User's Guide

MODEL MAKING FACILITIES

FOREWORD

This User's Manual is a summary of guidelines that describes the basic rules of general health and safety information and how-to's for safe and effective use of the Model Making Facilities in Izmir University of Economics, Faculty of Fine Arts and Design. Therefore it covers almost all the possible needs and hazards but still, it should not be forgotten that it may still not cover everthing at once.

Users will also find proper information about the sections of the Model Making Facilities.

Izmir, 2015

This manual is written based on the manual "Model Making Manual For Users and Supervisors" that was prepared by Argun Tanrıverdi, Alex Velasco and Selçuk Gürsan in 2009.

Training Outline

This Training Outline is a check sheet for the Model Making Training Sessions 1, 2 and 3.

Session 1

Training Session 1 is the theory based section of the training program which consists of an Introduction part to the Model Making Facilities Training, Orientation to the Facilities, General Health&Safety.

1. Introduction

- ☐ 1.1 Training schedule.....
  - ☐ 1.1.1 Sessions 1: Introduction, orientation, general health&safety.....
  - ☐ 1.1.2 Sessions 2: Manual hand tools safety and usage.....
  - ☐ 1.1.3 Sessions 3: Power Tools & Machinery safety and usage.....
    - ☐ 1.1.3.1 Sessions 3.1: Power Tools.....
    - ☐ 1.1.3.2 Sessions 3.2: Green Square Machines.....
    - ☐ 1.1.3.3 Sessions 3.3: Yellow Triangle Machines.....
  - ☐ 1.1.4 Ad-hoc training.....
- ☐ 1.2 Training documents.....
  - ☐ 1.2.1 Training Outline (Check list)..... ■
  - ☐ 1.2.2 Supervisor's Guide.....
  - ☐ 1.2.3 User's Guide..... ■
  - ☐ 1.2.4 Quick Instruction Manuals (sample)..... ■
  - ☐ 1.2.5 Model Making Facilities for Beginners..... ■
  - ☐ 1.2.6 Original User Manuals for machinery (sample)..... ■
  - ☐ 1.2.7 Additional safety information sheets (HSE,OSHA,etc.).....
  - ☐ 1.2.8 Safety Reports (Violations/Near-Misses/Accidents)..... ■

2. Orientation

- ☐ 2.1 *DB21*-Machines Room.....
  - ☐ 2.1.1 RFID & user health and safety as the top priorities.....
  - ☐ 2.1.2 Open hours.....
  - ☐ 2.1.3 Fire hose & fire extinguishers.....
  - ☐ 2.1.4 Exit..... ■

■

- [ ] 2.1.5 Loading gate.....
- [ ] 2.1.6 Material storage.....
- [ ] 2.1.7 Dust collection.....
- [ ] 2.1.8 Echo-proof environment.....
- [ ] 2.1.9 Hand tools area.....
- [ ] 2.1.10 Mobile Hand tools carts.....
- [ ] 2.1.11 Personal Protective Equipment to borrow.....
- [ ] 2.1.12 Eye wash stand.....
- [ ] 2.1.13 Machine cupboards.....
- [ ] 2.1.14 Electrical panel.....
- [ ] 2.1.15 Quick Instruction Manual.....
- [ ] 2.1.16 Safety language.....
  - [ ] 2.1.16.1 Green square machines.....
  - [ ] 2.1.16.2 Yellow triangle machines.....
  - [ ] 2.1.16.3 Red circle machines.....
- [ ] 2.2 ***DB22*** - The Studio.....
  - [ ] 2.2.1 RFID & a studio which is always available.....
  - [ ] 2.2.2 Fire hose and fire extinguishers.....
  - [ ] 2.2.3 Recycling corner.....
  - [ ] 2.2.4 Light switches.....
  - [ ] 2.2.5 Exits.....
  - [ ] 2.2.6 First-aid kit.....
  - [ ] 2.2.7 Wooden table surfaces.....
  - [ ] 2.2.8 Plugs on the ceiling.....
  - [ ] 2.2.9 Fire extinguisher.....
  - [ ] 2.2.10 Electrical board.....
  - [ ] 2.2.11 White board, projector, wifi internet.....
  - [ ] 2.2.12 Lockers.....
  - [ ] 2.2.13 Toilets.....
- [ ] 2.3 ***DB23***-Consumables Store.....
  - [ ] 2.3.1 Open racks on the wall.....
  - [ ] 2.3.2 Metal cupboards.....
  - [ ] 2.3.3 Locked space.....
  - [ ] 2.3.4 Clamps.....

