

K O S C I U S K O L E A D E R S H I P
A C A D E M Y

White Paper Project

April 25, 1991

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Kosciusko Leadership Academy

GOAL: Our goal was to assess the preparation of high school students for production work in the established orthopedic work place.

METHOD: We established a questionnaire for the orthopedic industry, interviewed representatives from them, and then used the findings as a basis of interviews with high school vocational educators in Kosciusko County.

SUMMARY:

A. ORTHOPEDIC INTERVIEWS:

1. DEPUY: Teevan received a response from Robert Morel of DePuy who stated that while there is good growth in the industry, there is very little hiring of high school graduates as they receive 5000 applications annually for positions.

Nevertheless mechanical drafting, shop math, and vocational machining courses would make high school graduates more qualified for entry level positions and could receive on the job training.

Mr. Morel's opinion, in spite of his company's non-use of local grads, was that the approach of discovering industry needs and attempting to communicate them to vocational educators ". . . is long overdue. . ."

2. ZIMMER: Decker interviewed Zimmer which recommended courses in machining, geometric tolerance, statistical process control, computer operation, math (including geometry), and (interestingly) communications and work ethics. They have extensive machinist training and high wages.

Zimmer has recently donated a Gorton tracer mill to WCHS and IVY Tech.

3. BIOMET: Chabot interviewed Darlene Whaley at Biomet who reported that entry level positions are not technical and that only about 15% hired are high school grads.

Training in CNC, CAD, computers, blueprints, math, industrial technology, drafting, work ethics, oral and written skills were recommended.

4. OTHY: Decker interviewed Othy which has a different approach to hiring in the orthopedic industry. With lower wages and higher turnover of workers, they are more amenable to less skilled employees who are trained through a buddy system of OTJ.

Othy recommends training in CNC mill and lathe, geometric tolerance, statistical process control, mill and lathe operation, computer control commands, and basic oral and written communication skills.

Othy is involved in a School Task Force that helps in training and recruitment of a work force.

B. VOCATIONAL EDUCATORS INTERVIEWS:

1. WARSAW: Chabot interviewed Bob Huffman, assistant principal of WCHS. The Warsaw Career Center includes WCHS, WHS, and TVHS. Huffman indicated that CAD and CNC courses and equipment in addition to the normal math, drafting, and industrial technology are being taught at Warsaw Career Center.

They have established a senior year coop program with the orthopedics with a sub-goal of working on work ethic. He emphasized the need for a more formal communication link between industry and education. The suggestion of a student scholarship program was discussed to encourage local student interest and future development.

2. TIPPECANOE VALLEY: Decker interviewed Scott Carmichael, a faculty member of the Tippecanoe Valley High School. They offer computer integrated electronic communication, drafting, CAD, electronics, machining and CNC simulator as well as basic measurement. They cooperate with DePuy in a student coop program, Tippecanoe Valley has relatively little on campus since they cooperate with the Warsaw Career Center.

3. WAWASEE: Teevan interviewed Jim Alford about shop training. Alford was excited about the addition in the last year and a half of CNC, CAD, and robotic machinery for training purposes at Wawasee. In order to increase training and to simulate the work place better they are expanding shop classes to two period blocks. These recent additions have upgraded the drafting, metals, lathes, grinders, and welding shop program previously offered.

CONCLUSIONS:

Based upon the findings of this committee the following recommendations are given:

1. That educators consider blending students who have identified either a vocational track or a college prep curriculum. Leaders in industry are discovering deficiencies in both groups, eg. vocational graduates often lack the advanced math and communication skills taught in a college prep track. Also, those typically coming straight from college often lack the hands-on machine experience.

2. That a formal link be established between education and industry. Ivy Tech's new task Force, along with the area Chamber of Commerce, is beginning to take a more active approach. However, this committee recommends consistent and regular interaction between these two groups.

3. That a scholarship program be funded by area industries in order to encourage enrollment in local vocational education offered by the county's high schools.

GRATITUDES: We were met everywhere with people who were kind and helpful. Those named in this report were exceptionally so, and we wish to thank and commend them for their community spirit.

