

# CSU-EMEC, CSU-EMEC FOUNDRY

## Rules & Procedures

Revised: 18 FEBRUARY 2014

### MISSION – ENGINEERING MANUFACTURING EDUCATION CENTER (EMEC):

To act as an instructional and practical laboratory to support, in priority order, the following:

- 1) Scheduled class and laboratory sessions in the EMEC.
- 2) ME undergraduate student work on ME Department sanctioned projects and activities.
- 3) ME Department instructional laboratory equipment.
- 4) Research activities of the ME faculty and graduate students.
- 5) Non-ME research and education related projects and activities.

### EMEC INSTRUCTORS:

Dr. Steven “Doc” Schaeffer, Ph.D.	970.491.5140	<a href="mailto:steven@engr.colostate.edu">steven@engr.colostate.edu</a>
Mrs. Debra Mann, B.S.	970.491.5140	<a href="mailto:debra@engr.colostate.edu">debra@engr.colostate.edu</a>
Mr. Keegan Barricklow	970.491.5140	<a href="mailto:keebarri@engr.colostate.edu">keebarri@engr.colostate.edu</a>

**EMEC HOURS:** 06:00 – 24:00 Work may take place between the hours of 24:00 and 06:00 only if an EMEC instructor or another ME faculty is present. The EMEC and CSU-EMEC FOUNDRY are closed to **all** users between the hours of midnight and 06:00.

### DEFINITIONS:

**SUPERVISED HOURS:** A C.S.U., ME faculty or administrator, paid engineering employee, graduate teaching assistant (GTA), EMEC work-study student is present in the EMEC.

**UNSUPERVISED HOURS:** One of the above “supervisors” is not present in the EMEC. Only faculty and C.R.A. EMEC USERS may use the EMEC. The “**two-person**” rule is in effect during Unsupervised Hours.

### EMEC USERS:

**“C.R.A.” EMEC USER:** CARD READER ACCESS EMEC USERS are ME students who have applied and signed both an “Acknowledgement Form” and “CSU-EMEC CARD READER ACCESS AGREEMENT,” and been listed having card reader access to B09. A list of C.R.A. EMEC Users is posted on the bulletin board inside the EMEC east door. Information regarding Card Reader Access can be obtained in the EMEC, or from an EMEC instructor. Reference “**Card Reader Access.doc**” for information regarding card reader access.

**NON-C.R.A EMEC USER:** Anyone not having Card Reader Access may not use the facility during Unsupervised Hours. (Even in the presence of a C.R.A. EMEC User).

**NON-M.E. DEPARTMENT EMEC USER:** A graduate or undergraduate student from departments other than Mechanical Engineering must have express consent from the EMEC instructor prior to beginning any activity in the EMEC.

**DRAWINGS & PROCEDURES:** All EMEC users are required to have a dimensioned drawing (minimally a sketch can suffice) as well as a written plan of procedure (Process Sheet), before receiving project approval. Projects must be coordinated with, and approved by a EMEC instructor or EMEC GTA before starting the work. Drawings may be electronic.

**TWO-PERSON RULE:** During Unsupervised EMEC hours, the “two-person” rule is in effect. A C.R.A. EMEC User must be in the shop with another person to help in case of an accident.

**EMEC SAFETY:** Safety is the responsibility of all faculty and students involved in using the EMEC. Anyone working in the EMEC is charged by the ME Department faculty and administration to enforce safe practices at all times. The EMEC SAFETY RULES & PROCEDURES are provided as part of this document. Every user of the EMEC is expected to know, follow, and enforce the complete published set of safety rules and procedures. A STUDENT ACKNOWLEDGEMENT FORM must be signed, dated, and filed in the office of the EMEC instructor before any student works in the EMEC.

**KEYS & SECURITY:** The EMEC has an “ALL-OPEN” philosophy. This means that all cabinets and necessary power panels are open and unlocked at all times so that EMEC users can have access to the tools and facilities of the EMEC for use in the EMEC. All EMEC users present are responsible to see that the EMEC is properly cleaned, tools put away, and that the entry doors are closed and locked when no one is present.

Card-reader access will be granted to CARD READER ACCESS EMEC Users or ME faculty. Faculty may request and receive permanently assigned EMEC keys.

All users of the EMEC should plan ahead for their use of the EMEC whenever possible. The EMEC gets used heavily at times, but there is plenty of free time in the EMEC during regular days when the university is open. The WORKCENTER SCHEDULE of potential constraint work centers is posted on the bulletin board inside the east EMEC door. The WORKCENTER SCHEDULE of planned EMEC use by class sessions and laboratory sessions is posted as an aid to planning. Users are strongly encouraged to communicate with an EMEC Instructor as work is planned and EMEC use is scheduled. There is a 10 minute grace period before a work center is granted to someone else who may be waiting.