3. Health and Safety

- [ ] 3.3.8 Heat exhaustion & Cumulative traumas (vibration and ergonomics)
- [ ] 3.4 General Health and Safety Regulations
- [ ] 3.4.1 Training is mandatory
- [ ] 3.4.2 Hours of operation, after hours and closed hours
- [ ] 3.4.3 Clothing
- [ ] 3.4.3.1 Hair
- [ ] 3.4.3.2 Loose clothing, sleeves
- [ ] 3.4.3.3 Wrist watches, accessories and jewellery
- [ ] 3.4.3.4 Shoes, foot protection
- [ ] 3.4.4 Personal Protective Equipment (PPE)
- [ ] 3.4.4.1 Eye protection
- [ ] 3.4.4.2 Respiratory protection
- [ ] 3.4.4.3 Hearing protection
- [ ] 3.4.4.4 Skin protection
- [ ] 3.4.4.5 Dust coats and overalls
- [ ] 3.4.5 Forbidden
- [ ] 3.4.5.1 Eating and drinking
- [ ] 3.4.5.2 Working alone
- [ ] 3.4.5.3 Letting untrained 'friends' in the facilities

Session 2

Training Session 2 is the first practice based section of the training program which consists of manual hand tool safety and usage. It also includes general health and safety issues regarding the usage of the tools.

4. Hand Tools Safety and Usage

- [ ] 4.1 Before you start
- [ ] 4.1.1 Work environment
- [ ] 4.1.2 Personal protection
- [ ] 4.1.3 Tool and workpiece check
- [ ] 4.1.4 Clamping
- [ ] 4.1.5 Balance and posture
- [ ] 4.1.6 Exertion of force
- [ ] 4.1.7 Misuse of tools

Session 3

Training Session 1 is the other practical based section of the training program which consists of power tool and machinery safety and usage. It also includes general health and safety issues regarding the usage of the machines.

5. Power Tools Safety and Usage

- [ ] 5.2.7 Hand Planer .....
- [ ] 5.2.8 Hand Router .....
- [ ] 5.2.9 Cordless/Electric Circular Saw .....
- [ ] 5.2.10 Cordless Multi Cutter .....
- [ ] 5.2.11 Sabre Saw .....
- [ ] 5.2.12 Delta Sander .....
- [ ] 5.2.13 Shears .....
- [ ] 5.2.14 Angle Grinder .....
- [ ] 5.2.15 Multi Rotary Tool .....
- [ ] 5.2.16 Hot Air Gun .....

6. Green Square Machines

Green Square Machines are the machinery of the Model Making Facilities that could be considered as potentially the '*least*' dangerous machines. A user can use a *GSM* after he/she recieves the proper training. All the other safety related issues are valid.

- [ ] 6.1 Before you start.....
  - [ ] 6.1.1 Working environment.....
  - [ ] 6.1.2 Personal protection.....
  - [ ] 6.1.3 Tool and workpiece check.....
  - [ ] 6.1.4 Clamping and push sticks.....
  - [ ] 6.1.5 Balance and posture.....
  - [ ] 6.1.6 Exertion of force.....
  - [ ] 6.1.7 Misuse of tools.....
- [ ] 6.2 Machines.....
  - [ ] 6.2.1 Oscillating Spindle Sander.....
  - [ ] 6.2.2 Disc Sander.....
  - [ ] 6.2.3 Multi-function Sander.....
  - [ ] 6.2.4 Scroll Saw.....
  - [ ] 6.2.5 Wood Lathe.....

7. Yellow Triangle Machines

Yellow Triangle Machines are the machinery of the Model Making Facilities that could be considered as potentially the '*more*' dangerous machines than the GSM. A user can use a *YTM* after he/she recieves the proper training and in addition to this, the user needs to inform his/her supervisor before using a YTM. All the other safety related issues are valid.