APPENDICES:

- A.) Warsaw Community Schools: Industrial Technology/Machine Tool Data
- B.) Wawasee School Corporation: Industrial Technology Course Summary
- C.) Orthopedic Industry Survey: Interview
- D.) Machinery Donation: Photograph
- E.) Report on Partners in Education: Summer Internship Program

INDUSTRIAL TECHNOLOGY
COMPUTER ASSISTED DESIGN

FRESHMAN YEAR

	<u>First Semester</u>	<u>Second Semester</u>
Per. 1	English	English
Per. 2	Math - Algebra	Math - Algebra
Per. 3	Science	Science
Per. 4	Physical Education	Physical Education
Per. 5	Design Technology	Intro. to Manufacturing or Intro. to Construction
Per. 6	Elective (Art, Foreign Language, etc.)	Elective (same)
Per. 7	Study Hall / Elective	Study Hall / Elective

SOPHOMORE YEAR

Per. 1	English	English
Per. 2	Math - Geometry	Math - Geometry
Per. 3	Health	Health
Per. 4	Science	Science
Per. 5	Computer-Aided Design	Manufacturing Enterprise or Constructing Structures
Per. 6	Elective	Elective
Per. 7	Elective	Elective

JUNIOR YEAR

Per. 1	English	English
Per. 2	Math - Algebra II	Math - Algebra II
Per. 3	Science/Elective	Science/Elective
Per. 4	U.S. History	U.S. History
Per. 5	Product and Manufacturing System Design	Construction Planning and Design
Per. 6	Elective	Elective
Per. 7	Study Hall/Elective	Study Hall/Elective

SENIOR YEAR

Per. 1	English	English
Per. 2	Government	Economics
Per. 3	Related Training	Related Training
Per. 4	ICT (Co-op) In the drafting field, <u>Machine</u> or <u>Architectural</u>	ICT (Co-op) In the drafting field, <u>Machine</u> or <u>Architectural</u>
Per. 5	Same as period 4	Same as period 4
Per. 6	Same as period 4	Same as period 4
Per. 7	Industrial Research and Development	Industrial Research and Development

MACHINE TOOL TECHNOLOGY

FRESHMAN YEAR

FIRST SEMESTER

SECOND SEMESTER

Per. 1	English	English
Per. 2	Math - Algebra	Math - Algebra
Per. 3	Science	Science
Per. 4	Physical Education	Physical Education
Per. 5	Introduction to Manufacturing	Design Technology
Per. 6	Elective (Art, Foreign Language, etc.)	Elective (same)
Per. 7	Study Hall/Elective	Study Hall/Elective

SOPHOMORE YEAR

Per. 1	English	English
Per. 2	Math - Geometry	Math - Geometry
Per. 3	Health	Health
Per. 4	Science	Science
Per. 5	Computer-Aided Design	Product Manufacturing System Design
Per. 6	Machine Tool Technology	Machine Tool Technology
Per. 7	Machine Tool Technology	Machine Tool Technology

JUNIOR_YEAR

Per. 1	English	English
Per. 2	Math - Algebra II	Math - Algebra II
Per. 3	Science/Elective	Science/Elective
Per. 4	U.S. History	U.S. History
Per. 5	Advanced Machine Tool Tech.	Advanced Machine Tool
Per. 6	Advanced Machine Tool Tech.	Advanced Machine Tool
Per. 7	Study Hall/Elective	Study Hall/Elective

SENIOR_YEAR

Per. 1	English	English
Per. 2	Government	Economics
Per. 3	Related Training	Related Training
Per. 4	Machine Tool Field (Co-op)	Machine Tool Field (Co-op)
Per. 5	Machine Tool Field (Co-op)	Machine Tool Field (Co-op)
Per. 6	Machine Tool Field (Co-op)	Machine Tool Field (Co-op)
Per. 7	Study Hall/Elective	Study Hall/Elective

Machine Tool Technology:

products produced by modern civilization require machine tool technology for their manufacture or transportation to market. Many types of machine tools have been developed to perform cutting operations. Tools range from simple hand operated machines to complex computer controlled machines capable of great precision. Machine tool technology is used to produce machines and equipment for all major divisions of industry which include; manufacturing; agriculture; construction; transportation; communication; and mineral extraction.

