MECHANICAL ENGINEERING
WORKSHOP & LABS

SAFETY MANUAL

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STANDARD EMERGENCY STEPS

➢ IN CASE OF FIRE ALARMED PROCEED QUICKLY TO THE NEAREST EMERGENCY EXITS AND CALL FIRE BRIGADE (Dial 998). AND CALL THE FACULTY SECURITY ON 06-5718106

➢ INFORM WORKSHOP SUPERVISOR AND NEAREST BUILDINGS ABOUT THE FIRE

➢ AFTER LEAVING THE BUILDING MOVE IN THE OPPOSITE DIRECTION AND DO NOT RETURN UNTIL ALL CLEAR CONFIRMED.

➢ WHEN COLLEAGUE ELECTRIC SHOCK NEVER TRY TOUCHING HIM BUT DIRECTLY TURN THE MEAN SWICH OFF AS FAST AS YOU CAN, THEN CALL AMBULANCE, (Dial 997) AND INFORM WORKSHOP SUPERVISOR.

➢ IN CASE OF COLLEAGUE INJURY OR NEEDS TO EMERGENCY MEDICALLY CARE, CALL AMBULANCE, (Dial 997) AND INFORM WORKSHOP SUPERVISOR.

GENERAL Safety INSTRUCTIONS

➢ SHEMAK AND THOUB DRESS ARE FORBIDDEN INSIDE WORKSHOP

➢ SAFETY SHOES MUST BE WORN INSIDE WORKSHOP

➢ SUITABLE SAFETY GLASSES MUST BE WORN WHEN MACHINES ARE RUNNING.

➢ ASK WORKSHOP SUPERVISOR BEFORE USING ANY NEW EQUIPMENT

➢ TAKE CARE WHEN USING COMPRESSED AIR.

➢ ALWAYS KEEP MACHINES CLEANED AFTER USE.

➢ HEARING PROTECTION SHOULD BE WORN FOR NOISY MACHINES.

➢ WORKING ALONE AFTER NORMAL HOURS IS NOT PERMITTED

(Normal Hours 8:00AM – 4:00PM)
1. Introduction

**SAFETY FIRST**

Starting from this logo the safety of students, technicians and staff who are using workshop or laboratories in mechanical engineering department is our concern.

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*Fig.1 2D-CAD Workshop layout showing the emergency evacuation path*
Workshop and laboratories in the mechanical engineering department are equipped with a great potential facilities and equipment up-to-date High-TEC around the world. The workshop is divided into 7 sub sections as shown in Figs. 1 & 2. The workshop is designed using up-to-date 3D-CAD SolidWorks Software. All sections were drawn and designed to satisfy high safety requirements. Figure 3 shows the High-TEC CNC lathe machine during its installation and testing before allowing students to use it.

As shown in the Figs. 1& 2 all workshop departments have its gates without doors and opened to one main corridor. This design is chosen to satisfy the maximum safety situation for all who may use workshop space. The main advantage of this design is to give the workshop supervisor a clear vision from his office at the beginning of the main
corridor, Fig. 2. At any hazards, incidents and/or 'near miss' incidents supervisor can take his action directly make necessary calls from his office or engaged directly to the event.

![High-TEC CNC lathe machine during its installation and testing](image)

*Fig. 3 High-TEC CNC lathe machine during its installation and testing*

The approved design shown Figs. 1& 2 satisfies, clear smooth and fast evacuation in case of emergency situations. The dashed lines with arrows in Fig. 1 show the path of emergency evacuation. The emergency exit leads to outside all the building to make sure that evacuation process is 100% safe.
At any place inside workshop you will see emergency exit labels clearly directed you to the emergency exits, Fig. 4. Before starting with workshop or laboratories work you must know everything concerning your safety. Emergency situations should take more attention. You must locate and know all emergency exits. That will help you in case of emergency situations to flow smoothly and directly to the emergency exits outside of all the building and danger.
Figure 5 shows an example of how the machines are distributed and placed inside workshop space. The placement of machines should be managed carefully to satisfy highest possible degree of safety to all workshop users.