- ☐ 7.1 Before you start.....
- ☐ 7.1.1 Work environment.....
- ☐ 7.1.2 Personal protection.....
- ☐ 7.1.3 Tool and workpiece check.....
- ☐ 7.1.4 Clamping.....
- ☐ 7.1.5 Balance and posture.....
- ☐ 7.1.6 Exertion of force.....
- ☐ 7.1.7 Misuse of tools.....
- ☐ 7.2 Machines.....
- ☐ 7.2.1 Table Saw.....
- ☐ 7.2.2 Bandsaw.....
- ☐ 7.2.3 Table-top Drill Press.....
- ☐ 7.2.4 Self-standing Drill Press.....

Session 4 - Ad-Hoc Training

Training Session 4 is the last practical based section of the training program which consists of the 'red circle' power tools and laser cutter safety and usage. It also includes general health and safety issues regarding the usage of the machines. This training session is a long process of learning by doing on the power tools with the workshop supervisor.

8. Red Circle Machines

Red Cicle Machines are the machinery of the Model Making Facilities that are potentially the '*most dangerous*' machines. A user can use a *RCM* after he/she recieves the '*advanced*' training and in addition to this, the user needs to inform his/her supervisor before using a RCM. All the other safety related issues are valid.

- ☐ 81 Before you start.....
- ☐ 8.1.1 Work environment.....

- [ ] 8.1.2 Personal protection.....
- [ ] 8.1.3 Tool and workpiece check.....
- [ ] 8.1.4 Clamping.....
- [ ] 81.5 Balance and posture.....
- [ ] 8.1.6 Exertion of force.....
- [ ] 8.1.7 Misuse of tools.....
- [ ] 8.2 Machines.....
- [ ] 8.2.1 Table Saw.....
- [ ] 8.2.2 Planer.....
- [ ] 8.2.3 Thicknesser.....

WELL DONE!

Session 1

Training Session 1 is the theory based section of the training program which consists of an Introduction part to the Model Making Facilities Training, Orientation to the Facilities, General Health&Safety.