Each CNC machine tool (Haas TM-3P, TL-1, TM-2P) has its own SCHEDULE.

Hallway doors to the EMEC must be closed and locked between the hours of 17:00 and 08:00 unless an instructor or GTA is present.

**EMEC USE BY NON-ME STUDENTS:** The EMEC may be used by non-ME students if a request is made to the ME Department Head and approval is received, or under special approval by the EMEC instructor. There is a minimum fee of \$20.00 assessed for any and all work done for non-ME students and faculty. See also **EMEC USE FOR SANTIONED CSU RESEARCH PROJECTS** (page 5).

**EMEC SAFETY RULES:** The most important rules in the EMEC are the SAFETY RULES. Safety rules are strictly enforced by the EMEC instructor, EMEC graduate teaching assistants, EMEC work-study employees, ME faculty and administration and by all EMEC users. **KNOWING, FOLLOWING, AND ENFORCING THESE RULES IS THE RESPONSIBILITY OF EACH PERSON USING THE EMEC!**

- 1) Eye protection must always be worn past the safety tape. The EMEC **DOES NOT** supply safety glasses. Anyone using the EMEC shall provide his or her own safety glasses. Lenses must be **clear and impact resistant**. **Dark sunglasses are not allowed** as a substitute for safety glasses. Face shields and welding helmets are provided for appropriate processes.
- 2) There will be **no open-toe or open-heel shoes** worn past the safety tape at any time. This includes sandals, clogs, thongs, flip-flops, etc. If you do wear these types of shoes to school, you will be asked to change them before being allowed in the work area of the EMEC.
- 3) Any long hair must be tied back to keep it from getting wrapped up in the machines.
- 4) **No loose clothing** should be worn in the EMEC work area. This includes baggy sweaters, baggy sweatshirts, outdoor coats, baggy pants, loose shirttails, and baggy sleeves. Long-sleeved shirts will be required to be rolled up above the elbow – operations pending. Loose chains, straps, leather, cords, and ropes may not be worn. Pants must be properly worn at the waist: either able to stay up by themselves, or with a belt. Pants worn below the waist that cannot stay up on their own are **not allowed**. Head scarves and head coverings may not hang loosely outside of outer clothing.
- 5) Absolutely no horse play in the EMEC. This includes running, yelling, throwing things, etc. If you are operating a machine and need to talk to someone, shut the machine off and then talk. Pay attention to the machine at all times while in operation.
- 6) Alcohol and/or illegal drug use before and during use of the EMEC will not be tolerated.
- 7) During unsupervised EMEC hours, C.R.A. EMEC Users are not responsible to supervise the work of NON-C.R.A. students or other “drop-ins” and are not allowed to supervise them.

- 8) During unsupervised EMEC hours, the **“two-person” rule** is in effect. This means that a C.R.A EMEC User must be accompanied in the shop by at least one other person, not necessarily C.R.A, to provide help in case of an accident. The second person may not engage in EMEC work unless the second person is also a C.R.A. EMEC USER.
- 9) Make every effort to avoid tool or machine breakage. However, tool or machine breakage is expected to occur from time to time. **Broken tools and machines:** Must be reported at once to the EMEC instructor, GTA, or EMEC work-study employees—**immediately !** Communicate orally, or written directly to the EMEC instructor. Telephone voice mail and email are also available. Place broken tools at the EMEC instructor’s office door with a note in the event the EMEC instructor is not present. Be sure to include your name, telephone number, and time and date of incident on the note.
- 10) An **EMERGENCY TELEPHONE** is located beneath the **FIRST AID** station in the EMEC. It is to be used exclusively for summoning help in the event of an accident. Dial **911** in the case of an emergency, or press one of the large emergency icons at the top of the telephone.
- 11) Personal communications devices (cell phones) and/or electronic music playback devices (iPods, CD players, etc.) are not allowed to be used in the EMEC when operating machine tools.
- 12) The above rules are standard in most shop atmospheres. They must be observed at all times.