In machining workshop machines are placed such that its back is placed to the wall and all electrical wiring and water or hydraulic accessories should be placed between the machine and the wall. The space between machines is designed to allow...
comfort and safe margin for students to move and notice all operations. Any one inside the workshop is not allowed to move between machines back and walls except for highly expert workers that should make maintenance for machines. In case of maintenance special care and instruction should be performed and no machine operation is allowed inside the workshop during installation or maintenance activities performed.

![Workshop main hall](image)

**Fig. 6 Workshop main hall**

The first step of students inside workshop is beginning with the workshop main hall, Fig. 6, where students take their first lectures, presentations and seminars about all things concerning safety of workshop and laboratories for the mechanical engineering department. Students are not allowed to get their second step going inside workshop
departments and sections before completing all requirements of this safety manual with supervisor approval after signing the agreement page at the end of this safety manual.

Figure 7 shows casting workshop training “as an example” under supervision of expert and well trained ME-Staff. Students watching the casting process with high attention and concentration and supervisors explain how the sensitive and precisely casting process performed. The color of the student coat is chosen to be blue while for staff is gray. Notice the commitment of all students and supervisors inside the workshop.
and the low number of students comparing with supervisors to make sure that student’s safety is totally under complete observation and control by ME-Staff.

Generally workshop and laboratories machinery could of two cases:

- Machinery needs only basic instruction by qualified person and could be operated with unsupervised using.
- Machinery experience to be operated safely, and needs clearance before unsupervised using, and sometimes unsupervised work is allowed only for highly skilled workshop or laboratory users.

Before using any machine or equipment, user must review the instructions of the operation. Health and safety precautions are necessary and essential before giving permission to any work activity. In case of restricted access to specific workshop or laboratories areas or machines, a clear warning designation should be clearly stated and announced. Machines could be locked off if necessary like maintenance or troubleshooting cases. In case of emergency situations the instructions stated in Fig. 8 should be carefully followed.
**STANDARD EMERGENCY STEPS**

IN CASE OF FIRE ALARMED PROCEED QUICKLY TO THE NEAREST EMERGENCY EXITS AND CALL FIRE BRIGADE (Dial 998) AND CALL THE FACULTY SECURITY ON 06-5718106.

INFORM WORKSHOP SUPERVISOR AND NEAREST BUILDINGS ABOUT THE FIRE.

AFTER LEAVING THE BUILDING MOVE IN THE OPPOSITE DIRECTION AND DO NOT RETURN UNTIL ALL CLEAR CONFIRMED.

WHEN COLLEAGUE ELECTRIC SHOCK NEVER TRY TOUCHING HIM BUT DIRECTLY TURN THE MEAN SWICH OFF AS FAST AS YOU CAN, THEN CALL AMBULANCE, (Dial 997) AND INFORM WORKSHOP SUPERVISOR.

IN CASE OF COLLEAGUE INJURY OR NEEDS TO EMERGENCY MEDICAL CARE, CALL AMBULANCE, (Dial 997) AND INFORM WORKSHOP SUPERVISOR.

**GENERAL SAFETY INSTRUCTIONS**

- SHEMAK AND THOUB DRESS ARE FORBIDDEN INSIDE WORKSHOP.
- SAFETY SHOES MUST BE WORN INSIDE WORKSHOP.
- SUITABLE SAFETY GLASSES MUST BE WORN WHEN MACHINES ARE RUNNING.
- ASK WORKSHOP SUPERVISOR BEFORE USING ANY NEW EQUIPMENT.
- TAKE CARE WHEN USING COMPRESSED AIR.
- ALWAYS KEEP MACHINES CLEANED AFTER USE.
- HEARING PROTECTION SHOULD BE WORN FOR NOISY MACHINES.
- WORKING ALONE AFTER NORMAL HOURS IS NOT PERMITTED. (Normal Hours 8:00 AM - 4:00 PM)

**Fig. 8 Board of standard emergency steps and general safety instructions**
Training and supervising should be operated by skilled and well trained persons, to make sure that any machine or tool is used as healthy and safe operation. Trainee and technicians must be completely supervised until they get permission to work without supervision. Workshop and laboratories contain many potential safety hazards. If you read and follow this safety manual carefully, these hazards can be eliminated. The basic workshop and laboratories safety requirements are outlined in this manual. See Fig. 9 for safety facilities at the workshop entrance.