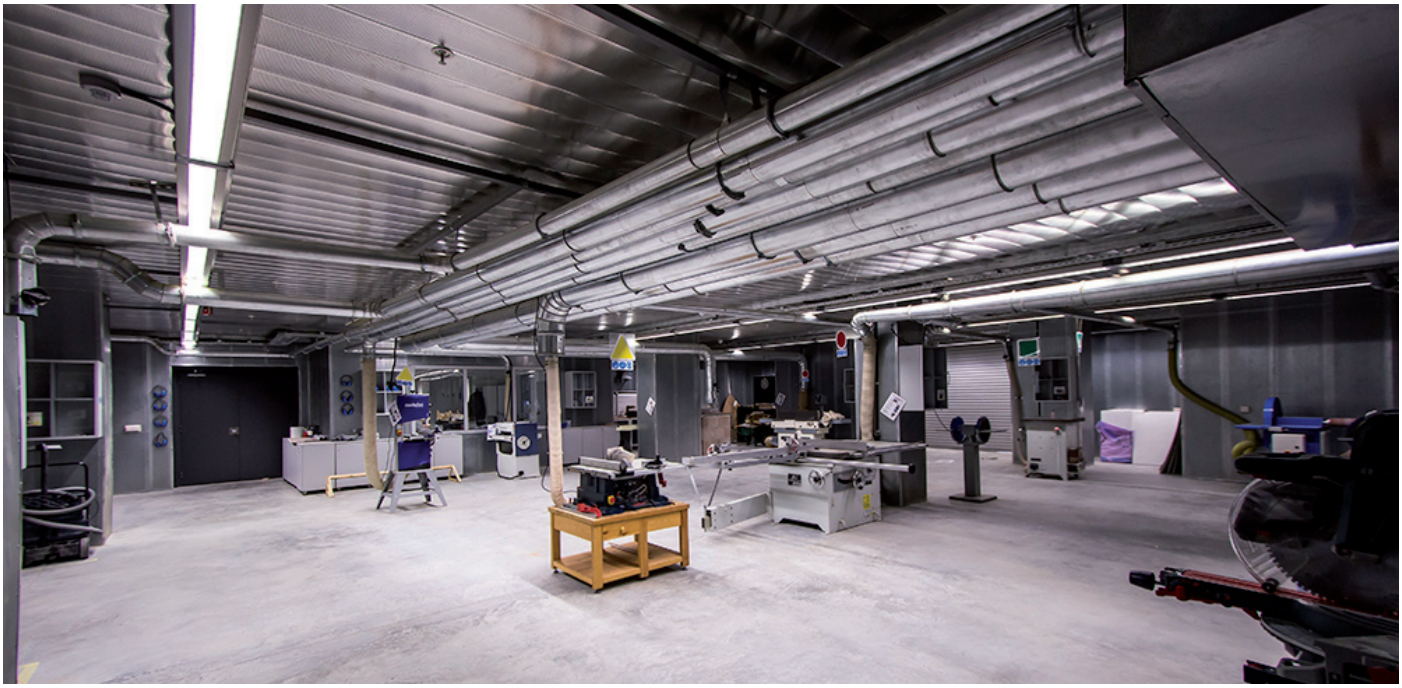
1. Introduction

1.1 *Training schedule:* Proper Model Making Facilities Training that prepares you to use the facilities take three sessions. These are:

- 1.1.1 *Session 1:* Introduction, orientation, general health&safety.
- 1.1.2 *Session 2:* Manual hand tools safety and usage.
- 1.1.3 *Session 3:* Power Tools & Machinery safety and usage.
  - 1.1.3.1 *Session 3.1:* Power Tools.
  - 1.1.3.2 *Session 3.2:* Green Square Machines.
  - 1.1.3.3 *Session 3.3:* Yellow Triangle Machines.
- 1.1.4 *Ad-hoc training*

2. Orientation

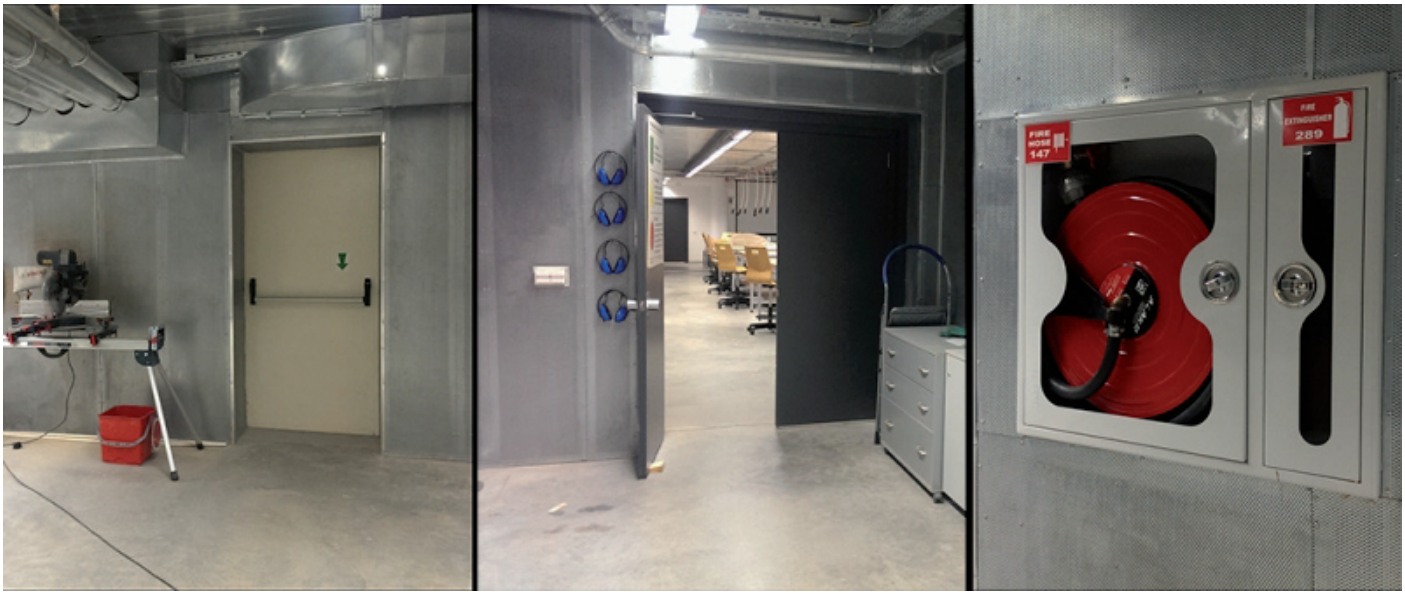
2.1 ***DB21 - Machines Room*** is the heart of the Model Making Facilities. The area is equipped with mainly woodworking and metalworking machinery, a robust dust collection and echo-proof wall system. It can be considered as an exceptional and unique facility within all the university facilities of the country.