**At no time should safety be sacrificed in order to complete a project!**

#### **MACHINE OPERATION SAFETY RULES:**

- 1) Machines are to be run by one person at a time. If you have more than one person changing things it is too easy for someone to get hurt. If there is more than one person at the machine, everyone but the operator must remain a spectator.
- 2) Do not try to carry on a conversation while running the machines. It takes only an instant to lose concentration and crash the machine or ruin the work piece.
- 3) Do not force anything on the machine. If it does not move freely, something may be locked or broken. By forcing it, the problem may worsen. Stop and get the EMEC instructor, GTA, or one of the EMEC work-study employees and they will assist in determining the problem.
- 4) The machine must be set up to a neutral position when one has completed their work. (e.g.: tram the head of the milling machine if it was tilted). Remove the cutter and return it to its proper place. Apply way lube to ways of lathes and milling machines.
- 5) The machine must be free of chips and oil when one has completed their work. Individuals are responsible for cleaning up any mess made. Clean each machine as they get used. Example: cut material off on the saw, clean the saw. Then do some milling and clean the EMEC. This way everyone gets to use a clean machine.
- 6) Leave adequate time for clean-up. EMEC users are always required to clean up before leaving.
- 7) Messes or set-ups cannot remain in the EMEC in the absence of a EMEC user, except in pre-approved circumstances. Such approvals should not be considered routine and must be obtained from the EMEC instructor, other ME faculty, or EMEC GTAs. Active set-ups that have been approved must be tagged with the **“STOP Do Not Alter...Set-up”tag**.



- 8) Emergency power shut-off switches are located throughout the EMEC. Know where they are located. They can be used to shut power off to all machines in the EMEC. Before restoring power, switch all switches on 3-phase machines to the “OFF” position to avoid single phase operation of motors.



**East entrance wall switch.**



**Switch on west wall above horizontal band saw.**

**MEZZANINE AREA / TOOL CRIB:** The area above and below the mezzanine is **off limits** to all students. This area may only be accessed by EMEC INSTRUCTORS, WORK-STUDY EMPLOYEES, OR GTAs. If you need tools or materials from the TOOL CRIB, ask between the hours of 08:30 and 16:30.

**MATERIALS & TOOLS:** Materials and tooling in the EMEC are provided for ME Department sanctioned projects and activities only. Use of materials for jigs and fixtures may be available in the materials storage area. Use of those materials must be approved by the EMEC instructor. Personal projects are not allowed in the EMEC. Fasteners and miscellaneous materials are for sanctioned EMEC projects and maintenance of the CSU-EMEC, and not for student project use. Tools may **NOT** be removed from the EMEC.

**SPRAY BOOTH (PAINT ROOM, ROOM B9B) PROTOCOL:**

- 1) Respirators must be cleaned with alcohol or hydrogen peroxide **BEFORE and AFTER** use.
- 2) Solvents may not sit out in open cans. Solvents must be disposed of in the “**Recycling**” container that is kept in the “Flammable Materials” cabinet. This includes non-halogenated liquids including solvents such as lacquer thinner, acetone, paint thinner, methyl ethyl ketone, toluene, oils such as cutting oils, way lube, machine oils, etc.
- 3) Layout fluid or dye must be used in the paint room.
- 4) The exhaust fan is to be running at all times the paint room is in use.
- 5) Be certain of proper compressed air pressures when using spray guns. Most spray guns are of the low pressure type requiring 30 to 50 psi.
- 6) Do not spray paint directly on the walls when testing spray guns. Use a sheet of newsprint suctioned to the exhaust filters.

**At NO time may any paints, oils, solvents, or other hazardous liquids be disposed of in any of the sink or floor drains of the CSU-EMEC!**

- 7) All work left in the paint room must be “tagged” with a standard form. “Notifications” must be filled out completely. Forms are available in the paint room.



**PROCESS SHEET (PLAN OF PROCEDURE):** A PROCESS SHEET (minimally a list) is required for all parts processed in the EMEC. Process sheets are available to help in planning manufacturing processes and procedures. Proper planning reduces tooling and material destruction and waste, considerably. Safety awareness is also increased.

**DESIGN DRAWING  
(PAPER AND/OR ELECTRONIC VERSIONS)  
& PROCESS SHEET ARE  
REQUIRED**

(APPROVED AND INITIALLED BY INSTRUCTOR,  
OR GTA(s))

**BEFORE WORKING ON PARTS, OR RESERVING MACHINE TIME !!!**

**RECYCLING:** The following byproducts of the EMEC are recycled. Please put recyclables in the appropriate receptacles. If unsure of your material, please ask. **Steel chips are not recycled!** **Steel chips are not recycled!** **Steel ships are not recycled!** **Failure to file recyclables properly will result in loss of EMEC access and/or card reader access.**

- ALUMINUM “CLIP” = solid pieces that are not chips from machining processes.
- ALUMINUM CHIPS = shavings and cuttings resulting from machining processes.
- BRASS, BRONZE, & COPPER “CLIP” = solid pieces that are not chips from machining.
- BRASS, BRONZE, & COPPER CHIPS = shavings and cuttings resulting from machining.
- STAINLESS STEEL “CLIP” = solid pieces that are not chips. Contains no mild or alloy steel.
- STEEL “CLIP” = solid pieces that are not chips from machining processes.
- WOOD = unfinished hardwood or softwood. **NO** manufactured forest products such as MDF, particleboard, OSB, plywood, etc.