All of these industries depend on people well trained in machine tool technology for their success. As demand for more and better machine tool products has increased the need for people with knowledge and skill has also increased creating excellent career opportunities. For a creative satisfying & secure future. Machine tool is an excellent choice.

If you are interested in a machine tool career or a career in a related field you will find the Warsaw Machine Tool Program to be the place to start. See a counselor and ask about the rewards of a machine tool career

Machine Tool Career:

People with training in machine tool technology find many jobs in local industry including the orthopedic appliance industry. Typical careers include:

Machinist
Tool & Die maker,
CNC operator
CAD/CAM operation
CNC programmer
Tool grinder
Quality control
Machine setup
Machine repair

Related career fields benefiting from machine tool training are:
Engineering
Design
Manufacturing

For more information plan to visit and tour the Machine Tool Lab and talk with the instructors and counsellors.

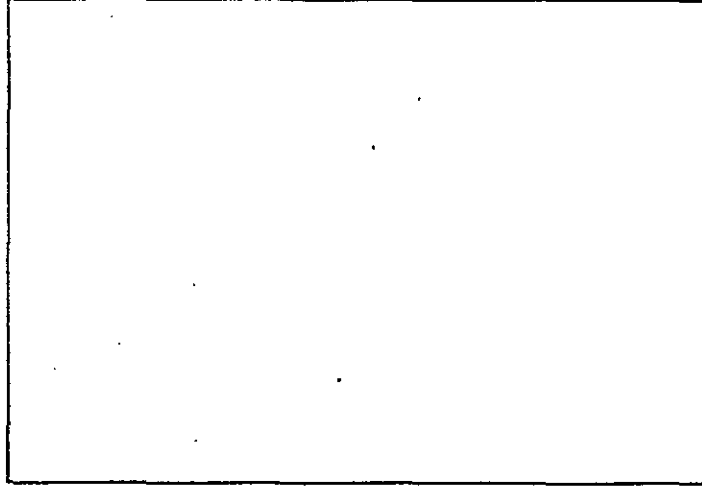
Phone: 269-7211
and ask for Mach. Tool Lab.

Phone: 267-5174
and ask for Vocational Office.

CALL TODAY!

WARSAW COMMUNITY
SCHOOL CORPORATION.

MACHINE TOOL
TECHNOLOGY



MACHINE TOOL
PROGRAM

Machine Tool Program:

The two year machine tool technology program is designed to give students the knowledge and skills needed for entry-level jobs in industry. The program stresses modern CNC (computer numerical control) operation, setup and programming as well as developing the necessary hands on skill and knowledge required to enter post high school trade or technical schools. Credits earned in the program are transferable to Ivy Tech saving students money for education costs and giving them a head start in the Ivy Tech program.

On completion of the program students attaining a "B" or better average are given a Machine Tool Certificate. This certificate is recognized by Warsaw and surrounding area employers as a recognition of accomplishment and considered a recommendation for employment.

No prerequisites are in effect at this time but to enter the program it is recommended that students be taking, or have taken mechanical drawing. Also general metals is recommended. Most students entering the program plan on completing the entire two year program. The course covers two periods of each day and four credits are given each year.

Machine Tool Technology I:

The first year of the program covers fundamentals including machinist hand tools, precision measurement, metal cutting lathes, shaper, drill press, milling machines and other machine tools

Machine Tool Technology II:

The student must have successfully completed Machine Tool Technology. This course offers more advanced training on the same machines along with studies of: materials; tool and die making; production techniques; and CNC programming, setup, and operation.

Facilities:

The facilities provide everything necessary for machine tool training as well as CNC training. The "machine area" contains all the equipment necessary to provide experience in the area of: conventional lathes, digital readout milling machines; powered axis milling; layout and inspection; heat treatment; and grinding. In the "CNC area" there are two CNC lathes and three CNC milling machines assuring ample running time opportunity. The classroom/programming area has the latest computer systems for CNC programming and simulation including printer/plotter capability.