Fig.9 Some safety facilities at the workshop entrance
2. Safety Responsibilities

In order to keep the work inside workshop and laboratories in safe side, all parties’ responsibilities should be clearly defined and well known by each party.

2.1 Responsibilities of the Chairman and Supervisor

Mechanical Engineering Chairman and supervisor should make sure to do some precautions:

- Ensure that this safety manual is available to each one by department website link and make sure that staff and students concerning to work inside workshop or labs has received a hard copy of this manual and has signed the form at its end.
- Ensure that general workshop and labs rules and emergency steps are listed clearly at the gate of working area.
- Ensure to review all health and safety precautions to guarantee that it is adequate to work atmosphere.
- Ensure that all machines and equipment are safe according to types of activities inside workshop and labs.
- Ensure that an appropriate risk controls are implemented.

Figure 10 shows the responsibility of workshop and laboratory supervisor that he should start his dealing with students with the explanation of safety board instructions.
2.2 Responsibilities of the Staff and Students

The responsibilities of all staff and students inside workshop and labs are not only taking their own health and safety care responsibility but also the health and safety of all others having access to workshop or labs areas:

- Avoiding any hazards when dealing with machines or equipment.
- Complying with all health and safety precautions in this manual.
- Complying with all emergency instructions stated in this manual.
- Making sure that devices and personal protective equipment are used properly and safely.
Making sure that in case of emergency situations, to follow exactly the emergency and evacuation procedures, Fig. 8.

- Avoiding any action that may cause risk of other persons inside workshops or labs.
- Asking workshop and labs supervisors before performing any unknown activity or operating any new machine or equipment that you are not familiar with.
- Wearing a suitable protective clothing and safety shoes at all times.
- Eating and drinking is not allowed inside the workshop or laboratory.
- Reporting all incidents, risk behave or near miss accidents, and make sure to inform chairman or supervisors, or by email at m.elashmawy@uoh.edu.sa

3. Standard Safety Behavior

Working inside workshop or laboratories should be carried out according to standard safe behavior as follows:-

- Always keep the logo **SAFETY FIRST** in your mind, avoid any risky situations and always keep attention about any possible risky behave or activity.
- Wearing cloths should be compatible to all workshop or laboratory nature and activities. *Shemak* and *Thoub* (Saudi national clothing) is not suitable for wearing in the workshop and most of laboratories, Figs. 11 and 12.
- Eye protection is important in case of hand operating or dealing with machine tools. Special eye protection should be worn when dealing with some equipment like welding machines.
- Always wear hearing protection when subjected to noisy operations.
- Never perform any irresponsible or reckless behavior action like running or pushing or fighting with your colleagues inside the workshop or any laboratory.
Fig.11 Shemak and Thoub dress are forbidden inside workshop

Fig.12 Shemak is risky to death inside workshops and many labs
Be careful when using doors and when entering or leaving any place in the workshop or labs.

- Avoid any work requires you to stay alone in the workshop or laboratory; at least a second party should stay with you.
- Do not eat or drink inside workshop or labs.
- Storing food or drink inside any refrigerator that used for workshop or labs materials.
- Do not smoke inside workshop or any laboratory.
- Waste cotton or rags with oil have to be collected in suitable steel containers and should be isolated from other normal west; this will lead to reduce chances for fire accidents.
- When dealing with any unfamiliar substance consider it as hazardous till the opposite is proven.
- Clear permission should be signed by the workshop and Labs supervisor, before any work done inside workshop or any laboratory.
- Before performing any operation the potential hazards of this operation should be precisely known and appropriate safety precautions should be adopted.
- Do not commence any flame producing activity until making sure that any volatile materials or flammable dusts are completely eliminated.
- Carrying or moving any potentially hazardous material should be carried out with more additional care.
- All fire-escape paths should be completely clear all the time.
➢ All safety equipment should be periodically checked and repaired and make sure that it remains accessible for all persons and all the time.

➢ Safety information and emergency precautions should be prominently displayed.

