tr>
<tr>
<td></td>
<td>Use the curriculum process to ensure that courses remain accessible to non-traditional students.</td>
<td>On going</td>
<td>In Progress</td>
</tr>
<tr>
<td>Plan for efficient use of facilities</td>
<td>Maintain efficient lab floorplan with options for placing of new equipment</td>
<td>On going</td>
<td>In Progress</td>
</tr>
<tr>
<td>Plan for construction of a new building dedicated for use by manufacturing and other industrial technology programs</td>
<td>Prepare long term plan for construction of a new building.</td>
<td>On going</td>
<td>In Progress</td>
</tr>
<tr>
<td>Replace tooling</td>
<td>Identify worn out tooling that includes cutting tools and machine accessories such as vises, rotary tools and lathe work holding chucks and others.</td>
<td>On going</td>
<td>Completed</td>
</tr>
<tr>
<td>Ensure currency of faculty skills in CAD/CAM</td>
<td>Schedule inservice training for faculty who teach courses using updated software.</td>
<td>On going</td>
<td>Completed</td>
</tr>
<tr>
<td>Replace worn out lathe chucks</td>
<td>Get quotations and apply for funding</td>
<td>Sept. 2014</td>
<td>Delayed</td>
</tr>
<tr>
<td>Replace worn out milling vises</td>
<td>Get quotations and apply for funding</td>
<td>Sept. 2014</td>
<td>Delayed</td>
</tr>
<tr>
<td>Hire machine maintenance person</td>
<td>Request funding to hire.</td>
<td>Sept. 2014</td>
<td>In Progress</td>
</tr>
</tbody>
</table>
3. **Do goals need to be restructured, eliminated or pursued with different activities?**

A majority of the goals of the Manufacturing Technology Program have been achieved. Primarily due to budget constraints some goals will have to be eliminated, restricted, or postponed. A prime example is the need for program offering expansion.

4. **What are the proposed goals for next year?**

**Proposed Goals for the 2014-2015 academic year include the following:**

A. Apply for additional CTEA Grant funds to replace additional equipment which has become outdated or mechanically worn out.

B. Conduct surveys of current students as well as follow-up on exited students in industry

C. Survey local employers for upcoming trends and industry needs.

D. Hold advisory meeting with a full range of industry partners.

E. Schedule semester classes in a rotation which allows program completion in a four semester cycle.

II. **Student and Program Success**

5. **What are the strengths of the program?**

**Program Strengths:**
The strengths of the program include the faculty dedication to grow and modify the Manufacturing Technology Program to meet the needs for student success in industry. Students are prepared for a career in the machining field, employed at major manufacturers and independent job shops. The need for life-long learning, environmental concern, and safety awareness are continually stressed.

Close ties with industry partners have increased the strength of the program. The SAC Manufacturing Technology Program faculty are members of advisory committees at local community colleges.

The Manufacturing Technology Program has two full time faculty members, one of which serves as the Department Chair. Collectively the instructors have 40 years of manufacturing industry experience. In addition, five adjunct faculty members round out the department staff with additional variations of industrial expertise.

The Manufacturing Technology Program offers morning, evening and weekend courses to meet student needs. Students are given a program list with courses listed for each certificate/degree program. Program course are offered in a rotation which allows a full time student to complete a program in any two year/four semester cycle.
What improvements does it need?

A. Machine preventive maintenance is limited as result of the reduction of department specific maintenance personnel hours. A doubling of hours from 3 hours per week to 6 per week or more is needed.
B. A better system of student follow-up after program completion.

6. What are faculty’s perceptions of the success of the program?

Overall, the Manufacturing Technology Program faculty feel that the program is successful, however, faculty are in agreement that:
A. Courses need to be continually reviewed and modified to meet the needs of industry.
B. Equipment and information must be kept current for the student to succeed in industry.
C. Student and business surveys help develop a better view into student needs.
D. Advisory committee members and industry partners are a critical segment of program success.
E. Faculty and students alike are building a greater sense of pride and satisfaction with the program.

8. What, if appropriate, are employer attitudes towards the program?

Comments from advisory committee members indicate a positive attitude towards the program.

9. What successes may be identified?

Program successes:

III. Curriculum, Pedagogy and Innovation

10. Describe the curriculum offerings, their relationship to the discipline, and substantive curriculum changes, e.g., new courses, deletions. How has the program kept up with changing needs of the students and community?

The Manufacturing Technology Department offers the following programs leading to either an associate degree or a certificate of completion: Conventional Machining, CNC Machine Setup and Operation, CNC Lathe Setup and Operation, CNC Milling Machine Setup and Operation, CNC Programmer A-MasterCAM.

