

HEAR FROM PROFESSIONALS. LEARN FROM EXPERIENCE.



MANUFACTURING

This cluster prepares learners for careers in planning, managing, and performing the processing of materials into intermediate or final products. Careers also include related professional and technical support activities such as production planning and control, maintenance and manufacturing/process engineering.



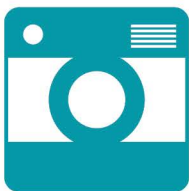
Learning that works
for Nebraska

WHAT TO EXPECT IN THIS GUIDE



INTERVIEWS

Each video contains interviews with employees and business representatives discussing work requirements, education levels, salary and job prospects.



TOURS

Experience virtual industry tours that provide a unique opportunity to get a glimpse inside Nebraska-based companies without leaving your home or classroom.



INFORMATION

Throughout the videos you will find valuable information regarding job markets, salaries, and educational requirements to help you identify a possible career path.

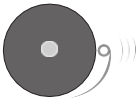
NOTE TO INSTRUCTOR:

These are suggested activities and questions to accompany the virtual industry tour. Each component may be used individually or modified to fit the needs of the classroom. Use these websites for more information on this career cluster:

- www.education.ne.gov/nce/career-clusters
- <https://www.education.ne.gov/nce/careerdevelopment/>
- [Nebraska H3 Reports](#)
- www.nebraskacareerconnections.org

In addition, NEworks has an array of resources, including Nebraska Workforce Trends magazine, Labor Market Regional Reviews, Occupational Profiles, and Career Ladder Posters, available at <https://networks.nebraska.gov> under Labor Market Information>Additional Services>Publications.

BELL RINGER:



Post the following prompt on a writing surface for students to answer as they enter the room. They will respond individually in their notes.

List the top 10 trading partners of the United States.

Have students share responses with the class including justifications. Reveal the list of top trading partners including: China, Canada, Mexico, Japan, Germany, South Korea, United Kingdom, France, India, and Italy.

For more information: <https://www.census.gov/>.

Point out that foreign trade provides markets for our manufactured products and agricultural goods. These trade partners also help supply manufactured products and agricultural goods for our citizens. Beneficial trade policies are essential for continued growth in the manufacturing sector which we will explore today.

ANTICIPATORY SET:



Guide students to think about the skills needed to be successful in this Career Cluster by facilitating a team building challenge. Materials needed: Uncooked spaghetti sticks (20 per group), string (one yard per group), masking tape (one yard per group), regular marshmallows (one per group) and one measuring tape or yard stick. Divide students into teams of three. Give these instructions:

- **As a group, build the tallest freestanding tower with the marshmallow at the top.**
- **Towers will be measured from tabletop (or the floor) to the top of the marshmallow.**
- **The tower cannot be suspended from the ceiling, chair, or other objects.**
- **The entire marshmallow must be on top of the tower.**
- **You have 10 minutes to work.**

Monitor students as they build. The spaghetti, string, or tape may be broken into smaller pieces. After ten minutes, bring students back together. Students may no longer touch the towers. Some may fall over. Measure the towers and recognize the winning team with a round of applause. Facilitate a group discussion by asking questions including:

- **Which designs were most successful?**
- **What strategies did your team use to build the tower?**
- **What skills did you use to complete this challenge?**

Point out that the skills of problem solving, creativity, adaptability and teamwork are essential in the Manufacturing Career Cluster.

INTRODUCTORY QUESTIONS:



Ask the following questions to students and have them respond in journals or aloud. If asking aloud, have students share with a partner first, then ask two or three students to share. Responses will vary and are based on the students' knowledge prior to watching the virtual tour.

