



Kellogg College

Course Cover Sheet

M-CAM Training Area:

CNC/Machining Multi-Skilled/Mechatronics Production Operation Welding/Fabrications

Program(s): Kellogg Advanced Manufacturing Assembly (KAMA)

Course: BUCO 85S Lifting and Tool Safety

Course Description: This course will be an interactive exercise and common sense approach to ergonomics. Participants will learn about two aspects of ergonomics: human factors and mechanical factors. The human factors refer to the design of equipment and the job site itself. The most common workplace injuries to various parts of the body will be reviewed and hands-on exercises to demonstrate proper work techniques will be emphasized.

Date Created: 4/14/14

Faculty Developer(s)/Instructional Designers(s): N/A

Employer/Industry Partner: Denso, TRMI, Il Stanley

College Contact: Levi Good

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Email: GoodL@kellogg.edu

Additional Information/Comments:

Instructional Materials:	Lifting Techniques Power Point
Hand and Power Tool Power Point	Safe lifting Techniques worksheet
Lifting and Tool Safety pre-test, post-test, and answer key	Tool Safety worksheet

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Lifting and Tool Safety

Course Number:	BUCO 85S
Credits:	.12
Semester:	Spring 2017 - KAMA
Start and End Dates:	February 1, 2017
Meeting Times/Dates:	10:00 a.m. – 12:00 p.m.
Location of Course:	Regional Manufacturing Technology Center (RMTC) 405 Hill Brady Road Battle Creek, MI 49037
Instructor:	Duane Hagen
KCC Staff Email Address:	duane@hagenenterprisesllc.com
Instructor Phone Number:	Lisa Larson, Program Coordinator: 269-660-5360
Instructor Office & Mailbox Location:	RMTC
Course Description:	This course will be an interactive exercise and common sense approach to ergonomics. Participants will learn about two aspects of ergonomics: human factors and mechanical factors. The human factors refer to the design of equipment and the job site itself. The most common workplace injuries to various parts of the body will be reviewed and hands-on exercises to demonstrate proper work techniques will be emphasized
Prerequisites:	None
Textbook(s):	None
Learner Supplies:	Instructor will provide supplies
General Education:	N/A; this course is not a General Education course.



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Occupational Program or Accreditation Standards:

N/A

Course Competencies:

1. Students will learn how to use proper hand protection
2. Students will learn how to inspect tools to ensure proper condition
3. Students will learn tool maintenance and care
4. Students will learn Ergonomic stretches and postures
5. Students will be able to explain the importance of communicating physical strains
6. Students will demonstrate proper techniques or tools for lifting large or heavy materials
7. Students will demonstrate proper lifting techniques

Mode of Instruction:

This course will incorporate a variety of learning experiences. Lectures, class discussions, large and small group work, and oral and written assignments will be used to enhance and reinforce textbook readings. Guest speakers, videos, hands-on learning activities and field trips may also be used to support textbook theory and practice.



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Assignments:

Competency	Assignment	Description	Possible Points
1-7	Pre-assessment	Each student will be given a pre-course assessment to measure baseline knowledge in each of the competency areas	5
1	Participation	Students will be shown proper hand protection	5
2	Participation	Students will inspect tools to ensure proper condition	5
3	Participation	Students will demonstrate ergonomic stretches and postures	5
4	Participation	Students will be taught the importance of communicating physical strains	5
5	Participation	Students will demonstrate proper techniques or tools for lifting large or heavy materials	5
6	Participation	Students will demonstrate proper lifting techniques	5
1-7	Final Assessment	Students will take a final assessments on lifting and safety techniques	10

Make-up Work, Late Assignments, and Retakes: Make-up work, late assignments, and retests may be available and/or accommodated at the discretion of the instructor and granted on a case-by-case determination. It is the expectation that students complete and turn-in assigned work on-time and in accordance with the course syllabus and instructor guidelines. Retakes on quizzes, tests, exams, or any other related course assessments are not common practice, and may only be granted as the result of extreme circumstances, as determined by the instructor.

Grade Determination:

Competency	Assignment	Points Possible	Weight
	Pre-Assessment	5	5%
	Participation/Attendance	30	80%
	Final Exam	10	15%
	TOTAL POINTS POSSIBLE →	45	100%



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Grading Information: In this course, you will earn a pass (P) or no-pass (N) grade.

Grading Chart:

Grade	Explanation	Credit Awarded
P	Earned 70% or more of the total possible points	Yes
N	Earned less than 70% of total possible points	No

- A “P” indicates you have passed the course and academic credit is earned for the course. This is equivalent to a “C” grade or better
- To earn a “P” grade, you must earn at least 70% of the total possible points for available for the course
- An “N” indicates that you have not passed the course and no academic credit is earned
- You should be aware that an “N” grade on your academic record may jeopardize your ability to obtain federal financial aid or your ability to transfer, since many colleges and universities consider this grade a failure.

Instructor Course Policies:

Students are expected to be present and engaged in class discussions and activities. If the instructor believes a student is not meeting course or program expectations, then the instructor will reach out to a Career Coach for intervention strategies. Any lack of participation during class time will result in a decrease in the potential points for that day.



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Attendance:

1. KCC Required Statement:

Regular attendance is an essential part of the educational experience and a requirement for an adequate evaluation of each student's academic progress. Excessive absence is reported to the Academic Advising department. An Advisor will reach out to students to discuss options for success. Continued absenteeism may lead to administration action. Faculty are required to report to the Financial Aid office students who have never attended class. Federal aid may be reduced if a student does not begin attendance in all classes. This includes online courses. For more information, please visit: <http://www.kellogg.edu/wp-content/uploads/2016/08/Handbook-2016-2017.pdf>.

2. Department Specific Attendance Info:

Attendance will be taken into consideration when grades are being determined. Points are assigned for attendance in the Grade Determination chart and will count toward your final grade.

If a student has excessive absences, the instructor will notify a Career Coaches to develop an appropriate action plan to mitigate or eliminate barriers causing the excessive absences.

Drop/Add Procedures:

Drop/Add procedural information may be found at: <http://www.kellogg.edu/catalog>. The drop/add dates for every course may be found on the KCC web site at: www.kellogg.edu follow the schedule link.

Incomplete Grade and Additional Grading Policies:

For information regarding additional grading policies, please visit the KCC catalog at: <http://www.kellogg.edu/catalog>.

Disability Services:

While ensuring the academic integrity of its programs, Kellogg Community College is dedicated to providing the reasonable accommodations needed to ensure equal access to educational opportunities for individuals with verified disabilities. Disability services are provided to students who self-disclose a disability to the Support Services Department and provide appropriate documentation. Support Services may be reached at 269.965.4150 or supportservices@kellogg.edu.

Academic Integrity Policies:

Ethical conduct is the obligation of every member of the KCC community. Breaches of Academic integrity constitute serious breaches of ethical conduct. Academic integrity requires that all academic work be wholly the product of an identified individual or individuals. This policy



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demonstrates KCC's concern for academic integrity and guarantees a fair procedure for handling these concerns. Examples of unethical conduct include: cheating, fabrication, and plagiarism. For more information regarding KCC's Student Code of Conduct, please visit: <http://www.kellogg.edu/wp-content/uploads/2016/08/Handbook-2016-2017.pdf>.