Safety information should include the contact numbers of:

✓ Fire brigade: **998**.
✓ Ambulance: **997**.
✓ UoH, Safety and Security Management: **06-5718105**
✓ Malik Khaled Hospital: **06-5328888**
✓ Hail Alaam Hospital: **06-5328080**
✓ Police Emergency: **999**
✓ Faculty Security: **06-5718106**

*Fig.13 In case of colleague electric shock don’t panic, just turn the main switch off*
Figure 14 represents an irresponsible behavior that may cause your colleague serious injury. Note that the person plying with compressed air gun is not allowed to be inside workshop area, he dress both “Shemak and Thoub”. Plying with compressed air inside workshop is ridicules behavior that may cause unexpected reflection from your colleague and no one can expect his reaction. He may get close to serious dangerous machines while it is operated, or get strong air stream in his eyes or may push you to get both of you in unsafe situation.
Fig. 15 You should read machine cautions and avoid any action may put you in risk situations, moving your hand nearby running grinding wheel is highly risky.

Figure 15 simulates a highly risky behavior. The grinding machine is considered as a highly risky machine. Note the red sign caution printed on the machine. The label states clearly that don’t get your hand close to the running grinding wheel. Grinding wheel rotates with very high speed and its material consists of highly abrasive materials that will remove skin and bone easily and very fast.
Fig. 16 You should read machine cautions and avoid any action may put you in risk situations, using your hand nearby running workpiece is highly risky.

The lathe machine has safety guards that the machine will not turned on while these guards opened. Figure 16 simulate a stupid behave while the lathe running. Putting your hand behind the safety guard will not cause the lathe to stop. It will keep running and if your hand sucked there you may lose it. So that don not put your hand behind any safety guard for any running machine.
**Fig. 17** You should read machine cautions and avoid any action may put you in risk situations; using your hand to remove metal chips waste is highly risky.

**Fig. 18**

A: wrong way using hand grinder, loose workpiece & in front of colleague.

B: right way using hand grinder, good fixed workpiece and away of your colleague.
FIRST AID BOX LOCATIONS

There are two **portable first aid boxes** inside the workshop on the two walls at the two ends of workshop main corridor.

![Portable first aid box, showing components inside](image19.jpg)

*Fig.19 Portable first aid box, showing components inside*

Before using of the first aid box you should have some training to know the components inside and the right way of using each one. Most of first aid box components are very easy to use. Take care and make sure to get professional medical care after using the first aid box “*it is just fast action to minimize the risk and to avoid complications and sometimes safe lives*”.
All workshop users should get some first aid training. This will give them the ability to engage to any situation of colleague’s emergency needs. Figure 20 shows also the importance of second party during any use of workshop or laboratory. So don’t try to perform any work alone if the second party is not available.
4. Physical Precautions

Workshop and Labs supervisor have to make sure that all machines, equipment, hand-held tools, are working properly and any malfunction equipment or tool is replaced with proper one. Other equipment or tools that need maintenance should be recorded for maintenance and separated until repaired. Securing a proper earthed pole and connecting it to all machines and equipment to avoid any user electric shock. Tools must be checked to keep it ready for work. Sharp tool edges of all cutting tools should be kept sharp and its sharp edges should be inverted when stored to avoid injury for users. Any defects in tools or machines should be immediately detected and assigned for repair after reporting it and informing the workshop and labs supervisor. Hand tools having sharp edges which may causes injury must be returned to its tool box after use and should not be carried in personnel pockets. Warning notices must be displayed during all the entire period of
maintenance or repairs to any machine. Whenever possible, all fuses should be removed, and all switches should be locked off using suitable temporary locks.

Overcrowding is always not recommended. Mats of slip preventive materials like rubber should be placed in front of machines whenever it possible. All machines should be anchored to the ground using suitable anchoring facility according to the nature of machine operating properties. Machines and equipment should be placed and wisely distributed inside the workplace. Proper light system have to be carefully designed according to the nature of the workplace and machinery used inside taking into consideration to include natural sun light whenever it possible. Ventilation system including natural and forced ventilations should be well designed according to the workfield nature. Hazards Warning labels must be fixed on machines explaining any risk and setting all necessary safety precautions.

Extremely hazardous portable powered tools like grinders or circular saws as examples should be operated by well qualified and trained persons only. Electrical connections and cables of portable powered tools should be periodically checked and repaired immediately when any malfunction detected and should not be returned to duty before approved after repair completion.