Curriculum continues to be modified to meet the needs of students and industry. The need for changes is monitored through several means. Possible needs are discussed within the Manufacturing Technology Department and then presented to the Advisory Committee for review.

Manufacturing Technology Program Course Offerings

MNFG 011 Mechanical Blueprint Reading 2 Units
This one of several basic manufacturing courses required as a core curriculum applicable to all Manufacturing Technology programs taught at this college. This course is lecture only.

MNFG 028 Basic Metals Technology 3 Units
This course provides technical information about the various metals and their characteristics as relates to the machining field. This course is lecture only and is parts of the core curriculum.

MNFG 053 Technical Mathematics 3 Units
This course is the other of the two basic courses used as a requirement for the A.S. degree or certificate programs. This course provides math skills related to and used in the manufacturing field of machine technology. It starts with basic algebra and includes basic geometry and trigonometry in a one semester course. This course is lecture only and is parts of the core curriculum.
MNFG 058 Basic Machining Concepts and Operations 3 Units
This course is the machining foundation upon which all other manufacturing courses are based. This course provides essential safety and operational skills used in all other machine tool courses. This course is lecture and lab combination and is part of the core curriculum.

MNFG 059 Advanced Turning Concepts and Operations 3 Units
This is an advanced engine lathe course that is lecture and lab combination and is required for programs utilizing advanced engine lathe or CNC lathe skills.

MNFG 068 Advanced Milling Concepts and Operations 3 Units
This is an advanced milling machine course that is lecture and lab combination and is required for programs utilizing advanced milling machine or CNC milling skills.

MNFG 069 Job Shop Skills 0.5-0.3 Units
This course is a variable unit course that is required for the conventional machining programs. It requires a high degree of flexibility in the use of the machine tool lab equipment such as might be required in a typical job shop in a real world setting. This course also allows the teaching of individualized specialty training as may be needed by individual students wanting to advance in their respective careers. This is a lab only course.

MNFG 071 CNC Program Writing 3 Units
This course develops the skills needed to read and write the alpha numeric codes used in CNC programming. This is a lecture course and part of the core curriculum.

MNFG 073 MasterCAM 2D 3 Units
This course is a lecture course that teaches essential skills in the use of the MasterCAM software to create a CNC program.

MNFG 074 CNC Milling Center Setup and Operation 3 Units
This course is the basic CNC milling course. It is the first CNC machining course which prepares students for employment in industry. This course is a lecture and lab combination course.

MNFG 075 MasterCAM 3D 3 Units
This course is a second level MasterCAM software class providing students with a higher level of skill.

MNFG 076 CNC Turning Center Setup and Operation 3 Units
This course is the basic CNC turning course. This is a lecture and lab combination course.

MNFG 077 MasterCAM 3D Toolpath and CAM Applications 3 Units
This course provides the link between the CNC programming courses and the CNC machining courses. It allows students to take CNC programs they have created and upload them to a CNC machine and produce a project part. This is a lecture and lab combination course.

MNFG 084 Advanced CNC Mill Setup and Operation 3 Units
This is an advanced CNC milling course using higher level technology. This is a lecture and lab combination course.

MNFG 086 Advanced CNC Lathe Programming, Setup and Operation 3 Units
This is an advanced CNC lathe course using higher level technology. This is a lecture and lab combination course.

MNFG 094 CNC Horizontal Mill Setup and Operation 3 Units
This is another CNC milling course using a more technologically advanced type of machine. This is a lecture and lab combination course.
MNFG 103 Solidworks Basic Solid Modeling  3 Units
This course provides training in virtual solid modeling using the Solidworks software.
This is a lecture course.

MNFG 104 Solidworks Intermediate Solid Modeling  3 Units
This course provides the next level of skills development in 3D solid modeling.
This is a lecture course.

MNFG 105 Solidworks Advanced Solid Modeling  3 Units
This course is the third in a series designed to teach industrial levels of skill in the use of the Solidworks software. This is a lecture course.

MNFG 106 Solidworks Drawings  3 Units
This course is the final in the Solidworks series and teaches essential skills in how to generate industrial quality technical drawings from Solidworks model data files. This is a lecture course.

MNFG 130 A CATIA Solid Modeling I  3 Units
This is an online course used to teach use of the CATIA software to generate 3D solid models.

MNFG 130 A CATIA Solid Modeling II  3 Units
This is an advanced online course used to teach use of the CATIA software to generate 3D solid models.