2.1.1 RFID & user health and safety as the top priorities. The Machines Room is only open to the faculty members, but being a faculty member only is not enough to have access to the facility. All the faculty members; including all the lecturers; must have the proper 'Model Making Facilities training'. In any case, only trained supervisors have the authorization to access the Machines Room by swiping their ID cards to the RFID reader. Users need to get their supervisor to open the facility.

2.1.2 DB21 - Machines Room is open during normal hours (08:30-18:00). Users may also use the facility between after hours (18:00-24:00) but in this case, a constant supervision by the course lecturers (or workshop supervisor in extraordinary situations) is essential. In all the cases, the Machines Room is closed from 24:00 to 08:30.

2.1.3 Fire hose and fire extinguishers' locations should be well known by all the facility users in case of an emergency. The Machines Room has one fire-hose and an extinguisher attached right next to the hose on one of the columns.



2.1.4 Exits A facility user should also be aware of what to do in case of an emergency and how to evacuate the area immediately. Locations of the exits should be well-known. DB21 - Machines Room has an emergency exit right across the main entrance (see the left hand side of the picture above). The door is always open from the inside but kept locked from outside reach. In case of an emergency, the right move a facility user should take is to inform the supervisor and leave the area from the 'Emergency Door' immediately.

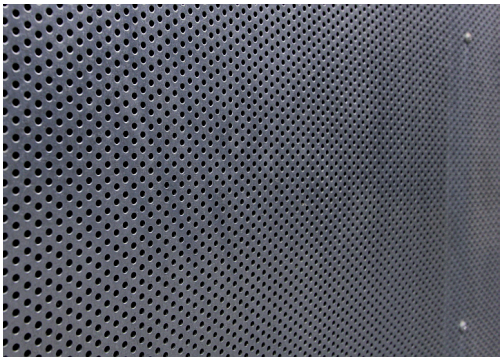
2.1.5 Loading Gate The facility has a third entrance which is a big loading shutter gate. It is mainly for loading big and heavy material, machinery or projects. The remote control of the gate is kept in the DB23 - Office under the supervision of the workshop supervisor.



2.1.6 Materials Storage Model Making Facilities have a limited amount of space to store raw materials. There are horizontal and vertical racks at each side of the loading gate as can be seen from the picture above. A certain amount of raw material can usually be found and used by the users with permission. In normal conditions, users should bring their own materials. It should also be kept in mind that up to a certain amount users' raw materials could be stored ***temporarily*** only.

2.1.7 Dust Collection is an important issue to take care of in all the workshop facilities and Model Making Facilities at the IUE offer a state-of-art dust collection system originally designed for the machinery and the capacity of the facilities. The system is operated manually. Users should inform the workshop supervisor to turn the system on when they start operating machinery.

2.1.8 Echo-Proof Environment. Machines Room's walls, columns and ceiling are all covered with punctured steel boards that prevents echoing. Especially during busy operation hours, echo-proof environment is healthy for the users of the facility as it may prevent hearing damages.