Code of Conduct:

Kellogg Community College students are expected to model the skills and behaviors of working professionals. This includes exhibiting behaviors which support respect and courtesy in the class environment. For more information regarding KCC's Student Code of Conduct, please visit: <http://www.kellogg.edu/wp-content/uploads/2016/08/Handbook-2016-2017.pdf>.

Safe and Successful Campus Environment:

KCC is dedicated to providing a safe environment which is conducive to success for all students. When staff notice that a student is struggling emotionally, intellectually, or behaviorally with classroom expectations, they may notify the appropriate personnel on campus to intervene and provide assistance to that student. Academic assistance is available in The Bridge and through Academic Advising; personal counseling is also available in Support Services.

Students whose behavior suggests they are struggling may also be contacted by the KCC Director of Student Relations or by KCC Public Safety. If students have safety concerns about others' behavior in class or on campus, those students are encouraged to discuss their concerns with KCC Public Safety directly.

Academic Support Services:

Kellogg Community College is committed to your academic success. If for any reason a student is struggling with a class, speak to the Professor immediately. They are the best resource. Additional resources available include The Bridge (<http://www.kellogg.edu/services/the-bridge/>) and Support Services (<http://www.kellogg.edu/services/student-support-services/>).

Honors Contract Information:

Honors contracts are a way for students to turn any college-level KCC course into an honors course, giving them the flexibility to take ownership over learning. At the beginning of the semester, with instructor approval, a student may work with the instructor to develop a unique honors project beyond the course syllabus. Once the honors project is clearly defined and the student's project has been approved by the instructor, the student works independently on that project during the semester and may seek support from the instructor as needed; then, at the end of the semester, when the student successfully completes the honors project as outlined in the contract **and** earns at least a B+ in the course, the student will earn honors designation on their transcript. To download the honors contract and learn more about the Honors Program, please visit <http://www.kellogg.edu/academics/honors-program/>.



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Retain this Syllabus & Syllabus Disclaimer:

This syllabus is a record of learning outcomes associated with this course. Many institutions will require a copy of this syllabus to grant transfer credit. It is the student's responsibility to retain a copy for future use.

Information contained in this syllabus was, to the best knowledge of the instructor, considered correct and complete when distributed for use at the beginning of the semester. However, this syllabus should not be considered a contract between Kellogg Community College and any student, nor between the instructor and any student. The instructor reserves the right, acting within the policies and procedures of Kellogg Community College, to make changes in course content or instructional techniques without notice or obligation.

Use of Technology & Student Email Accounts:

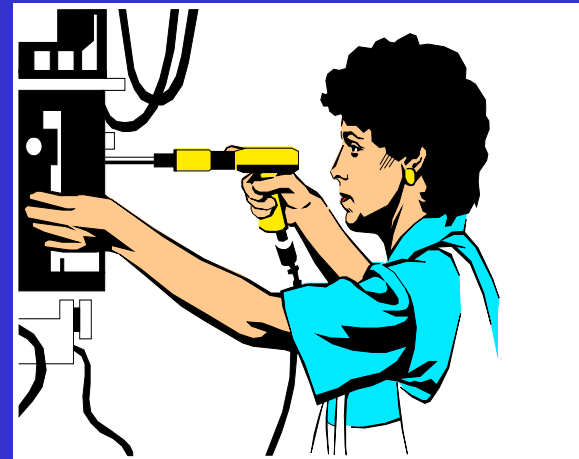
The College has a variety of computer systems which are provided for the use of students and are to be used for education, research, academic development, and public service only. You are responsible for seeing that the computing facilities are used in an effective, efficient, ethical, and lawful manner. Computer systems, such as e-mail, are intended for college related activities only. Inappropriate messages and/or materials are not to be sent or stored. For more information, visit the KCC web page at: www.kellogg.edu.

Textbook Statement:

There are multiple choices for purchasing textbooks, including the Kellogg Community College bookstore (www.kellogg.edu - follow the on campus link to the bookstore). Please be advised that each student should fully investigate the refund policies of book retail stores, including the Kellogg Community College bookstore, PRIOR to purchasing a book for any course. When purchasing a book from the Kellogg Community College bookstore, students are encouraged not to break a textbook's binding, or open a book in shrink-wrap covering, prior to attending the first course session in order to verify that a correct book has been purchased. Students are advised to keep all receipts from book purchases.

Service Learning Option: Service learning is not an option for this course.

Hand and Power Tool Safety



Just the Facts

The Occupational Safety and Health Administration states that most injuries on construction sites involve excavation cave-ins, **power tool accidents**, falls, electrical hazards, and exposure to potentially dangerous materials

Working with power tools, you can get an electric shock, lose a finger, lose an eye, or go deaf. It's especially dangerous to use a tool that's defective, that's been modified, or that's not designed for the job. Of course, you can also get injured if you use any tool carelessly.

Hazards

Workers using hand and power tools may be exposed to these hazards:



- Objects that fall, fly, are abrasive, or splash
- Harmful dusts, fumes, mists, vapors, and gases
- Frayed or damaged electrical cords, hazardous connections and improper grounding
- Vibration and impact

What do you think are the most common injuries from working with hand and power tools?

- Electric shock
- Flash burns
- Falling
- Hand and Eye injuries
- Hearing loss
- Crushing, cuts or losing a body part
- Ergonomic injuries

Basic Tool Safety Rules

- Maintain regularly
- Inspect before use
- Use the right tool for the job
- Operate according to manufacturers' instructions
- Use the right Personal Protective Equipment (PPE)
- Use guarding

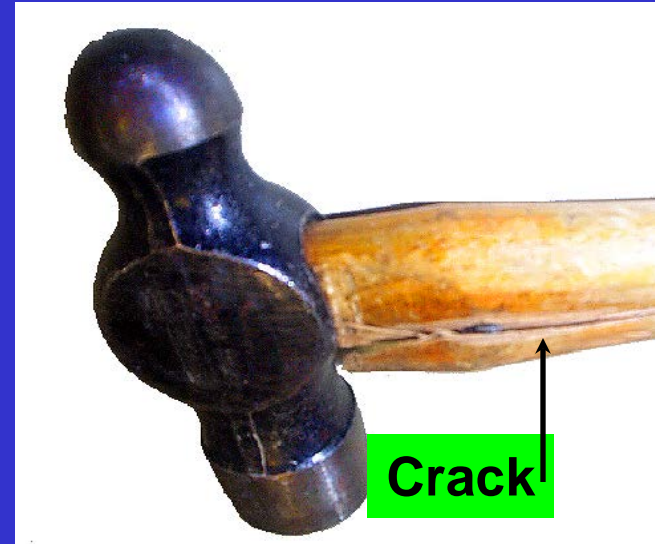


Hand Tool Hazards

Hazards are usually caused by misuse and improper maintenance

Do not use:

- wrenches when jaws are sprung
- impact tools (chisels and wedges) when heads have mushroomed
- tools with loose, cracked or splintered handles
- a screwdriver as a chisel
- tools with taped handles – they may be hiding cracks



Cutting and Slicing Tools

(Knives, Box Cutters, Scissors, Razor Blades, etc...)

Safety Gloves – Protection against accidental cuts and vibration

A Sharp Blade Is Safer – When dull, a blade can slip from the object being cut and cause a serious injury.

Cut Downward – Always away from your hand.