Examples of sources of needed course modification include:

A. Trends in new technology presented at Industry Trade Shows/Conferences.
B. Local industry trends presented at regional advisory meetings.
C. Recent changes to textbooks or other training materials.
D. Suggestions from industry partners and advisory members.
E. Information gained at Workforce Council meetings.

The college catalog contains a detailed listing of five degree/certificate programs and the requirements for each.

11. **Describe the program’s relationship to student services and its offerings to the students served.**

The SAC Manufacturing Technology Program strives to help students where ever possible. Many students can be helped by making use of the many student services available. Examples include:

**EOPS:** Help for students with low or no income.

**Disabled Student Services:** Assistance and evaluation is made available for special needs students. Also have supplied advice of equipment such as computer work stations that would have easier handicap access.

**Career Center:** Conducts seminars on interview skills and resume writing. Forwards employment requests.

**Counseling:** Helps students develop educational plans. Assists students in planning for a degree or certificate. Helps student become aware of other options and student services. A CTE counselor is now available to assist students in our area.

12. **Describe the use of technology, e.g., computer labs, increased use of Blackboard, hybrid or online courses, etc. How does the use of these tools enhance learning?**
The Manufacturing Technology Program is very technology intensive. All segments of the program have integrated high levels of technology into daily instructor and student use. Most courses are comprised of lecture and lab components, or at least lecture and lab demonstration components.

The Lecture segment of manufacturing instruction includes:

A. Mediated classrooms with full multi-media capability including overhead computer projectors.
B. Lectures are typically based upon textbook chapters which have image intense PowerPoint presentations. Students can also access these presentations through a textbook CD or online.
C. Closed captioned commercially produced videos are used also as another segment of lecture.
D. Blackboard is used in the Manufacturing Technology Program for enhanced student contact. These technology tools enhance learning by making the lecture segment of the course more interactive and vibrant. Modern students seem to thrive on technology and computer based presentations. Images and procedures can be brought into the lecture that would be impossible otherwise.

The Lab segment of machining instruction includes:

Scheduled lab hours during which students work on assigned lab projects which require them to practice on and use industrial quality conventional and/or CNC machine tools. Conventional machine operations classes require up to eight weekly hours of lab time for completion of assigned machining projects. CNC machine classes require two weekly hours of lab time.

13. **What changes have been made in pedagogy?**

14. **What grants has the program been involved with? How has this changed the program?**

VTEA / CTEA
2008-2009 CNC Lathe replacement
2009-2010 Acquisition of high technology CNC Turning Center with Live Tooling
2010-2011 Replace CNC and conventional mills
2011-2012 Add State of the art CNC milling machine and replace two conventional lathes

These changes have improved the quality of the machinery in the machine tool lab and allowed us to improve our instruction to industrial levels of technology.

IV. **Assessment of Conclusions and Recommendations**

15. **What research has the department conducted?**

16. **What resources has the department explored to ascertain the status of the discipline/program in other arenas?**

A. The Manufacturing Technology Program faculty have visited numerous other manufacturing programs at the community college level. These visits are used for comparison of practices that seem to work or not.
B. The Manufacturing Technology Program encourages tours by high school, ROP, community college, and industry partners representatives. These visitors are asked to compare and contrast their respective programs.
C. The program instructors attend update training and conferences at other colleges or factory training sites.
D. The Manufacturing Technology Advisory Committee is comprised of members from industry. Their experience and expertise is used to advise on modifications for the improvement of the SAC Manufacturing Technology program.

17. Please summarize findings of direct SLO assessment. How has this informed future plans for the program?

Upon review of SLO assessment, the following findings were made:
- SLO’s should continue to be assessed and reviewed.
- Objectives of assignments should be stated more clearly.
- Revise certain activities that leading up to and/or support assignments/activities.
- Increase discussion and activities to promote better understanding of subject matter.

18. What changes are recommended for the program?

The primary changes and modifications for the Manufacturing Technology Program are as follows:

A. An advanced survey instrument should be developed to survey employers.
B. An expanded schedule of equipment maintenance put into place.
C. A better instrument to track student completers.
D. Increase marketing with targeted non-traditional students.

19. What issues have emerged that require interdisciplinary dialogue and possible inclusion in overall college planning?

The expansion of the Manufacturing Technology Program would require additional space. Long range college plans indicate a larger machine tool lab area will be constructed beneath a new parking structure. These plans have been included in the future oval college planning.

In the shorter term, discussions have been held with the Engineering Program to possibly collaborate on a Robotics course or certificate.