Industrial Cooperative Training:

This program operates in conjunction with the machine tool program. During their senior year students train "on the job" at local industries for a minimum of three hours a day, five days a week during the time school is in session. Students receive instruction in basic skills, safety practices, and technical knowledge. This is an excellent opportunity for students to learn and apply their knowledge in the real world environment. The students are paid a wage and many continue in their jobs after graduation and begin lucrative satisfying & secure machine tool careers.

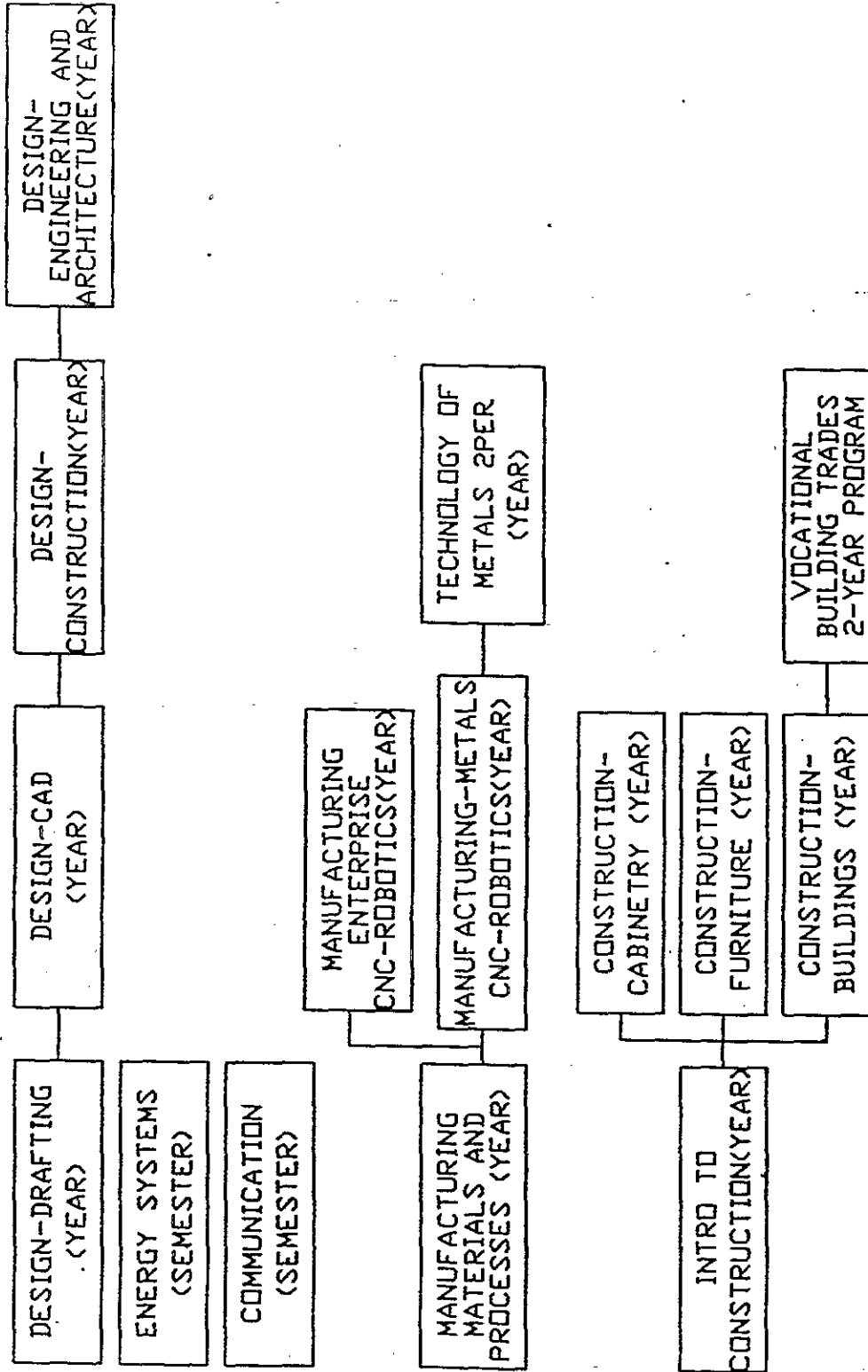
INDUSTRIAL TECHNOLOGY

GRADES 11-12

GRADES 11-12

GRADES 10-11-12

GRADES 9-10-11-12



Introduction to Construction

GRADE	9-10-11-12	Prerequisite to all other Construction
CREDIT	2	classes and Building Trades. This one
HOURS	1	course is the introduction and prerequisite
WEEKS	36 (year)	to all other construction courses. Areas to be