Put It Back – Never leave a cutting tool lying on a table, chair, sink or desk. There are only three places that a cutting tool should ever be

- 1) in use,
- 2) stored safely in a drawer, tool box, in a knife rack, or,
- 3) in the dishwasher (blade down, handle up)

Never put knives in a sink full of soapy or dirty water. Someone could reach into the water and severely cut their hand.



Cutting and Slicing Tools



Let It Go! – Never attempt to catch a dropped knife or other cutting tool – let it fall.

Wipe Away From The Sharp Edge – if you need to wipe or clean material off the blade, always wipe away from the sharp edge.

Never Touch The Sharp Edge – Always use a piece of paper to test the sharpness of a knife
– NEVER use your fingers!

Never use a knife as a substitute for other tools – such as a screwdriver or bottle opener.

Hand Tools - Protection



Keep floor surface where working free from debris and tripping or slipping hazards

Keep cutting tools sharp

Use tools as they were intended to be used

Use Personal Protective Equipment (PPE), such as safety glasses and gloves

PPE determined by Job Hazard Analysis (JHA)

Examples of PPE

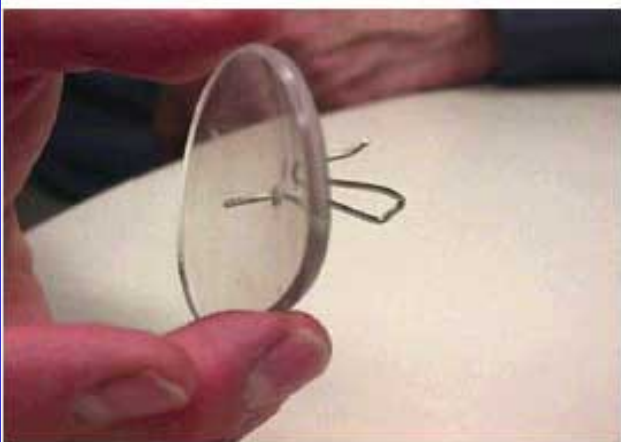
Body Part	Protection
Eye	safety glasses, goggles
Face	face shields
Head	hard hats
Feet	safety shoes
Hands and arms	gloves
Bodies	vests
Hearing	earplugs, earmuffs

Does PPE Help?



A trash bag that held a turpentine container ruptured. Without warning, the can exploded and the mixture of paint thinner and paint sprayed all over Phil's face, head, and upper body. The force of the explosion knocked him to the ground.

While applying siding with an air powered staple gun, the son fired a staple, hitting a metal plate behind the siding. It ricocheted back towards his face and one leg of the staple



penetrated the safety glasses' lens. The staple hit with such force that the frames were cracked and the son received bruising on the eyebrow and cheekbone.

PPE Standards

Various OSHA standards list specific requirements for various types/levels of PPE

- **Logging Standards**
- **Electrical Standards**
- **Hazardous Noise Standards**
- **Respiratory Protection Standards**
- **Chemical-Specific Standards**

Personal Protective Equipment

Responsibilities

- **Employer**
 - Assess workplace for hazards
 - Provide PPE
 - Determine when to use
 - Provide PPE training for employees and instruction in proper use
- **Employee**
 - Use PPE in accordance with training received and other instructions
 - Inspect daily and maintain in a clean and reliable condition

Power Tools

Must be fitted with guards and safety switches

Extremely hazardous when used improperly

Different types, determined by their power source:

- Electric
- Pneumatic
- Liquid fuel
- Hydraulic
- Powder-actuated



General Safety Guidelines for Power Tools

Be aware of all power lines and electrical circuits, water pipes, and other mechanical hazards in your work area, particularly those below the work surface, hidden from the operator's view, that may be contacted.

Wear proper apparel. Do not wear loose clothing, dangling objects or jewelry. Long hair must be restrained. Gloves should not be worn when operating certain power tools. Check appropriate tool manuals.

Most Dangerous Powered Hand Tool?

HINTS

1. Operating temperature can reach 900 degrees F.
2. Parts can move up to 68 miles an hour
3. At full speed, > 600 teeth pass at a given point per second
4. One in 5 injuries are from “kickback”.

Answer: Chain Saw



Switches

Hand-held power tools must be equipped with one of the following:

Constant pressure switch

shuts off power upon release

Examples: circular saw, chain saw, grinder, hand-held power drill



On-Off Switch

Examples: routers, planers, laminate trimmers, shears, jig saws, nibblers, scroll saws



Power Tools - Precautions

- **Disconnect tools when not in use, before servicing and cleaning, and when changing accessories**
- **Keep people not involved with the work away from the work**
- **Secure work with clamps or a vise, freeing both hands to operate the tool**
- **Don't hold the switch button while carrying a plugged-in tool**
- **Keep tools sharp and clean**
- **Remove damaged electric tools & tag them: "Do Not Use"**

Power Tools – Precautions

Electric Cords



Don't carry portable tools by the cord

Don't use electric cords to hoist or lower tools

Don't yank cord or hose to disconnect it

Keep cords and hoses away from heat, oil, and sharp edges

Replace damaged cords immediately!

Would you use this extension cord?



Electric Power Tools

To protect a worker from shock, these tools must:

- have a 3-wire cord plugged into a grounded receptacle
- be double insulated, or
- be powered by a low-voltage isolation transformer



Double insulated markings



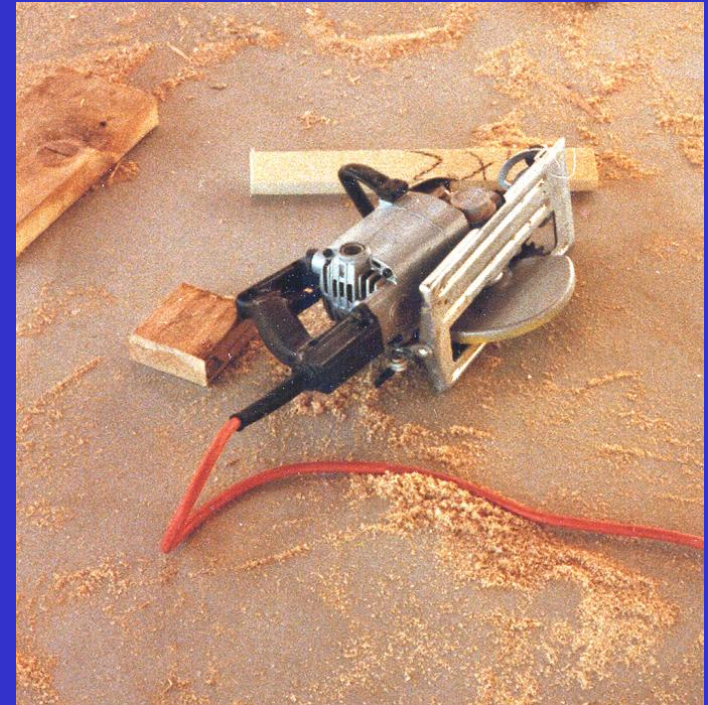
Plug with a grounding pin



When using double insulated tools, be sure the outer case is undamaged and the tools are distinctly marked with this symbol or clearly labeled as "DOUBLE INSULATION" or "DOUBLE INSULATED" by the manufacturer.