2.1.9 Hand-tools area One end of the Machines Room is allocated for manual and electric hand-tools use with a hand tools pin board and wooden benches. Users are allowed to use a certain amount of hand tools (hammers, saws, screws, etc.) that are the property of Model Making Facilities and the faculty. Those equipments are also to be borrowed to be used in other parts of the faculty building. But ***users must sign the 'Equipment Loan Application Form' provided by the workshop supervisor.***

2.1.10 Mobile Hand-tools Carts. The facility has two mobile hand-tools carts located in the hand-Tools area. One of the carts is equipped with proper manual hand-tools and the other one keeps some other measuring tools and drillll bits. The equipped cart may be borrowed for use in other parts of the faculty building or can be taken to sites. Users must sign the '***Equipment Loan Application Form'*** if they need the cart in other parts of the faculty building. ***Only supervisors are allowed to borrow the carts to take to sites*** *(outside the university borders).*

2.1.11 ***P****ersonal* ***P****rotective* ***E****quipments to Borrow.* Model Making Facilities users have to have their own PPEs; which are safety googles or spectacles and respiratory equipments; in order to work in the facilties. But, for extreme situations, users may choose to use safety spectacles provided by the facilities (users should still keep in mind that those spectacles may not be in good condition). Also, users may find it useful to use ear muffs, especially in busy facility environment.

2.1.12 Eye Wash Stand is another 'safety' equipment provided to the users. It is located right next to the main entrance of the Machines Room. Its main aim is to clean eyes that are disturbed by dust, chemicals or etc. when the hands of the user is also dirty. As could be understood, it operates by the foot switch (pedal).

2.1.13 Machine Cupboards are located on facility columns and walls. Each cupboard is assigned to one or two machinery and may contain accessories, spare parts, etc. of the machine that it is assigned to. Users may see the photograph of the machine on each cupboard easily.

2.1.14 Electrical Panel is placed inside the Machines Room. It is kept locked for the safety of the users and therefore can only be reached by the workshop supervisor. Users may check the board visually if they feel like there is an electrical problem and inform the workshop supervisor.

2.1.15 Quick Instruction Manuals. Each machine has an A4 size Q-Card that helps users to remember how to operate machine adjustments like table angle, blade height, etc.

2.1.16 Safety Language Model Making Facilities has a unique language (icon) systems for the machinery safety. Each machine has an icon hanging from above and they mean something and these are what they are:

2.1.16.1 ***Green Square Machines***. These machines are considered as the least potentially dangerous machinery. Users may use these machine after they attend and qualified the Model Making Facilities Training.

2.1.16.2 ***Yellow Triangle Machines***. Users may use these machine after they attend and qualified the Model Making Facilities Training. The difference is that users have to inform the supervisor before they start using the machine.

2.1.16.3 ***Red Square Machines***. These machines are potentially the most dangerous machines in the facility. Users may use these machine after they attend and qualified the **Advanced** Model Making Facilities Training, which is basically a progress of practice on particular machine under the supervision of the workshop supervisor.

2.2 ***DB22 - The Studio*** is the studio area of the Model Making Facilities; also called as the 'Hand Tools Area'.

2.2.1 RFID & a studio that is always available. The studio is only open to the faculty members. Any faculty member (including first year students after the add/drop period) may enter the Model Making Facilities by swiping their ID cards to the RFID reader. The space should be available for use; which means only courses directly related to the facilities are being held in DB22. All the other times, a faculty student or lecturer should be able to use this section during normal hours (08:30-18:00) and as a group, users may get permission to work here during after hours (18:00-24:00) but must sign the '***After-Hours Facility Use Application Form'*** provided by the workshop supervisor (it could also be downloaded from the facilities website: *mmfacilities.wordpress.com*).

2.2.2 Fire hose and fire extinguishers' locations should be well known by all the facility users in case of an emergency. The Studio has one fire-hose and an extinguisher attached right next to the hose on the wall on the right hand side.

2.2.3 Recycling Corner. It is the newest addition to the facilities and is created to collect old material (not raw material) for the use in student projects.

RECYCLING CORNER

2.2.4 Light switches. Unlike 'ordinary' light switches, the switches of DB22 is on the wall at the end of the space (right beside the door of DB21).