4.1. Cleanliness of the Faith

Cleanliness of the Faith, this great Islamic symbol could be the key of workshop and laboratories safety behavior. Cleanliness is very essential for workplace to make sure that all possible kind of risks is under full control. The following safety precautions should be monitored in order to insure the safety inside workshop and Labs areas:-

- Floors should be always dry and clean, Fig. 22.
- Benches should be always clean and having no chemicals, grease or oils.
➢ Aisles, entrances and exits should be always free from any obstacle.

➢ All emergency equipment should be placed as easy access all the time and should be ready to be used immediately whenever it needs and its access should be always free from any obstacle.

➢ Workplace as well as machines or equipment should be left entirely cleaned after use as you find it before using it.

➢ When you are the last to leaving the workshop, make sure that all lights, air-conditioners and equipment are turned off before you leave.

![Fig.22 Some oil on the floor may cause big problems, Cleanliness of the Faith](image)

5. Standard Emergency Steps

In case of fire or any other emergency situation the following procedures should be applied:-
In case of fire alarmed proceed quickly to the nearest emergency exits and call fire brigade (Dial 998). And call security on 06-5718106.

Inform workshop and labs supervisor and nearest buildings about the fire.

After leaving the building move in the opposite direction and do not return until all clear confirmed.

In case of colleague injury or needs to emergency medical care, call ambulance, (Dial 997) and inform workshop supervisor.

6. Fire Extinguishers

Fire extinguishers are suitable for fighting minor fires only. In case of major fires and consequently possible high risk or out of control fire all people inside the building have to leave the building immediately and should use the emergency exits. Make sure that fire extinguishers are adequate according to the fire type.

- **Water Type Fire Extinguisher**
  
  *Color cod is red.* For solid fires use only. Not suitable for chemical or electrical fire types.

- **Carbon Dioxide Fire Extinguisher [CO₂]**
  
  *Color cod is red having a black band.* Suitable for electrical as well as flammable liquid fire types. This type is safe to use for all fire types, however re-ignition is possible for gas dissipation cases.
Fig.23 Fire extinguishers are to extinguish minor fires only

7. Welding and Brazing

Welding processes need appropriate heat and fire-resisting protective safety precautions including fire-resisting clothing, fire-resisting gloves, fire-resisting overalls or aprons, fire-resisting safety shoes. Protective fire-resisting safety equipment for welding activities is all highly important for welders and assists. Improper wearing of suitable eye protection has extremely painful consequences for the eyes that may cause a partial or full blindness.
Proper and effective ventilation system covering the entire welding workplace is essential to avoid breathing the hazard gases. Extremely toxic fumes containing cadmium are emitted accompanying with many silver solders processes. Welding process needs local effective fume extractors and ventilation systems. Welding operator should comply with all welding safety precautions including proper clothing, gloves, face barrier and proper extractors and ventilations facilities. Avoiding breathing welding produced fumes is essential for welders to keep themselves away from very dangerous toxic gases which are so harmful for their respiratory system. During welding or brazing operations, all necessary and proper firefighting systems should be ready and all
firefighting precautions should be totally considered. Welding processes are prohibits to be undertaken nearby areas containing any flammable materials. For confined and closed places welding process needs strict written permit including all necessary specifications for ventilation and respiratory protective equipment.

7.1 Oxy-Acetylene

Oxy-Acetylene welding is quite dangerous when used in wrong manner. It consists of Acetylene and oxygen which has very strong firing potential and considered as high risky equipment that needs well trained and qualified persons to properly operate. Acetylene and oxygen cylinders should be used in vertical position and should be fixed to a wall or chained to a welding trolley, Fig. 25. The most serious problem could be happened during Oxy-Acetylene welding process is the Flash Back.

In order to prevent blow backs explosion, flash back arrestors should be used and connected to both acetylene and oxygen hoses. Leak test using soap-water solution is quite important test for all Oxy-Acetylene welding components including cylinders, regulators, hoses, nozzles and guns. All users of Oxy-Acetylene welding equipment should receive intensive training by well qualified persons. All users should be completely conscious and always in attention to the particular hazards associated with Oxy-Acetylene cylinders. All Oxy-Acetylene welding equipment should be kept free from oil or grease all the time. Immediate shut off possibility in case of a malfunction is
essential such as keeping valve keys in position at all times that facilitate accessible and fast shut off process.