explored in this course are many types of structures such as bridges, dams, roads, residential and furniture construction if time allows. A large part of this course will deal with the safe and efficient use of machines and tools used in construction. A fee will be charged for materials used.

Manufacturing - Materials and Processes

GRADE	9-10-11-12	Prerequisite to Manufacturing - Metals and
CREDIT	2	Manufacturing-Enterprise. The Manufacturing
HOURS	1	course takes a look at the many types of
WEEKS	36 (year)	materials used in industry to produce goods

for consumers. Naturally then, along with the materials comes a look at many processes used to manufacture the materials into the consumer goods. Materials such as plastics, paper, metals, ceramics, fiber glass, and wood are examples of materials you would be exposed to in this course. Naturally you will then be introduced to the various processes compatible to working with the above materials. These processes might include casting, sawing, forging, grinding, extruding, turning, milling, and moulding. A fee will be charged for materials used. An introduction to Computer Numerical Controlled (CNC) machines will be given and introductory experiences in robotics will be offered.

Construction--Buildings

GRADE	10-11-12	Prerequisite: Introduction to Construction or
CREDIT	2	teacher approval. Prerequisite to Building Trades.
HOURS	1	When constructing a building, most times
WEEKS	36 (year)	many types of skilled people are involved

such as carpenters, masons, electricians, plumbers, excavators, roofers, and dry wallers to name a few. This class would provide instruction and experiences in the areas of actual survey and layout of buildings along with the construction of a building. Other areas to be covered would be electrical wiring and plumbing a structure, plus masonry activities in the form of laying bricks and concrete blocks. Instruction in the correct operation of tools and machines pertaining to the construction industry would naturally be given.

Construction--Cabinetry

GRADE 10-11-12
CREDIT 2
HOURS 1
WEEKS 36 (year)

Prerequisite: Introduction to Construction or teacher approval. The cabinet maker is a skilled person who might find his product in industrial plants, homes, hospitals, mobile homes, recreational vehicles, and numerous other places where people need storage area. Students will be instructed in the construction of cabinets and will actually build cabinets for their own use or for sale to others. Areas to be dealt with will be types of materials used, methods of fabrication, types of fasteners, utilization of tools and machines, installation of and the electrical wiring of cabinets.

A fee will be charged for materials used.

Construction--Furniture

GRADE 10-11-12
CREDIT 2
HOURS 1
WEEKS 36 (year)

Prerequisite: Introduction to Construction or teacher approval. Construction of furniture is a type of construction in its own. Furniture would be considered to be in the form of chairs, tables, desks, shelves, beds, and various types of storage and display units. Subjects to be addressed will be materials used in furniture, methods of fabrication, types of finishes, utilization of tools and machines, and types of fastening devices. Students might construct furniture for their own use or for sale to others. A materials fee will be charged for materials used.

Manufacturing--Metals

GRADE 10-11-12
CREDIT 2
HOURS 1
WEEKS 36 (year)

Prerequisite: Manufacturing--Materials and Processes or teacher approval. The metal working industry has many areas to study. This course will explore the areas of the machine shop and welding. Experiences and instruction on machines such as the lathe, milling machines, and surface grinder will be included. A computer numerical control (CNC) lathe and milling machine has been added to the metal shop. Two robots have also been added and experiences in integrating robots into industry will be offered. Some work in the machining of plastics is also being offered. Types of welding offered will be: stick arc welding MIG, TIG, and oxy-acetylene. Naturally instruction will be given in the use of various hand tools and measuring devices used in the machine shop and welding fields. A fee for materials used will be charged.