Electric Tools – Good Practices

- Operate within design limits
- Use gloves and safety shoes
- Store in a dry place
- Don't use in wet locations unless approved for that (use GFCI)
- Keep work areas well lit
- Ensure cords don't present a tripping hazard



Good Practice?



Guarding

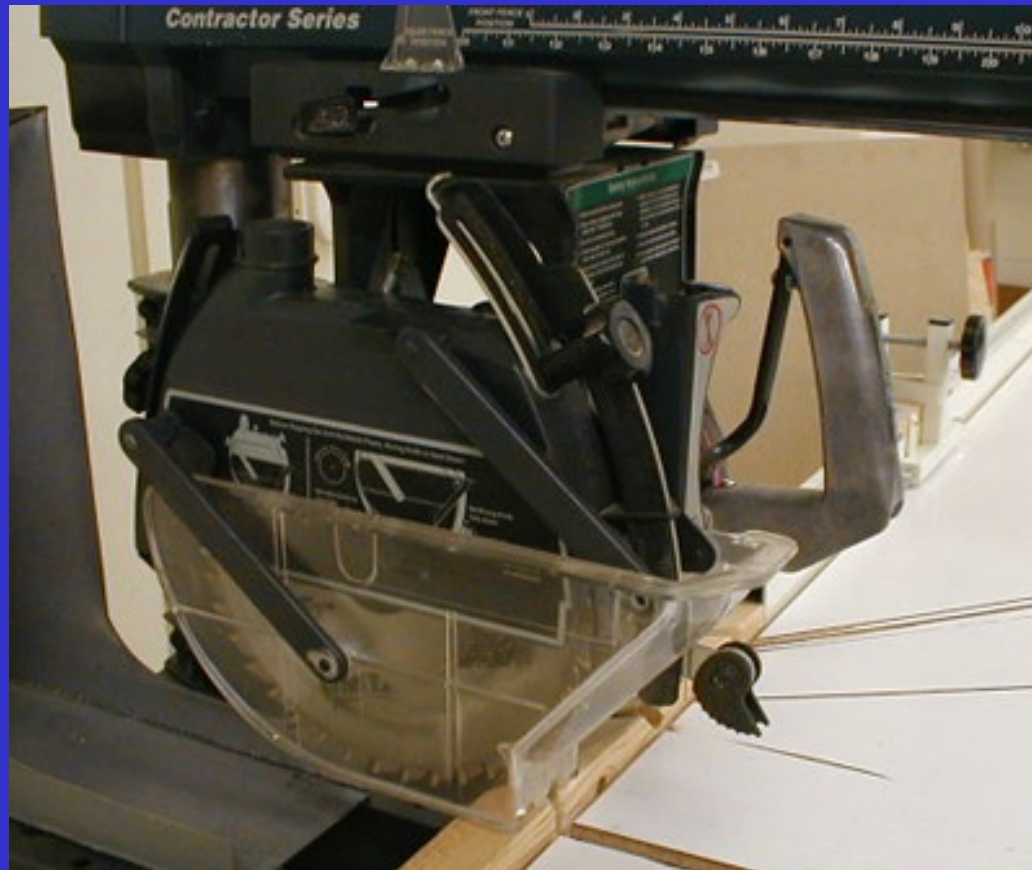
Guard exposed moving parts of power tools

Guard belts, gears, shafts, pulleys, sprockets, spindles, flywheels, chains, or other moving parts

Never remove a guard when a tool is in use



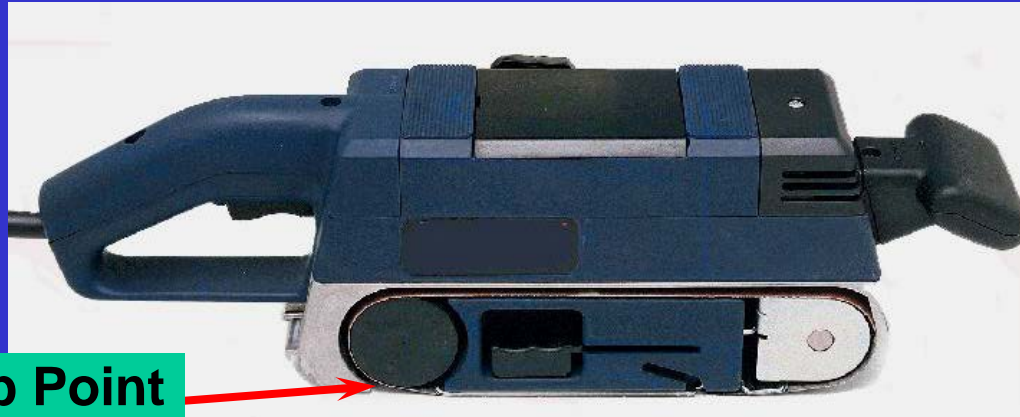
Guarding - Point of Operation



This shows a radial arm saw equipped with proper point of operation guards

The point of operation is where the work is actually performed on the materials – it must be guarded

Guarding Protection



Nip Point

Machine guards must protect the operator and others from:

- **Point of operation**
- **In-running nip points**
- **Rotating parts**
- **Flying chips and sparks**

Differences between Pneumatic and Electrical Drivers

Power	Torque Control System	Advantages	Disadvantages
Air	Cushion Clutch	<ul style="list-style-type: none"> * Stable torque * Fewer moving parts * High tightening speed * Low-cost tool 	<ul style="list-style-type: none"> * Considerable noise * Slightly reactive clutch
	Shut Off Clutch	<ul style="list-style-type: none"> * Stable torque * Fewer moving parts * Easy torque adjustment * Loss reactive clutch 	<ul style="list-style-type: none"> * Considerable noise * Rather high tool cost
	Impact Clutch (Hammering)	<ul style="list-style-type: none"> * High torque * Fewer moving parts * High tightening speed 	<ul style="list-style-type: none"> * Unstable torque * Loud noise * Large clutch impact
Electricity	Current Control	<ul style="list-style-type: none"> * Stable torque * Easy torque adjustment * High torque accuracy * Little noise 	<ul style="list-style-type: none"> * Slow tightening speed * Transformer sometimes required * Large grip
	Mechanical Clutch	<ul style="list-style-type: none"> * Stable torque * Easy torque adjustment * Loss reactive clutch * Little Noise 	<ul style="list-style-type: none"> * Transformer sometimes required * Large grip

Pneumatic Tools

Powered by compressed air

Includes nailers, staplers, drivers, drills & sanders

Main hazard - getting hit by a tool attachment or by a fastener the worker is using with the tool or the hazard of spinning rotary parts.