7.2 Electric Arc Welding

Insulation and earthing arrangements of arc welding machines is essential, regularly checking its connections should be performed properly and any defect must be repaired before performing any welding process. Any improper of electric connections or cables required the equipment to categorized as out of duty until get repaired and approved. Wet atmosphere surrounding arc welding is quite dangerous and no welding should be carried out in such cases. Welding operator should kept all dry (hands and clothing).

Face shield is essential and should be kept all the time clean and ready for use and it should be used in proper way to cover all the face and protect it from hazards excessive light and heat.

Of course keeping arc welding equipment dry is essential but in some specific situation this is not the case. Such like under water welding that needs very high tech equipment that sealed as well as very well trained and qualified welders.

8. Lifting Equipment

8.1 Machine Handling

Lifting equipment should be supervised carefully by well-trained and expert persons.

SWL, safe working load, should be indicated on the lifting machines, and should be assigned as strict limitation for any lifting process. As general construction, any defective component within lifting equipment will result on removing this lift from duty until repaired and checked. For large weights, lifting process should be performed with
extra attention and the load should be initially held few millimeters then centimeters from the floor. This technique will give a chance to check the safety conditions of the lifting process including all lifting tools engaged. Persons not allowed under any circumstances to get under any load while lifting it.

8.2 Manual Handling

Most injuries occurred during manual lifting of loads especially for heavy or sharp edged loads that needs group of persons to perform lifting process. Team work synchronize is essential for such sensitive and dangerous process. Hand lifting performed by group should be performed with highly attention, each member of group should be aware completely by his task as well as by the whole entire lifting plane. A well trained and qualified leader of such group is quite important that everyone should comply what he should say. Such clear order and knowing well the nature of lifting steps is a very good strategy that makes many hard lifting or moving processes accomplished in proper way without injuries. Of course accidents could be possible all the time but group commitment reduces such accidents to the minimum percentage.

As General Rule

Moving or carrying any object with in workshop or laboratory should be fully approved and observed by workshop and Labs supervisor.

9. Gas Cylinders

This Part is designed according to Australian Standards. A class 2 dangerous material is assigned for any compressed gases, liquid gases and dissolved gases which classified as follows:
Class 2-1

Flammable Gases

Should be labeled with a red colored diamond shape label (such as Butane)

Class 2-2:

Non-flammable Non-Toxic Gases

Should be labeled with a green colored diamond label (such as Helium)

Class 2-3:

Poisonous Gases

Should be labeled with a white colored diamond label (such as Ammonia)

If multiple types of hazard gases occurred, additional diamond labels are required to indicate the subcategory risks. As example, Chlorine is of Class 2-3 (toxic material) and Class 5-a (oxidizing material), Table1.

Table 1 table of signs for dangerous goods classes and divisions [Source: http://www.uq.edu.au/ohs/purchase-of-dangerous-goods-hazardous-chemicals ]
9.1 Gas Cylinders Moving

Majority of gas cylinder accidents occurred while moving it from place to another. The following precautions needs be implemented to reduce accident possibilities to minimum values as low as possible:

- Close and Secure gas cylinder’s valve, disconnect and remove all attached connections.
- Use suitable trolleys for transportation that is stable and has secured chain.
- Moving cylinders should be performed only by well-trained persons.
- Moving larger gas cylinders should be performed using specially designed cylinder lifts.

9.2 Gas Cylinders Storage

Only minor storage of gas cylinders is presented in this manual according to Australian standard (AS 4332- The Storage and Handling of Gases in Cylinders). Table 2 lists the quantities of gases in cylinders described as minor storage.

Table 2 Quantities of gases minor storage table [Source: Australian Standard; AS 4332]

<table>
<thead>
<tr>
<th>Gas Class</th>
<th>Maximum capacity, m³</th>
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<tbody>
<tr>
<td>2-1</td>
<td>0.5</td>
</tr>
<tr>
<td>2-2</td>
<td>2</td>
</tr>
<tr>
<td>2-2 with 5-1</td>
<td>1</td>
</tr>
<tr>
<td>2-3</td>
<td>0.05</td>
</tr>
</tbody>
</table>
Storage of all gases of mixed classes’ type must not exceed 2 m$^3$ and each subclass quantity must not exceed tabulated quantities of Table 2.