Manufacturing--Enterprise

GRADE	11-12	Prerequisite: Manufacturing--Materials and Processes or teacher approval. This course will study and put into operation an enterprise. This will include the forming of a company, the selection and design of a product to produce, and marketing the product. Advertising the product will be necessary as well as selling stock to finance the operation of the company. The designing and production of jigs and fixtures as well as designing the production line is necessary. The enterprise will then need closing. An added feature of this class is a lot of individual work is done as well as group teamwork. Experiences in administration, line worker, advertising, designing, and sales are offered. Experiences in Computer Numerical Controlled (CNC) machines and robotics will be offered. An example would be to utilize CNC and robots in producing a marketable product.
CREDIT	2	
HOURS	1	
WEEKS	36 (year)	

Energy Systems (semester)

GRADE	9-10-11-12	The energy phase of this course would focus on energy sources, applications of, and alternatives to what is presently used. You might become involved with lab projects such as designing and building a more efficient wind mill or water turbine. Maybe designing and building a heat engine would be to your liking. To develop and build a solar heating system is a typical type of project also. Are you interested in developing an electric power plant as a project? Exploring energy sources, the applications of many kinds of energy, and looking to future alternatives for present day energy sources promises to be a very exciting course. A fee for material use will be charged.
CREDIT	1	
HOURS	1	
WEEKS	18	

Design-Drafting

GRADE	9-10-11-12	Prerequisite to upper level design classes. This course is designed to give students valuable information about how modern industry communicates. The design-drafting course will teach students basic drafting skills by having "hands on" experiences with the: (1) drafting machine, (2) diazo blueprinter and (3) the micro computer with digitizer, and plotter. Topics include house planning and design, and engineering graphics.
CREDIT	2	
HOURS	1	
WEEKS	36 (year)	

Communications (semester)

GRADE	9-10-11-12	Communications includes such basic things as facial expressions, body language, and sign language all the way to our present world of electronic communications. This course will deal with many of the "old" as well as "new" methods of communication. Main areas to be explored will be photography, graphics (such as newspapers, signs, and advertising), electronic communications (TV, radio, telephone and others). Another subject to be treated in this course will be robotics. A typical project in robotics would be to design and build a hydraulic or pneumatic robot. Students choosing this course should have access to a camera such as a 35mm. There also will be fees charged for such things as film, electronic kits, and other supplies that might be used.
CREDIT	1	
HOURS	1	
WEEKS	18	

Design-CAD

GRADE	10-11-12	Prerequisite: Design-Drafting.
CREDIT	2	Computer aided design (CAD), this class is designed to teach students the basics of computer assisted drafting and design. Students will have hands-on experiences with the micro computer and other peripherals. Various CAD programs will be learned. This class is a prerequisite for all upper level design classes.
HOURS	1	
WEEKS	36 (year)	

Design-Construction

GRADE	11-12	Prerequisite: Design-Drafting or CAD
CREDIT	2	This class will study various construction techniques, methods, procedures, and material processes. Computer assisted design will aid the student in designing residential houses and other low rise buildings. Students will construct models of their designs.
HOURS	1	
WEEKS	36 (year)	

Design - Engineering and Architecture

GRADE	11-12	Prerequisite: Design-Drafting or CAD
CREDIT	2	This course is designed for the student who is interested in becoming an architect, an inventor, an engineer, a drafter, an interior designer, or a scientist. Students will be offered personalized instruction in architectural, civil, machine, aeronautical, and marine designs. Creative designs include: domes, dams, towers, ships, airplanes, and community planning.
HOURS	1	
WEEKS	36 (year)	

Technology of Metals

GRADE	11-12	Recommended courses would include Manufacturing
CREDIT	4	Materials and Processes and Manufacturing-Metals.
HOURS	2	This class would offer experiences in conventional
WEEKS	36	machining such as work on the lathe, vertical and horizontal mills, surface grinder, and hand tools and measuring devices pertaining to the machine shop.

Instruction would also be given on the programming and use of the Computer Numerical Controlled (CNC) lathe and milling machine. Time would also be spent on the programming and use of robots in industry. Our two robot arms can be programmed to perform many tasks.