2.2.5 Exits A facility user should also be aware of what to do in case of an emergency and how to evacuate the area immediately. Locations of the exits should be well-known. DB22 - Studio has two gates: one that opens to DB21 - Machines Room (on the left hand side) and the main gate (on the right hand side). In case of an emergency, the right move a facility user should take is to inform the supervisor and evacuate the area from the 'main gate'.

2.2.6 First-aid Kit. Users may find the first-aid kit useful in case of small incidents like cuts or bruises. It is located on the wall between DB21 and 22 (as can be seen from the picture above).

2.2.7 Wooden table surfaces. It means that you can actually cut your work piece on the table without any need of using a cutting mat (unlike other faculty studios).

2.2.8 Plugs on the ceiling work at **360 V** which means, they are not particularly for mobile phone and laptop battery chargers but for electric hand tools (e.g electric drill, sanders, etc.). A fluctuation of the current may damage or kill a mobile device.

2.2.9 Fire extinguisher of DB25 - Paint Room. The big fire extinguisher is the system to extinguish a fire in the paint room. The grey box on the other side of the column is the control panel and alarm of the extinguisher system. Users should inform workshop supervisor in case they hear a sound coming from the control panel.

2.1.10 Electrical Panel is placed inside the Studio. It is kept locked for the safety of the users and therefore can only be reached by the work-shop supervisor.

2.2.11 White board, projector, Wi-Fi internet. As all the ordinary faculty studios, DB22 has a white board, a projector and Wi-Fi internet connection.

2.2.12 Lockers. In addition to the students lockers, Model Making Facilities have a large number of lockers that are available for *temporary* use of the facility users. Users need to bring their own padlocks to secure their equipments.

2.2.13 Toilets. At the end of the corridor that's shown in the picture above, users may find the Men's and Ladies' Rooms.

2.3 ***DB23 - Consumables Store*** is the facilities' hardware store.

2.3.1 Open racks on the walls keep a number of types of consumables like bolts, nuts, nails, screws and etc. is kept. The essential point is that all the consumables are for student use and could be obtained free of charge (up to a certain amount of course).

2.3.2 Metal cupboards contain a certain type and amount of paints, glues, varnishes and finishes. What are being kept are also free of charge to the facility users.

2.3.3 Consumables Store is kept locked for the proper use of the material that are being kept inside.

2.3.4 Users have access to a number of a certain amount of sizes of F-clamps.They are also kept in the Consumables Store.

2.4 ***DB24 - Office*** is the space where the workshop supervisor resides.

2.4.1 In addition to the workshop supervisors desk, there is a desk for the visiting lecturer. Visiting lecturers have access to WiFi and a B/W A4 printer.

2.4.2 There is a telephone line in the Office for all the emergency calls and users can see the '*Emergency Telephone Numbers*' list on the Office windows and on the desks.

2.4.3 Some precious spares, electric hand tools and machinery are kept in the cupboards of the Office. Don't forget to ask the workshop supervisor for the available tools and access to those.

2.5 ***DB26 - Computer Aided Model Making Room*** is another important production center of the facilities. A Universal PLS120.6D laser cutting machine and 2 Makerbot 3D printers operate in the space.

2.5.1 A user who is willing to use the machines needs to get a training. The training is held during the first operations and the user makes another cut under supervision.

2.5.2 The machines are used intensely, especially during finals period. That is why users should book the machines in advance. See the workshop supervisor for the booking. Applications via email to *argun.tanriverdi@ieu.edu.tr* is also accepted.

2.5.3 There are certain types of materials that are not suitable to process. Don't forget that some materials could be harmful for your health and also the machine. See the '*Laser Cutter To-Do's*' information board for details.

2.5.4 The laser cutting machine is a free-of-charge opportunity for the facilities users but users need to pay for the material for 3D printing according to the mass of the raw material to be consumed. Cash payment is not accepted. Instead, users need to get their student IDs uploaded from the university department of financial affairs.

2.5.5 Ventilation is too important for laser cutting and the ventilation (fume collection) unit operates manually. Don't forget to ask your supervisor to get it turned on.

2.5 ***DB27 - Wet Room*** is one of the 2 wet-area facilities of the Model Making Facilities. It is basically designed to do watery model making with materials like mud and plaster.