- **When you think of Manufacturing, what types of jobs come to mind?**
- **Are these careers YOU might be interested in? Why or why not?**

CONTENT:



Show the 15-minute virtual industry tour at <https://bit.ly/NECTEMfg>, which features three companies: MetalQuest Unlimited, Inc., Chief Buildings and Royal Engineered Composites. Or have students individually view the online video. Students will complete the Student Viewing Guide worksheet as they learn about the Career Cluster. Introduce the virtual tour by saying:

- **Today we are studying careers in the Manufacturing Career Cluster. Each professional in the video will describe their involvement in the industry, as well as the skills necessary for success.**

FOLLOW-UP
QUESTIONS:



Ask the following questions after students view the virtual industry tour. Questions can be assigned as journal questions, asked aloud or discussed in small groups.

1. How would you define this career cluster?

- The Manufacturing Career Cluster involves careers in planning, managing, and performing the processing of materials into intermediate or final products and related professional and technical support activities such as production planning and control, maintenance and manufacturing or process engineering.
- Estimating manager, estimator, lathe department leader, quality auditor and inspector, quality assurance technician, quality engineer, quality manager, quality technician, production manager, president, vice president and vice president of operations.
- Other careers not mentioned in the video: Environmental engineer, environmental specialist, safety coordinator, safety engineer, dispatcher, freight and materials mover, logistical engineer, materials handler, computer installer and repairer, instrument control technician, job and fixture designer, security system installer and repairer, design engineer, industrial engineer, labor relations manager, manufacturing engineer, assembler, bookbinder, calibration technician, machine operator, inspector, lab technician and SPC coordinator.

Note to instructor: This would be a good time to explain to the students that this career cluster can be divided into six programs of study including:

- Health, safety, and environmental assurance
- Logistics and inventory control
- Maintenance, installation, and repair
- Manufacturing production process development
- Production
- Quality assurance

Each Career Pathway has a narrower skill set for the occupations within this Career Cluster.

For more information about these careers:

<http://bit.ly/ManufacturingCC>

<http://bit.ly/MANUFACTURINGccPDF>

2. What types of careers are included in this career cluster?

For data and reports on U.S. manufacturing, visit www.nam.org. State data can be found at https://bit.ly/NE_NAM.

For more information and downloadable tools for each career cluster, follow the link below:
<https://www.education.ne.gov/nce/careerdevelopment/nce-career-fields-career-clusters/>

Additionally have students access Nebraska Career Connections at www.nebraskacareerconnections.org. Nebraska Career Connections provides education and career planning resources to bring Nebraskans together – students, parents, educators, adults, and employers. Whether you're planning for life after high school, exploring career options, or creating a portfolio of materials for a job search, this system can provide you with the tools needed.

Sign up for your account by clicking on Create An Account – it's fast and easy!

3. What careers and jobs in this Career Cluster could be obtained immediately after high school graduation?

- Welding was mentioned as one high school degree option.
- Other examples not mentioned in this video: Heavy equipment operation, industrial truck and tractor operation, material handling, business machine technology, custodial services, electronics technology, construction trades, iron working, precision production, upholstery and leather working and woodworking.
- For more information about these careers:
<http://bit.ly/ManufacturingCC> and
<http://bit.ly/MANUFACTURINGccPDF>
- Health, Safety, and Environmental Assurance: Workers ensure that the equipment is being used safely in the workplace; plan for safety in new production processes; conduct hazard investigations and inspections; and implement health, safety, and/or environmental programs, projects, policies, or procedures.
- Logistics and Inventory Control: Workers move raw materials, unload trucks, wrap pallets for shipment, and communicate with traffic managers.

4. List and describe the pathways of this Career Cluster.

- Maintenance, Installation, and Repair: Workers perform preventive maintenance procedures on machines, tools, and equipment. They also troubleshoot and repair electrical, electronic, and mechanical systems.
- Manufacturing Production Process Development: Workers are responsible for product design of the manufacturing process. They also monitor the manufacturing process and the materials used to manufacture the product.
- Production: Workers make parts or assemble them. They work with machines, making or assembling electronic parts, constructing, or assembling modular housing, performing welding jobs, or printing materials.
- Quality Assurance: Workers assure that standards and procedures are adhered to and that delivered products or services meet performance requirements.