We can offer welding experiences in oxy-acetylene, stick arc, MIG, TIG.

Project work would involve programming the CNC lathe and milling machine as well as programming the robots to do pick and place jobs. The robots would also be used in a workcell to serve other machines. Other project work would involve the uses of conventional machining and welding.

KOSCIUSKO LEADERSHIP ACADEMY

WHITE PAPER PROJECT

JERRY CHABOT
WARSAW COMMUNITY SCHOOLS

ALLYN DECKER
GRACE COLLEGE

JOHN TEEVAN
GRACE BRETHEN CHURCH
WINONA LAKE

QUESTION

Are Kosciusko County high schools preparing students with the necessary educational and technical skills to enter the established orthopedic industry workplace?

ORTHOPEDIC INDUSTRY SURVEY-INTERVIEW

Employment skills needed by a high school graduate for an entry level manufacturing/technical position.

1. What type of positions are available?
2. Approximately how many manufacturing entry level positions does your company post in one year?
3. Approximately how many of those are filled by recent high school graduates (18-20 years of age)?
4. What specific types of skills are needed to be successful for each position?

5. What are the salaries and benefits for these positions?

6. What would an average entry level manufacturing position provide in terms of:
 - a. starting hourly wage: _____
 - b. comprehensive health insurance (check: yes, no)
 - c. profit sharing (check: yes, no)
 - d. retirement plan option (check: yes, no)
 - e. savings/investment programs (check: yes, no)
 - f. other benefits:

7. What types of high school courses would you recommend for these positions?

8. Do you have written job descriptions available for these positions?

9. Describe your entry level training program and budget.

10. What percentage of your company's training budget is allocated for on the job training of entry level manufacturing employees?

11. Would this amount of training budget be reduced if technical training at the local high school and VoTech level was enhanced?

12. May we observe some of these types of positions?

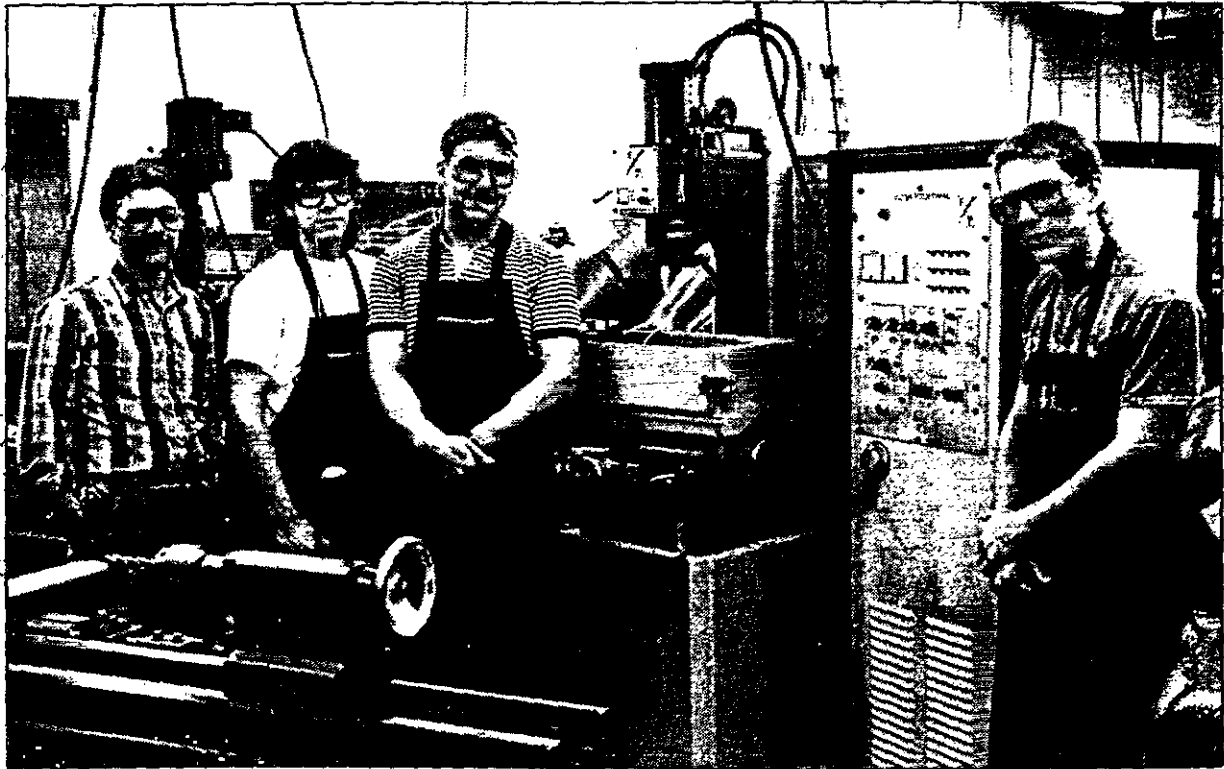
13. What other printed materials do you have available that would help us address the questions?