## **WELDING ROOM (ROOM B9C) PROTOCOL:**

- 1) The exhaust fan is to be running at all times the welding room is in use. Close the room door when welding.
- 2) Flammables such as papers, coats, backpacks, etc. are to be kept out of the welding room when welding is taking place.
- 3) No flammable liquids may be in the welding room when welding is taking place.
- 4) Cylinders are to be chained upright at all times.
- 5) All empty cylinders must be tagged with an “**EMPTY**” tag. There are reusable orange colored tags hanging on the south wall of the welding room.
- 6) Use a wrench that fits properly when changing cylinders.
- 7) Wear proper safety gear including safety glasses, proper shade of welding lens, fire resistant jacket, gloves, long pants, shoes, etc.
- 8) Only **ONE** welding machine may be operated at any given time. **DO NOT** use any two machines simultaneously! **DO NOT** unplug, disconnect, or connect any of the welding machines to a power supply without obtaining clearance to do so from an instructor, or GTA.
- 9) Do not leave hot metal in the welding room without the “**HOT METAL**” sign placed nearby.
- 10) Seldom will ground water seep up around the pillar on the south side of the welding room. A puddle of water forms at that column and sometimes flows out on the floor under the GTAW welding machine. **MOP AND DRY ANY WATER BEFORE WELDING!**

**ASSISTANCE:** The EMEC instructor, other ME faculty, and ME work-study employees are in the EMEC to assist undergraduate students, graduate students, as well as each other, in:

- Learning how to manufacture parts, components, assemblies, and products.
- Learning how to safely use manufacturing equipment.
- Helping to design projects.
- Maintaining the EMEC as a safe, functioning, friendly place to work and learn.
- Answering questions about design and fabrication processes.
- Providing resources for solving problems related to engineering projects.
- Enforcing the rules.

## **A FEW THINGS TO REMEMBER:**

- 1) Understand as much as possible about what you want to do before coming into the EMEC. This will help you to be able to convey your needs to the EMEC instructor, EMEC work-study employees, or other ME faculty so desired results can be obtained. Plan ahead.
- 2) Allow plenty of time to do your machining and fabrication work. Set-ups and processes can take longer than expected – especially if you lack sufficient experience.
- 3) If you don’t know, please ask!!!
- 4) Contribute to the success of the EMEC by using common sense and prudence.
- 5) Have fun and enjoy your time and experiences in the CSU-EMEC – you have a wonderful learning facility!

## **EMEC USE FOR SANTIONED CSU RESEARCH PROJECTS:**

### **REGARDING:**

Graduate Students of Departments Other Than Mechanical or Civil Engineering  
Research Assistants of Departments Other Than Mechanical or Civil Engineering  
M.E. Graduates Employed by Other Departments at C.S.U.  
CSU-EMEC C.R.A. Employees of C.S.U.  
The Steel Bridge Team of Civil Engineering

Project work on sanctioned C.S.U. research projects may be completed in the Mechanical Engineering Manufacturing Education Center (CSU-EMEC) pending express approval from the EMEC instructor. Work from outside the Department of Mechanical Engineering will be given lowest priority since allowance of outside work shall be considered a privilege because it is a deviation from the mission of the EMEC. Work from outside the Department of Mechanical Engineering normally will be subject to the “**Standard Shop Rates**” because EMEC staff will perform this work.

Employees and graduate students from other departments, and Steel Bridge Team members must be granted card reader access through regular EMEC C.R.A. procedure if EMEC access is desired.

C.R.A. employees and graduate students from other departments using the EMEC are subject to a use fee. This fee is used exclusively to offset costs of perishable tooling, abrasives, broken tools, machine maintenance, etc. The use fee will be contracted on a case-by-case basis through the EMEC instructor prior to commencing work. Reference “**Standard Shop Rates.doc**” for detailed information regarding NON-ME DEPARTMENT USE FEES.

As with all work performed in the EMEC, a design drawing, minimally a dimensioned sketch, (paper or electronic version) is required.

### **CSU-EMEC FOUNDRY:**

The foundry is off-limits without prior approval from Dr. Steven L. Schaeffer. Students without express personal instruction from Dr. Schaeffer, may under **NO** circumstances work alone in the foundry. The above policies pertain to all students when working at the CSU-EMEC FOUNDRY.

### **MERC (Motorsport Engineering Research Center) at 3317 W. Vine Drive, Fort Collins:**

Student use of machine tools and fabrication equipment at the MERC is not allowed. The MERC is not an official part of the EMEC.