5. Over 6,700 new manufacturing jobs will be created. What is driving job creation in this career cluster?

- Answers will vary but might include: Global demand for products is increasing as developing countries continue to grow. New innovations and products also increase demand. The growth of demand of products drives the addition of jobs in this career cluster.

6. Charlie at MetalQuest Unlimited mentioned an internship. What is an internship? Why are internships beneficial?

- An internship is a work position for a student or trainee that can be paid or unpaid.
- Internship benefits include: work experience to include on your resume and for future jobs, increased knowledge and experience, exposure to real tasks of the job to help determine if this is a future career, some internships are paid, potential to earn college credit, opportunity to network with professionals in the career field and chance to develop confidence.
- The benefit for the business is that it is very expensive to hire people for jobs. Companies like the opportunity to “try out” an employee without having to fully hire them. If the intern fits into the culture of the company, they are more likely to hire them.

7. The virtual tour mentioned traits employers seek when hiring. What Career Readiness Skills should a desirable applicant possess?

- Answers will vary.
- For more information: <https://bit.ly/necrstandards>.

8. During the virtual tour, we were introduced to several managers and department leaders. How would work differ for a department leader versus a machine operator? How does a good manager help employees grow?

- Answers will vary but might include: The manager oversees employees in the department. He/she reviews the schedule for the machines and employees. He/she is responsible for weekly and daily maintenance of the machines. If a machine operator has an issue, they would come to the manager. As a manager, he/she would receive more pay for his title of department leader.
- Answers will vary, but might include: build trust, ask questions, delegate responsibilities, challenge employees to grow, seek feedback and more.
- For more information: <https://www.liveabout.com/developing-your-employees-2275869>.

9. Employers expect great employees to regularly be at work on time. What other workplace expectations should employees meet or exceed?

- Answers will vary, but should include the following:
- Arrive on time to work, appointments or meetings adequately prepared and appropriately dressed
- Comply with workplace policies, norms/culture, procedures, and protocols.
- Exhibit professional etiquette in all interactions.
- Understand the importance of health, safety, human resource, and environmental regulations.

10. Core academic skills include reading, written communication, listening, speaking, and mathematical reasoning with problem solving. How might these core academic skills be used in this Career Cluster?

- Answers will vary. Here are a few examples: Machine operators must accurately read instructions and orders for the day and week. The lathe department leader must have effective verbal communication to discuss the week's schedule with department employees. Estimators and engineers will use mathematics to design buildings and then provide an estimate of the cost of the building. A quality manager collects data, looks at defects and problem-solves operator issues to produce parts that meet standards.

11. A Career Ready individual contributes to employer and community success. When have you demonstrated this Career Readiness skill by meeting and exceeding workplace expectations?

- Answers will vary.
- Explain to students that this is a sample behavioral interview question that they may be asked in a job interview.
- Employers use past experiences as a way to predict future performance.
- One technique used to respond to behavioral questions is the STAR response: situation, task, action, and result. Example sources for more information include: https://bit.ly/STAR_technique1 and https://bit.ly/STAR_technique2.

12. Which pathways are represented in the virtual tour?

- Production: Chief Buildings and MetalQuest Unlimited
- Manufacturing Production Process Development: MetalQuest Unlimited
- Quality Assurance: Royal Engineered Composites

EXTENDED
LEARNING
ACTIVITIES:



The following are suggested activities to increase student learning and exposure to this Career Cluster.

- Join a Career and Technical Student Organization such as FBLA, FFA, SkillsUSA, DECA, or FCCLA. Student members have the chance to apply lessons and information learned in the classroom in real hands-on experiences.
- Have each student put together a portfolio of tangible materials that showcase his or her skills and work experience. Use the digital portfolio available at www.NebraskaCareerConnections.org under the Students Tab in the High School section.
- Make a list of the Career Readiness Skills that are personal strengths. Then make a list of the skills and behaviors required for a career in Manufacturing. Compare the list to determine which Career Readiness Skills need to be strengthened for employment in this Career Cluster.
- Show a manufacturing video from YouTube.com. Applicable topics to this Career Cluster include: Welding, technology, trucks, machine tools, assembly lines, construction machines, the world's biggest machines, environmental tech, engineering disasters, mechatronics, and robots. Have students answer a guided note worksheet during the video or write a short reflection paper.