14. In research and development, what does the future hold for entry level positions in Warsaw?

15. What long term ramifications do you perceive if your company is unable to satisfactorily fill manufacturing positions from the local community?

16. What types of employee recruitment programs do you have?

17. Would you characterize your company's recruitment activity of local entry level manufacturing positions as:
- a. extensive
 - b. moderate
 - c. little
18. Has your company made a recent shift away from recruitment of individuals of recent high school graduate age to fill hourly manufacturing positions? (check: yes, no) If so, why?
19. Has your company made a recent shift away from local recruitment of individuals to fill hourly manufacturing positions? (check: yes, no) If so, why?
20. Do you have current programs with area high schools?
21. What local programs in the high schools and VoTech facilities are you aware of that provide orthopedic-related manufacturing skills?
22. Are you personally aware of any recent Kosciusko County high school graduates employed by your company?
23. What efforts has your company made to communicate your training needs to the local educational community?



Machinery Donation

Gary Nieter □ Times-Union

An EDM machine and a Gorton tracer mill were donated by Zimmer Inc. to be used by Warsaw Community High School and Ivy

Tech students. Pictured from left are Jeff Williams, machine tool instructor, Joshua Drudge, Joel Bowers and Kevin McGuire.

Excerpted from Partners in Education, Summer Internship Program Final Report:

T E C H N I C A L S K I L L S

Objectives:

I. General Metals

- A. Read and interpret print.
- B. Develop teamwork skills: positive work attitudes, interpersonal skills, etc.
- C. Identification & properties of metals.
- D. Follow router & instructions sheet.
- E. Machine the part.
- F. Complete math calculations.
- G. Use effective time management skills.
- H. Complete a career study in the area of machining.

II. Machine Tool

- A. The student will demonstrate self-motivation by going on to another non-required project after completion of his required project.
- B. The student will demonstrate a knowledge of shop math including algebra, trigonometry, geometry in calculation of setups, product design, exercises and quizzes.
- C. The student will demonstrate an ability to read blueprints by developing a usable sketch containing blueprint information, exercises and quizzes.
- D. The student will demonstrate an understanding of metal cutting and grinding by grinding and using his own tool bits.
- E. The student will demonstrate an understanding of the quality process by incorporating inspection into his projects.
- F. The student will demonstrate an understanding of and an appreciation for record keeping and attention to detail by keeping a record of inspections and inspection results.
- G. The student will demonstrate good penmanship and spelling in his record keeping.
- H. The student will demonstrate an ability to use measuring tools in doing his projects, inspection and exercises.
- I. The student will demonstrate good interpersonal skills including attitude and communication as they interact during the inspection process.
- J. The student will demonstrate an ability to solve problems in design considerations, setup, development of quality procedures and exercises.
- K. The student will demonstrate an ability to operate machines through his lab work.
- L. The student will demonstrate an understanding of industrial terminology through exposure to the curriculum form and study of industrial catalogs.

Developed by: Scott Carmichael, Industrial Technology, Tippecanoe Valley H.S.
Terry Screeton, Mathematics, Tippecanoe Valley High School
Jeff Williams, Machine Shop, Warsaw Community High School