Take the same precautions with an air hose that you take with electric cords

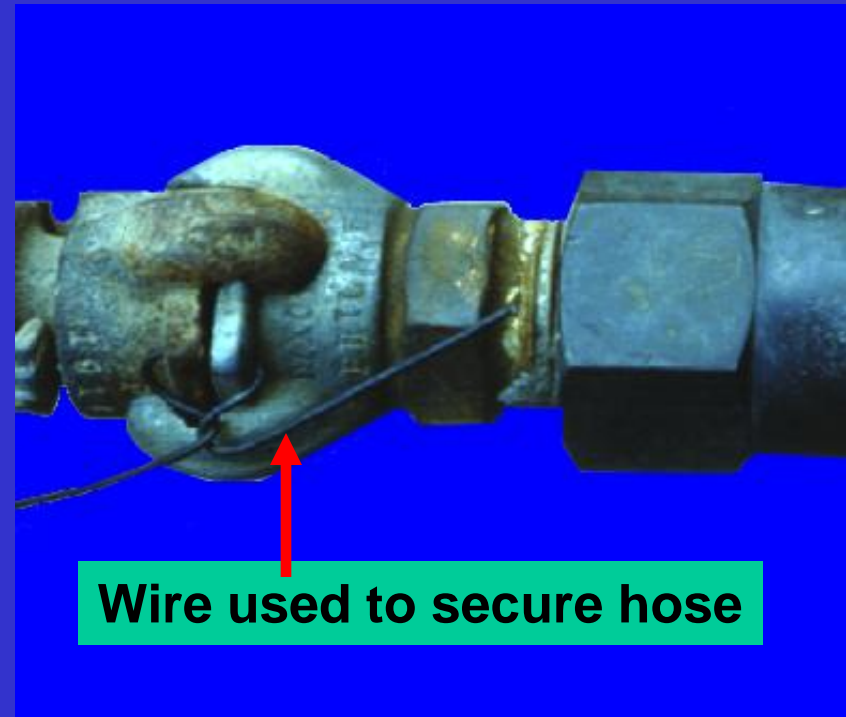


**Nail Gun -
Cut-Away View**

Pneumatic Tools - Fastening

Ensure tool is fastened securely to the air hose to prevent a disconnection

Use a short wire or positive locking device attaching the air hose to the tool



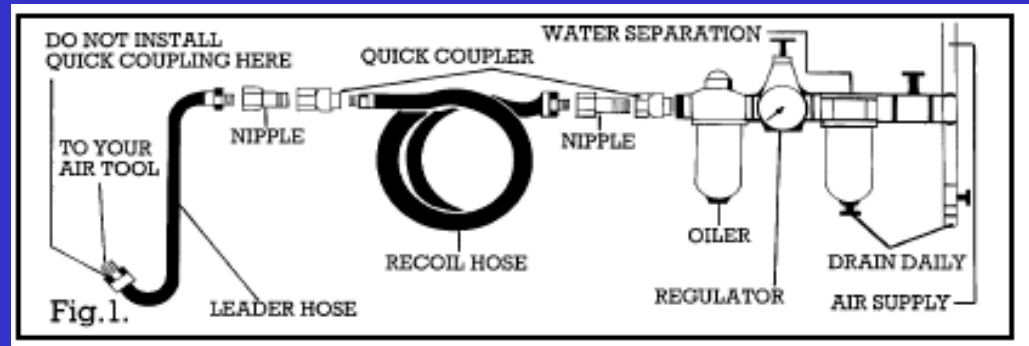
Pneumatic Tool Connections



← Unacceptable



← Acceptable



Pneumatic Tool Safety

Place a safety device on the muzzle to prevent the tool from ejecting fasteners, unless the muzzle is in contact with work surface

Install a safety clip or retainer to prevent attachments, such as chisels on a chipping hammer, from being ejected

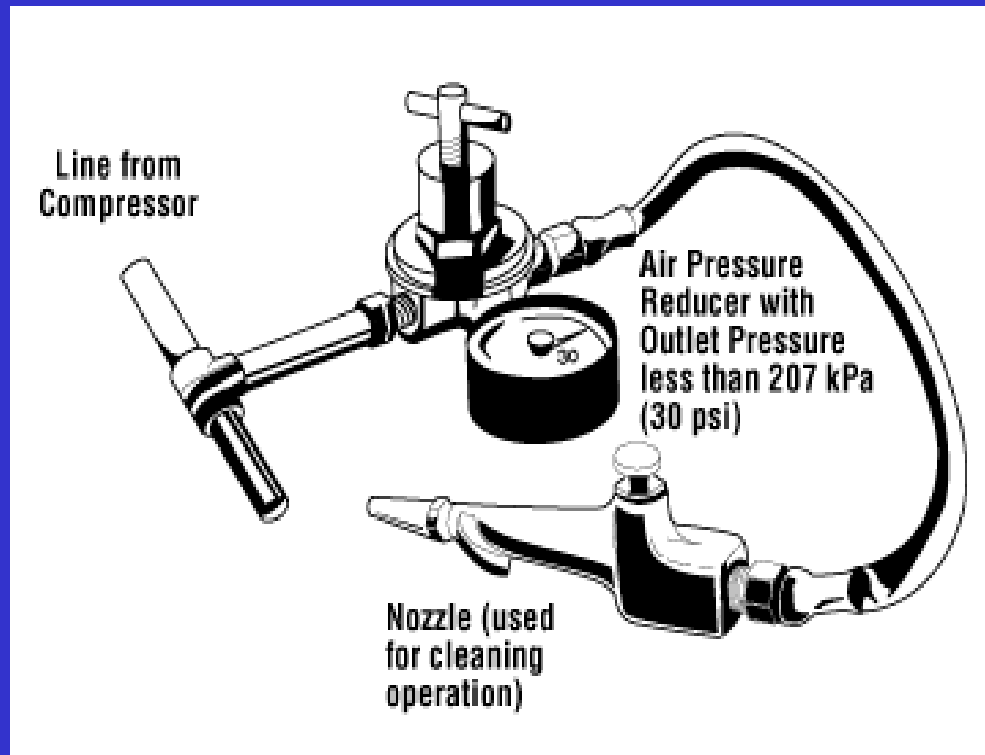
Wear eye protection. Wear hearing protection with jackhammers.



Muzzle in contact with work surface

Compressed Air Cleaning

Don't use compressed air for cleaning



Exception - where reduced to less than 30 p.s.i. with effective chip guarding and PPE

Reporting Accidents/Injuries

- First priority is to receive prompt medical attention (call 911)
- Report all work-related accidents, injuries or illnesses to your supervisor
 - Regardless of severity
- Paperwork to be filled out
 - Incident Report
 - Workers' Compensation

Hospitalization must be reported immediately to EHS&RM and no later than 8 hours from time of accident

PNEUMATIC TOOLS

Tool retainer

- A tool retainer shall be installed on each piece of utilization equipment which, without such a retainer, may eject the tool.

Air hose

- Hose and hose connections used for conducting compressed air to utilization equipment shall be designed for the pressure and service to which they are subjected.

COMPRESSED AIR

- 1. Before making or breaking any air connection, always turn off the air supply. Use the valve to turn off the air - never kink the hose as a shortcut kinking the hose may damage or even rupture the air hose.**
- 2. Protect the air hose from damage. Move it out of the way of vehicles so that it isn't run over. Also, be sure not to drag hoses around sharp corners.**
- 3. Be sure to use the proper size air hose and fittings to keep air pressure at a maximum throughout the entire line. Most manufacturers recommend 90 psi at the tool.**

COMPRESSED AIR

4. To ensure the best connection, clear any dirt off the nipple before connecting the air hose to the tool.
5. When the tool is connected, check the hose and all connections for leaks or damage before using the tool.
6. Maintain a clean, dry, regulated source of air to operate air tools at peak performance.
7. Do not use compressed air to blow your clothes.



Summary

Power tools are very common to any production facility. They can expose employees to multiple hazards if they are not maintained and used properly.

It is critical that you know how to maintain, test and operate any power tool you intend to use.