EXTENDED
LEARNING
ACTIVITIES
CONTINUED:



- Tour the program or schools laboratories and shop areas. Evaluate the areas for workplace safety. Discuss how to improve facilities and make them safer for students and staff
- Identify and complete a simple home repair project at home or at school.
- Divide students into teams for an assembly line activity. Provide a template design on paper that must be recreated.
- Teams will decide how to most efficiently re-create multiples of the template design. Use the activity to also discuss quality control.
- Tour a local manufacturing plant or distribution center.
- List ten of the United States largest manufacturing companies.

- Individually, select one company to research and answer questions including: “What does the company produce? What is unique about the company or product? How does the company show innovation and use modern manufacturing?”
- Meet with the school counselor to discuss classes that would help prepare a student for careers in this Career Cluster. Also, discuss valuable certifications that can be obtained during high school.
- Identify a postsecondary institution that is offering certifications or degrees that would help prepare a student for a career in this Career Cluster. Obtain and complete admissions and scholarship applications for the school or program.
- Visit Nebraska Dream It, Do It, the website for the Nebraska Advanced Manufacturing Coalition:
<https://www.dreamitdoitnebraska.com/>.
- Participate in a Manufacturing Day activity. If none are available locally, work with local businesses and other organizations to create special events for the day or month.

- Participate in an Innovation Challenge or robotics competition. An example of this type of activity can be found at:
<https://www.vexrobotics.com/> or
<https://www.firstinspires.org/robotics/frc>.

THERE ARE MANY RESOURCES THAT CAN BE USED BY TEACHERS, PARENTS AND JOB SEEKERS FOR CAREER EXPLORATION.

Some resources are tailored for Nebraska and some are national, but all provide valuable information and many incorporate information from the Nebraska Department of Labor Market Information (LMI). This list is not comprehensive, and only represents a sampling of the many resources available. Share the Career Exploration/ Planning resources table with students and have them do a review of what each offers them as a tool for finding the right career fit. Nebraska Career Connections is a totally FREE resource that is highly recommended for use by career and technical education students and teachers.

CAREER EXPLORATION & PLANNING		
Website	Type of Resources Available	Produced & Sponsored By
Nebraska Career Connections www.nebraskacareerconnections.org	Education and career planning resources for students, parents, educators, adults and employers. Students can explore career options, search for colleges, find out about applying for college, tuition, scholarships & financial aid, and create an e-portfolio and resume.	Nebraska Departments of Education and Labor, Nebraska VR, and Partnerships for Innovation.
Nebraska H3 Reports: https://bit.ly/neH3	Information on High Wage, High Demand, High Skill jobs in Nebraska. Top H3 occupations are identified on the home page. Reports can be generated by each Nebraska Economic Development Region and also statewide. Reports include H3 Report, Nebraska Economic Industry Report and All Career Clusters Report, Jobs can be searched by Job Title or SOC Code.	Nebraska Departments of Education, Labor and Economic Development
O*NET OnLine www.onetonline.org	Occupation information: knowledge, skills, abilities, Career Interest profile, job outlook and wages	U.S. Department of Labor, Employment and Training Administration (sponsor) Developed by the National Center for O*NET Development
My Next Move www.mynextmove.org/	Condensed version of information from O*NET OnLine	
Occupational Outlook Handbook www.bls.gov/ooh/	Nationwide data on occupation pay, work environment, job outlook, similar occupations, and more	Bureau of Labor Statistics
Nebraska Reality Check https://www.education.ne.gov/nce/career-readiness-videos/	Lifestyle cost information and occupations in corresponding wage range	Nebraska Department of Education

IN-DEPTH		
Website	Type of Resources Available	Produced & Sponsored By
CareerOneStop www.careeronestop.org	Variety of resources related to career planning, job training, and job searches	U.S. Department of Labor, Employment and Training Administration (sponsor)
GetMyFuture (section of the CareerOneStop website) www.careeronestop.org/GetMyFuture	IResources tailored to students and young adults such as career exploration, information on finding education and training programs, and how to conduct a successful job search.	U.S. Department of Labor, Employment and Training Administration (sponsor)

Instructions: Questions 1 and 2 should be answered after watching **all** three sections of the virtual industry tour.