Storing and handling of minor storage gas cylinders quantities should comply with the following precautions:

- Keeping it away from any sources of heat or fire.
- Adequate ventilation system should be uses all the time.
- Separating Class 2 cylinders from other dangerous materials by 3 meters at least and not less than 1m from doors, windows or air ventilation system.
 ✓ Total allowed cylinders capacity of any workplace must include all cylinders inside the place.

 ✓ Total capacity of gases in the workplace including storage areas must not be more than one of minor storage for each 200 m² of workshop area.

 ✓ Minimum distance of 5 meters should be used as safe separation distance for any minor stores of gas cylinders.

 ✓ Basements must not be used for any minor storage activities.

10. Roles of Working Alone

Working alone is not allowed, the following cases represents the working alone risky situations.

 ✓ Working alone at isolated or remote areas that make assistance of others not easy.
 ✓ Working alone when operating any machine or equipment that may be of high risk.
 ✓ Working alone when dealing with any work including dangerous to perform alone.

In case of any of the above mentioned situations, working alone must be not allowed.

Sometimes working alone becomes necessary for some circumstances, in such cases any person should comply with the following precautions when working alone as follows:

 ➢ Working alone in office environments needs written afterhours access permission.
 ➢ Working alone is completely forbidden for staff or students when working in workshops or labs that including high risky medium or equipment.
All emergency assistance contacts and facilities should be available and easy to access. The place should have working telephone and contacting any assistance agency should be accessible.

Security should be informed by your place and your nature of activity.

You must show your working alone permission when asked, so you are not allowed to work alone if you forget to bring the written allowance with you as it is your responsibility to make it available any time during your working alone hours.

11. Roles of Afterhours Accessibility

In case of afterhours working necessity, persons should comply with all working alone guidelines and all other safety guidelines and precautions.

Normal working hours for the mechanical workshop or labs are from Saturday to Wednesday, 8:00 am to 4:00 pm. During normal working hours, all technical and academic staff is normally available for monitoring all workshop activities. Anyone needs to work outside these normal working hours he should have a formal and official written approval from the department chairman or workshop and labs supervisor.

As a general rule, undergraduate students are not allowed to work afterhours. Undergraduate and research students requiring to work after official working hours should get official written permission from department chairman. Afterhours access form should be approved and signed by the chairman in addition to the workshop & labs supervisor. When working afterhours the completed afterhours access form and student ID, must be shown up when asked by any faculty staff or security. If you lose it or forget to bring it with you, you will be asked to leave the workshop or labs without any comply.
As General Guidelines:

- When entering or leaving the building make sure that all doors are securely closed and locked after your access.
- Make sure that doors of internal areas are all secured when leaving.
- Make sure to get yourself familiar with all safety precautions and emergency contact numbers, these should be announced and displayed in workplace.
- Inform college security by any unsecure or a possible suspicious behavior.
- Giving anyone else security codes or keys are not adequate behavior that may get you in trouble with role braking.
- Do allow unauthorized persons to get access to buildings with you.

Operating of any equipment should be complying with the following roles:

- More than one person is available and present.
- Machine operator should have received training in using it properly.
- Machine operator should have permission to use any equipment.

Any breaking or uncomely with any of the abovementioned roles will result in immediate cancellation of the afterhours access permission.

Workshop and Labs Supervisor have full authority to pause or cancel afterhours access permission for a certain period of time according to any activities may be held in the workshop or Labs areas (like equipment installations or maintenance or any others).
Agreement Statement

Engineering workshop and labs contain equipment and tools which is used by well trained and qualified technical staff having adequate experience in machining and tools. Improper use of those machines including high risk consequences. Great care and attention should be paid when using any part of any machine otherwise operators may get injured.

A general workshop and labs and machine tool specific safety precautions must take place before using the workshop or labs. This workshop and labs safety guideline is a part of this agreement that must be read carefully before signing.

No allowance to access any workplace before signing this agreement statement.

- I have read this Safety Manual and understand it very well.
- I agree to comply with all guidelines and safety precautions stated in this Safety Manual.

Student Name :.................................................................
Student ID Number :..............................................
Student Signature :.................................................... Date:   /   /

Supervisor Name :...........................................................
Supervisor ID Number :.............................................
Supervisor Signature :............................................... Date:   /   /