Summary

Hazards are usually the result of improper tool use or not following one or more of these protection techniques:

- Inspecting the tool before use
- Read Tool Owners Manual prior to use
- Using PPE (Personal Protective Equipment)
- Using guards
- Properly storing and maintaining the tool
- Keep the workplace neat and free of clutter
- Using safe handling techniques

Circle the one best answer.

1. True or False. Approved safe lifting is to bend at the waist and lift.
2. True or False. If a load is awkward to handle get help to lift or use a cart, dolly or other mechanical lifting device you are approved to use.
3. Which item is **not** a basic rule of safe lifting?
 - a. Have a clear path.
 - b. Set the load down properly.
 - c. Always pull a cart or dolly.
 - d. Get help for long loads.
 - e. Split up heavy loads when you can.
4. In the rules for safe lifting which is **not** a best practice?
 - a. Bend your knees.
 - b. Get a good hand hold.
 - c. Center yourself over the load.
 - d. Lift straight up - let your legs do the work.
 - e. Twist and turn at the waist.
5. True or False. In a lift with a partner make sure you communicate and plan the lift.
6. True or False. When necessary remove the guard on a grinder to put on a larger wheel than designed for the grinder.
7. True or False. When working with electric power tools use a ground fault circuit interrupter (GFCI) adapter especially in a damp environment.
8. True or False. When using hand or power tools always wear proper personal protective equipment that has been determined appropriate by OSHA or Job Hazard Analysis.
9. True or False. For a power cord with a ground pin it is appropriate to remove the ground pin on a 2-prong outlet then operate the power tool.
10. True or False. Keeping tools clean is part of a best practice for safety.

Lifting Techniques



Lifting process

BEFORE YOU LIFT

- **Plan Your Route:** Path clear? Trip hazards removed? Dry?
- **Assess the Load:** Too heavy? Can I use a hand truck or forklift? Can I slide it?

WHEN YOU LIFT

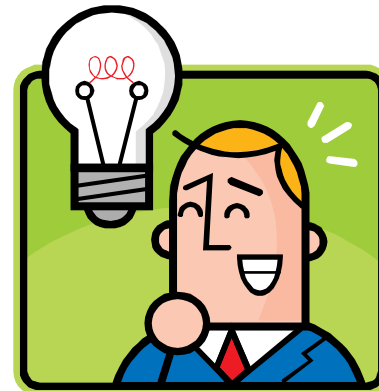
- **Lift It Right:** Position your body close to the object. Maintain the natural curve of your back.
- **Move It Right:** Don't twist your back.
- **Lower It Right:** When you put the load down, bend your knees not your waist.

GET HELP IF YOU NEED IT

- **Work Together:** Don't be a hero. Communicate with your partner!

Plan ahead

- **Size up the load:**
 - Can it be split into multiple loads?
 - Smaller loads cause less strain on the back.
 - Can you slide it rather than lift?
- **Use material handling equipment if load is too heavy:**
 - Forklifts
 - Hoists
 - Dollies



Plan ahead

- **Avoid using lower rack for moderately heavy to heavy items or awkward items.**
- **Get help when lifting heavy, awkward, or long items.**



Basic rules of good lifting

- Size up the load before you lift.
- Can you lift a corner?
- Can you get to the item?
- Do you need to move something to gain better access?



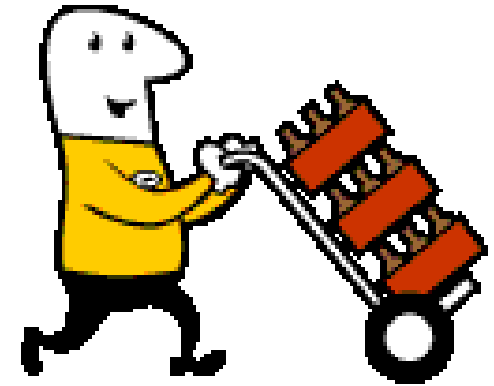
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- Bend your knees.
- Get a good hand hold.
- Center yourself over the load.
- Lift straight up - let your legs do the work.
- Don't twist or turn.



Basic rules of good lifting

- Have a clear path.
- Set the load down properly.
- Always push a cart or dolly.
- Get help for long loads.
- Split up heavy loads when you can.
- Pushing a load is easier on the back; easier to control.



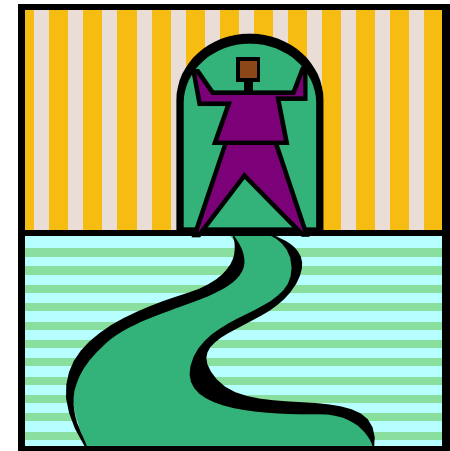
Never twist or turn when lifting

- Adds strain to the back's discs, muscles, ligaments, tendons.
- Plan your lift to avoid awkward positions.
- Set load down if you're losing your grip.
- Don't twist and turn or juggle load to regain grip.
- Keep back as straight as possible.



Carrying the load

- Ensure a clear path.
- Ensure a place where load can be set down.
- Check for stability of load.
- Can you get a good grip?



Carrying the load

- Use mechanical equipment if load is too heavy.
- Get help if load is too heavy - lift at the same time to keep load balanced.



Lowering the load

- **Bend the knees to let leg muscles support the weight.**
- **Slowly lower it; do not drop the load.**
- **Avoid sudden movements.**
- **Lower the load at the same time if working with a partner.**



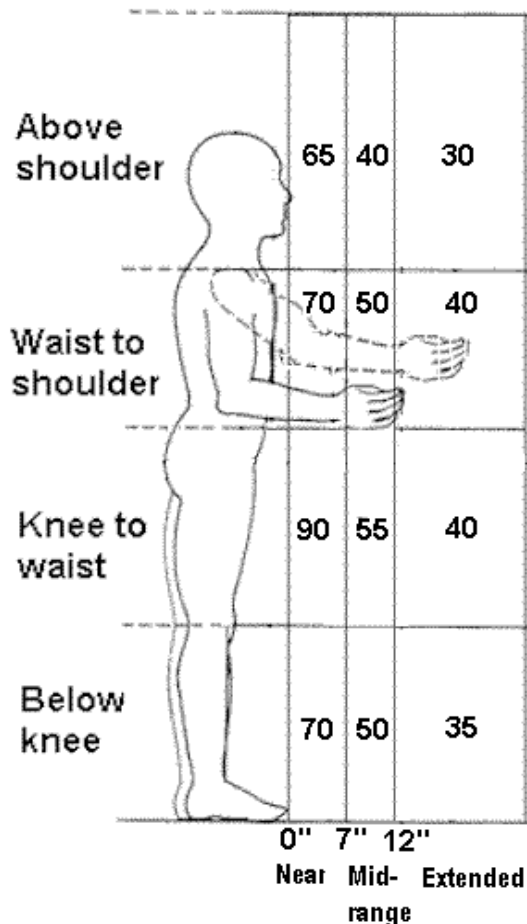
Awkward Lifting



Lifts that are:

- Above the shoulders
- Below the knees
- At arms' length

Analysis tools



- The closer to the body the more Strength you have.
- L&I Lifting Calculator
- Other tools:
 - American Conference Group of Industrial Hygiene (ACGIH) Lifting Threshold Limit Value (TLV)
 - National Institute of Occupational Safety & Health (NIOSH) Lifting Equation

Principles for reducing heavy lifting

- Reduce the weight
- Increase the weight (to balance load)
- Use mechanical assistance
- Slide instead of lift
- Team lifting



Reducing heavy lifting



Reduce the weight of the load



Wood pallet
60 pounds



Plastic pallet
20 pounds

Reducing heavy lifting

Use mechanical assistance



Pneumatic conveyor

Reducing heavy lifting



Slide instead of lifting



Principles for reducing frequent lifting

- Use mechanical assistance
- Avoid unnecessary lifting
- Use mobile storage shelves



Reducing frequent lifting

Use mechanical assistance...