1. List six careers mentioned during the virtual industry tour:

- | | |
|-----------------------------------|--|
| 1. Estimating manager | 4. Quality auditor/inspector |
| 2. Estimator | 5. Production manager |
| 3. Lathe department leader | 6. Vice president of operations |

President, quality assurance technician, quality engineer, and quality manager

2. Where is each business located?

BUSINESS	LOCATION
MetalQuest Unlimited	Hebron
Royal Engineered Composites	Minden
Chief Buildings	Grand Island

Instructions: The following questions are specific to the MetalQuest Unlimited section of the virtual industry tour.

3. Describe what MetalQuest does:

- **MetalQuest is a contract manufacturer that makes precision machine parts.**

4. What are the job responsibilities of the lathe department leader?

- **Review schedule for the machines and people**
- **Complete daily and weekly maintenance**

5. How many educational programs are offered in Nebraska in the Manufacturing Career Cluster?

200+

6. How many new manufacturing jobs will be created in the next few years? 6,700

Instructions: The following questions are specific to the Ameritas section of the virtual industry tour.

7. What are the products of Royal Engineered Composites?

- **Create composite components made with epoxy, resin, cloth which are parts for aircraft, helicopters, and jet engines**

8. What are the job responsibilities of a quality manager?

- **Oversee inspection and testing labs**

9. What are the job responsibilities of a quality technician?

- **Use scientific processes to guarantee quality manufactured products**

10. What skills should a great quality engineer demonstrate?

- 1. Problem solving**
- 2. Use of statistical tools**
- 3. Critical thinking**
- 4. Creativity**

11. Why is quality assurance important in the manufacturing industry?

- **Answers will vary but should include: Machine parts must be a specific size to fit and withstand heat and friction. Quality assurance is important in the production of all goods because of functionality and customer satisfaction.**

Instructions: The following questions are specific to the Chief Buildings section.

12. Describe what Chief Buildings does:

- **Designs and makes metal buildings**

13. What is one basic expectation of great employees?

- **Regularly be at work on time**

14. What are the job responsibilities of an estimating manager?

- **Oversee team of estimators that manage costs, review specs and plans, provide a price quote**

15. How many Nebraskans work in manufacturing? Over 95,000 (Note: as of 2021, over 100,000)

*Instructions: Respond to Question 16 after watching **all** three sections of the virtual industry tour.*

16. Which of the careers introduced in the virtual industry tour best fit your skill set and interests? Explain.

- **Answers will vary.**



ABOUT THIS PROJECT

The virtual industry tours provide a unique opportunity for students, parents and job-seekers to experience Nebraska-based industries without leaving the home or classroom.

The videos showcase different businesses and industries in each of the sixteen Career Clusters plus Entrepreneurship in the Nebraska Career Education Model. In addition to the tour of the business or industry, the videos also contain interviews with employees and managers discussing work requirements, education levels, salary and job prospects. The videos provide an accurate picture of today's workplace, breaking down stereotypes and assumptions while emphasizing the knowledge and skills required to be successful.

The teacher and student guides are designed to enhance student learning for each virtual tour. For the students, a guided notes worksheet is included to help them record important information about the career cluster. The teacher's guide includes a lesson plan complete with anticipatory set, introductory questions, and discussion questions to follow the virtual tours.

Discussion Guides and Career Readiness Resources are available at:
WWW.NEBRASKACAREERCLUSTERS.COM/RESOURCES



It is the policy of the Nebraska Department of Education not to discriminate on the basis of sex, disability, race, color, religion, marital status, age, national origin, or genetic information in its educational programs, admission policies, employment, or other agency programs.

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