**East Central College**

**Precision Machining Department**

**Assessment Report**

**Spring 2015**

The aim of the department’s assessments was based upon demonstration of competencies. Performance will be satisfactory when the following learning objectives are mastered.

* Demonstrate basic functions, safety, and measurement.
* Demonstrate mastery of application, processes, and setup.
* Explain math concepts utilized and interpretation.
* Translate manual techniques into Numerical Control Programming.
* Translate application, process, and setup procedures.
* Demonstrate mastery of software to streamline development, part creation and programming.
* Perform professional applications of technology of production.

The conditions under which the competencies will be demonstrated are with written assessments generated both departmentally and externally consisting of various question types. Under criteria-performance, the students identify and demonstrate knowledge of the given objective. Standardized exams such as the NOCTI test, are given as an exit exam in the capstone class, as well as technical skill assessments based on NIMS credentials are given within the appropriate courses throughout the program.

To assess basic functions, safety, and measurement NIMS’s Material, Measurement, and Safetycredential was used. One hundred percent of the students earned the credential.

A generated question pool and hands on skill sets was used to demonstrate mastery and translations of application, processes, and setup procedures. Based on final grades of the courses where application, processes, and setup course objectives are taught over two years, 64.7% of the students have mastered the competencies. 22.5% of the students were above average and 10.8% were average. Based on these findings, as a department, further curriculum adjustments are necessary to improve outcomes.

Math concepts and interpretation are utilized throughout all the courses of Precision Machining. Utilizing the NTMA math book for shop math in our machine tool classes, 91% of the students indicated mastery level of the math competencies for machine tool. The other 9% of the students are above average. Based on these findings, students that pursue the AAS degree have greatly improved their math scores through developmental mathematics courses, the Applied Algebra and Trigonometry course (degree requirement), and NTMA Shop Math as a supplement.

Translating manual techniques into Numerical Control Programming is done throughout the manual machine tool classes. Students are taught how the Cartesian coordinate system directly applies to our computer numerical control equipment. Using hands on learning activities, students see the effects on all aspects of machining. With the skill sets incorporated into the manual machining classes, the transition to CNC machining and programming is much easier. The understanding of geometry and the processes needed to set up a machine to create a part greatly enhances a student’s ability to convert manual machining to CNC machine code programming. Using CNC programming based on manual machining understanding and demonstration, 10% of the students have mastered the concepts transitioning to CNC, 80% are above average, and 10% are average. To assess the outcomes for demonstrating Translate Manual Techniques into Numerical Control Programming a generated question pool was created. Students testing with this question pool earned a 100% pass rate. However, when assessed with the NIMS credential CNC Mill and Lathe Programming and Setup, there was an 80% pass rate. As the students take the more advanced CNC programming and operation classes, the students develop a better understanding of the concepts and greatly improve their scores.

Students utilize Solid Works Cad software and Master Cam which is a CAD/CAM system to master software to streamline development, part creation and programming. In Computer Aided Manufacturing and Solidworks courses students utilize software to learn more about processes and tool path. Based on final grades of the courses, 57% of the students have mastered these courses, 27% of the students are above average, and 15% are average. Based on these findings and classroom observations, further investigation of student computer skill sets are needed with possible computer techniques incorporated into the classes.

Performing professional applications of technology for production is incorporated into our capstone class. Utilizing all the skills students have learned throughout the two years in the program, they must invent and produce a product. Using Project Management tools built into the course, the students have a better understanding on how the business side of manufacturing works. Based on final grades of the course, 82% of the students have mastered professional applications of technology for production, and 18% of the students are above average.

CLO assessments are given on a 2 year cycle using NOCTI TSA assessments and ACT Work Keys assessments of Reading, Math, and Locating Information. Starting spring 2015 post-tests was administered which is an industry standard. Based on the NOCTI analysis of scores for post secondary written cognitive, as a site cumulative score analysis, we were at 82.2% and 91.3% for the group. The state average is 77.8% and national is 74.7%. The 82.2% directly correlates to the findings of the students who mastered professional applications of technology for production.

The students also took the ACT Work Keys tests for Reading, Math, and Locating Information. The results from this set of assessments, we had one platinum, nine gold, two silver, and one bronze certificate. Under the reading assessment scores which go from 1 to 7 as a scale, 2 students had a score of 7, 6 students had a score of 6, 4 students had a score of 5, and 1 student with a score of 4. Under the math assessment score, 2 students had a score of 7, 10 students had a score of 6, and 1 student had a score of 3. Under the locating information assessment score, 1 student had a score of 6, 9 students had a score of 5, 2 students had a score of 4, and 1 student had a score of 3. Based on the findings of the work keys assessment, reading and locating information needs to be addressed. An adjustment in curriculum for a course or courses to address reading and locating information can be added to help the students improve their scores.

Based on the assessments of the learning objectives, NOCTI scores, and ACT work keys scores, the Precision Machining Department overall is above the state levels for learning outcomes. Curriculum changes in certain courses to address translating manual techniques into numerical control programming and mastery of software to streamline development, part creation and programming will be addressed with the advice of our advisory committee. After adjustment of these courses, further analysis of these outcomes will be made in the next 2 year cycle. Reading and locating information will be addressed by adding curriculum and course work within certain courses under the advice of the advisory committee and fellow faculty.

At the time of this report, no information has been given to the department on the 180 day student follow up and employer satisfaction survey.