Reducing frequent lifting



Use mobile storage:

Parts stay on racks as they move from one manufacturing process to the next.

Principles for reducing awkward lifting/ Reaching

- Remove obstacles
- Slide closer
- Reduce shelf depth
- Reduce package size
- Use mechanical assistance
- Team lifting



Reducing awkward lifting/ Reaching



Slide objects closer

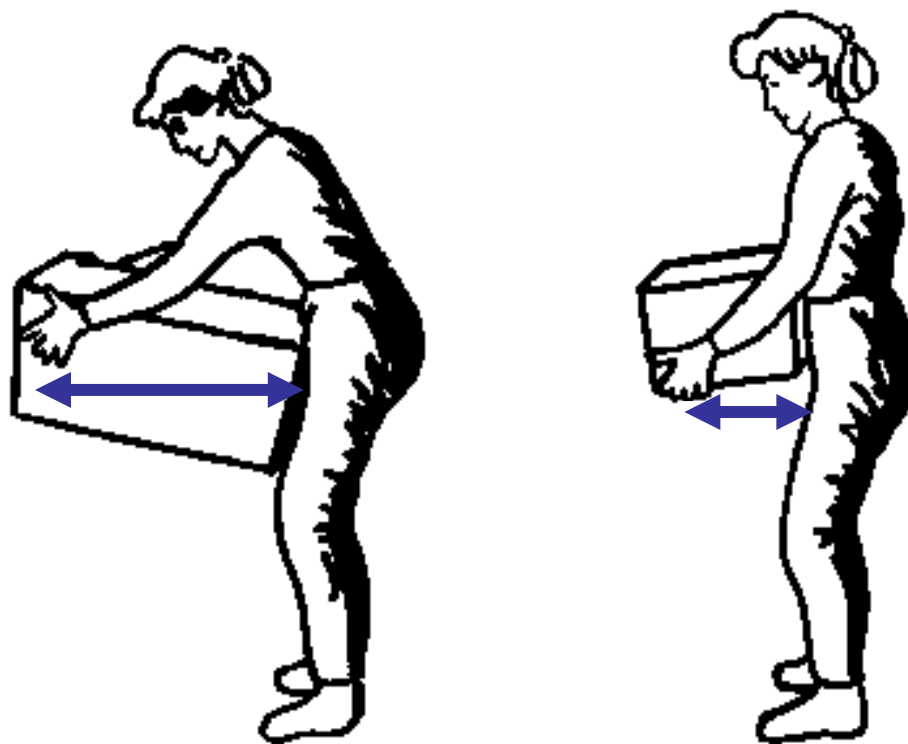


“Homemade” hook
for pulling small
boxes to edge of
shelf.

Reducing awkward lifting/ Reaching



Reduce package size



Principles for reducing awkward lifting/ Bending

- Use mechanical assistance to raise the load
- Add handles
- Arrange storage
- Avoid unnecessary lifting



Reducing awkward lifting/ Bending



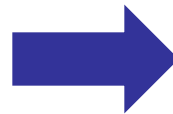
Use mechanical assistance to raise the load



Reducing awkward lifting/ Bending



Add handles



Reducing awkward lifting/ Bending



Rearrange storage



Reducing awkward lifting/ Bending

Avoid unnecessary lifting

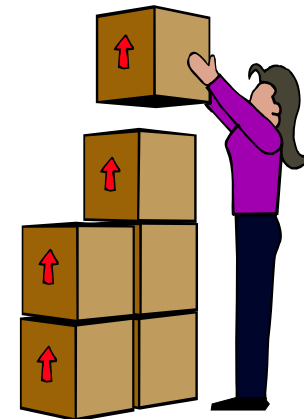


Tire hanger keeps
wheels up off the
floor in auto shop



Principles for reducing awkward lifting/ Reaching above shoulders

- Arrange storage
- Use mechanical assistance
- Use a rolling stair or “safety ladder”



Reducing awkward lifting/ Avoid reaching above shoulders



Arrange storage



Reducing awkward lifting/ Twisting



Use conveyors

**Allows boxes to be unloaded and
checked in with minimal lifting**

Lifting techniques training

Teach lifting techniques to employees:

- Training alone is not effective.
- Making changes to jobs and equipment is better.
- Making changes along with training is most effective.



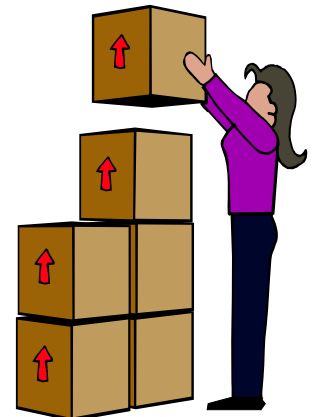
Lifting techniques training

- Job-specific, on-site, hands-on training is more effective than classroom.
- Have employees demonstrate proper lifting techniques before “graduating.”



Other factors in back injuries

- Age of employee
- Improper postures when sleeping, standing, sitting
- Physical condition of employee
- Repetitive motions





Conclusion

- When lifting a box, think out of the box!
- Is there a better way?
- Don't wait for someone to get injured before changing a job.
- Just because we have done it this way. Do we have to continue to use the same method to handle a loading and unloading of materials?

Questions?



Georgia

Subject Matter Expert (SME) Course Review Summary

College: Kellogg Community College

M-CAM Training Area: CNC/Machining Multi-Skilled/Mechatronics Production Operation Welding/Fabrication

Degree Program Name: Kellogg Advanced Manufacturing Assembly

Title of Course: BUCO 85S Lifting and Tool Safety

Subject Matter Expert (SME) Reviewer Information

Name: Mary Agostini

Title: Lean Six Sigma Master Blackbelt, Business Process Improvement Specialist

Phone: (419) 261-1490

Email: m-agostini@hotmail.com

Organization/Affiliation: A&W Continuous Improvement, LLC

Attach Resume or provide credentials (showing years of experience and work experience that is relevant to course content):

Synopsis of Findings:

Course Competencies:

1. Proper hand protection

- Course covers basic safety regarding the use of hand and power tools, including electric shock, flash burns, falling, hand and eye injuries, hearing loss, crushing and ergonomic injuries. Participants learn how to identify and prevent risk of injury when using hand and power tools. Personal protective equipment use is covered to ensure participants learn when and how to protect themselves from potential injury. Guarding and proper tool use are also addressed.

2. How to inspect tools to ensure proper condition

- Participants learn how to inspect tools prior to use in order to identify concerns and prevent injuries.

3. Tool maintenance and care

- Participants learn how to properly care for and maintain their tools and equipment for safe use.

4. Ergonomic stretches and postures

- Ergonomics and proper lifting techniques are covered, including stretching to prevent strains and correct lifting posture.

5. The importance of communicating physical strains

- Participants learn the importance of communicating in avoid physical strains.

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6. Proper techniques or tools for lifting large or heavy materials

- Students learn how to reduce risk by sliding, using mechanical assistance, and reducing the frequency of lifting.

7. Proper lifting techniques

- Participants learn proper lifting techniques, including the basic rules of good lifting. They're shown how to avoid unnecessary strain while lifting through proper planning.

This course provides effective instruction on proper tool safety techniques, and proper lifting techniques for employees in the workplace. This course content is consistent with OSHA recommendations and is up to date with current industry standards.

Reviewers Signature Mary Agostini

Date: 01/31/17

**Michigan Coalition for Advanced Manufacturing
Subject Matter Expert Course Review**

1. Course Overview and Objectives	Exceptional	Satisfactory	Ineffective
The goals and purpose of the course is clearly stated.	X		
Prerequisites and/or any required competencies are clearly stated.	X		
Learning objectives are specific and well-defined.	X		
Learning objectives describe outcomes that are measurable.		X	
Outcomes align to occupational focus (industry skills and standards).	X		
Comments or recommendations: According to the course syllabus, "Participants attending this course will learn how to properly handle tools and demonstrate proper lifting techniques." Pre-assessments are given prior to instruction to evaluate participants' level of expertise. A comprehensive exam is given to ensure participants have grasped the key components of proper lifting techniques and tool safety			
2. Material and Resources	Exceptional	Satisfactory	Ineffective
The instructional materials contribute to the achievement of the course learning objectives.	X		
The materials and resources meet/reflect current industry practices and standards.	X		
The instructional materials provide options for a variety of learning styles.	X		
Resources and materials are cited appropriately. If applicable, license information is provided.		X	
Comments or recommendations: This course utilizes classroom lecture, class discussion, work groups, and written and oral assignments to provide participants with an effective learning experience. Supporting materials include videos, guest speakers, field trips, and hands-on exercises to show and demonstrate real-world scenarios. This reviewer has no way of knowing whether course content requires citation, as the content is commonly known in manufacturing safety environments.			
3. Learning Activities	Exceptional	Satisfactory	Ineffective
Provide opportunities for interaction and active learning.	X		
Help understand fundamental concepts, and build skills useful outside of the learning object.	X		
Activities are linked to current industry practices and standards.	X		
Comments or recommendations: Participants are provided real world scenarios through field trips, guest speakers and hands-on exercises. Participants must apply critical thinking techniques to determine how to address specific situations, such as awkward loads, large loads, or heavy loads.			

**Michigan Coalition for Advanced Manufacturing
Subject Matter Expert Course Review**

4. Assessment Tools/Criteria for Evaluation	Exceptional	Satisfactory	Ineffective
The course evaluation criteria/course grading policy is stated clearly on syllabus.	X		
Measure stated learning objectives and link to industry standards.	X		
Align with course activities and resources.	X		
Include specific criteria for evaluation of student work and participation.	X		
Comments and recommendations: The course instructor captures number of points versus possible points, by individual competency. Points are then weighted by pre-assessment, course participation and attendance, and the final exam.			
5. Equipment/Technology	Exceptional	Satisfactory	Ineffective
Meets industry standards and needs.		X	
Supports the course learning objectives.		X	
Provides students with easy access to the technologies required in the course/module.	X		
Comments and recommendations: This course is up to date with current industry standards and guidelines for proper lifting and tool safety.			

This workforce solution was funded by a grant awarded by the U.S. Department of Labor’s Employment and Training Administration. The solution was created by the grantee and does not necessarily reflect the official position of the U.S. Department of Labor. The Department of Labor makes no guarantees, warranties, or assurances of any kind, express or implied, with respect to such information, including any information on linked sites and including, but not limited to, accuracy of the information or its completeness, timeliness, usefulness, adequacy, continued availability, or ownership.

The eight community colleges and MCAM is an equal opportunity employer/program provider. Auxiliary aids and services are available upon request to individuals with disabilities. TTY users please call 1-877-878-8464 or visit www.michigan.gov/mdcr.”



Michigan Coalition for Advanced Manufacturing Subject Matter Expert Course Review

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MARY M AGOSTINI

EXECUTIVE MANAGEMENT

- Strategic Planning and Deployment
- Operations Assessment and Improvement
- Quality Improvement
- Safety Performance Improvement
- Product and Process Innovation

PROFESSIONAL PROFILE

Certified Lean Six Sigma Master Black Belt with over 25 years of experience in process and product innovation, process efficiency improvement, quality improvement, and training and mentoring. A proven track record in multiple industry settings, including manufacturing, health care and higher education.

CORE COMPETENCIES

- Project management
- Development of Metrics and tracking systems
- Project prioritization and assignment
- Lean Six Sigma program management
- Root cause analysis
- Solutions development
- Project benefit estimation and tracking
- Strategic alignment
- Resource management
- Change management
- Team leadership
- Analytics
- Process and product design

EXPERIENCE

PARTNER & FACULTY, STRATEGY DEPLOYMENT INSTITUTE

August, 2016 to Date

Providing training and guidance for multiple industry settings on effective strategy execution.

PRESIDENT, A&W CONTINUOUS IMPROVEMENT, LLC

June, 2013 to Date

Providing consulting services in manufacturing, healthcare, higher education and government. Implementation of process and performance improvement techniques.

DIRECTOR, PATIENT FLOW AND LOGISTICS, CATHOLIC HEALTH PARTNERS

January 2012 to September 2013

Implemented strategy execution across multiple hospitals, resulting in over \$30M increase in business performance.

LEAN SIX SIGMA MASTER BLACK BELT, MERCY HEALTH PARTNERS

March 2007 to January 2012

Implemented effective strategy deployment in the Northern Region, resulting in improved business performance, safety performance, and quality performance across the board.

LEAN SIX SIGMA MASTER BLACK BELT, JOHNS MANVILLE CORPORATION

July 1995 to March 2004

Operations consolidation resulting in \$23M return. Quality and Safety performance improvement and monitoring.

EDUCATION

UNIVERSITY OF TOELDO, 2013

BS Interdisciplinary Studies, Business Minor – graduated Magna Cum Laude

BOWLING GREEN STATE UNIVERSITY

Mechanical Engineering – 3.96 GPA

OWENS COMMUNITY COLLEGE

Statistical Engineering Technology – 3.9 GPA

COMMUNICATION

Key Note Speaker, NW Ohio Lean Consortium, 2014

Speaker, NW Ohio Lean Consortium, 2013

Speaker, VHA Lean Healthcare Conference, San Diego, 2013

LEADERSHIP

Chair of Alganssee Citizens Committee for Reformed Zoning

Chair of the Properties & Performance Committee, TAPPI

REFERENCES

SAMANTHA PLATZKE

CFO, Care Logistics

Contact information provided upon request

KIM BORDENKERCHER

CEO, Henry County Hospital

Contact information provided upon request