2.5.1 Granite table in the middle is suitable for all types of watery model making. It is cleanable unlike it would be with wooden tables.

2.5.2 Although it lacks proper plumbing, the facility could be and is used by certain courses.

2.5.3 Metal racks on the walls are to store projects and materials that are not chemicals. Paints, varnishes, etc. should be stored in the metal cupboards in the DB23 - Consumables Store.

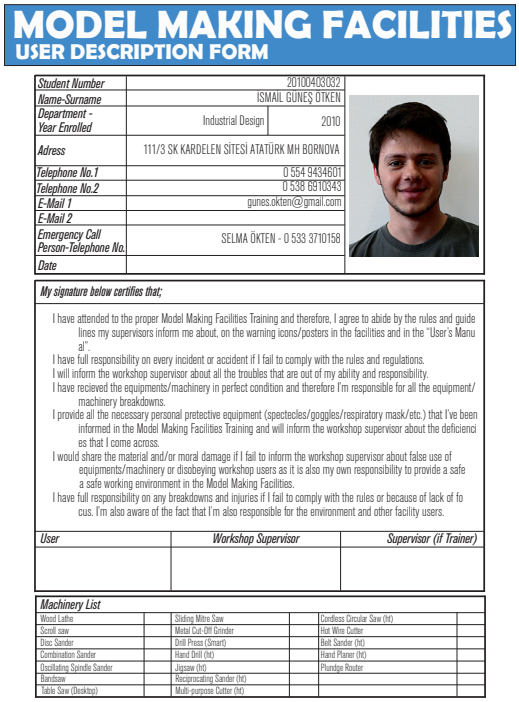
3. Health and Safety Essentials

In this section, users will be informed about the possible hazards that users may come across with in the workshop facilities and what to do's in those situations. In addition, it will be possible to understand the point of view of the Faculty of Fine Arts and Design and the university towards health and safety regarding issues.

3.1 ***The Philosophy*** behind this training stands basically on three elements but above everything else, the main emphasis is on ***USER HEALTH and SAFETY***. It is strongly believed that in such environments, there can be nothing more important than the health and safety of the facility users. In this perspective, all the rules and regulations are designed and will later be applied accordingly.

3.1.1 ***'Users'*** *and* ***'Supervisors'*** There are 2 categories of facility users. All the faculty students who attend and succeed the proper Model Making Facilities Training are called as *Users*. Users have the permission and right to enter DB22 - The Studio with their own student ID cards and also use all the equipments that they are trained on in the DB21 - Machines Room. All the faculty members (may also include non-faculty members in certain situations) who attend and succeed the proper Model Making Facilities Training are called as *Supervisors.* Supervisors have the permission and right to enter DB22 - The Studio with their own ID cards and use all the equipments that they are trained on in the DB21 - Machines Room. Supervisors may also attend training sessions as trainers.

3.1.1.1 ***Database***. For all the users of the Model Making Facilities, an information sheet is created for the user database as they recieve the training. In these sheets, a picture and contact information of the user is kept including a contact name and telephone number for emergency.



MODEL MAKING FACILITIES
USER DESCRIPTION FORM

Student Number	20100403032	
Name-Surname	ISMAIL GUNEŞ ÖTKEN	
Department - Year Enrolled	Industrial Design	2010
Adress	111/3 SK KARDELEN SİTESİ ATATÜRK MH BORNOVA	
Telephone No.1	0 554 9434601	
Telephone No.2	0 538 6910343	
E-Mail 1	gunes.okten@gmail.com	
E-Mail 2		
Emergency Call Person-Telephone No.	SELMA ÖKTEN - 0 533 3710158	
Date		

My signature below certifies that;

I have attended to the proper Model Making Facilities Training and therefore, I agree to abide by the rules and guide lines my supervisors inform me about, on the warning icons/posters in the facilities and in the "User's Manu al".
I have full responsibility on every incident or accident if I fail to comply with the rules and regulations.
I will inform the workshop supervisor about all the troubles that are out of my ability and responsibility.
I have recieved the equipments/machinery in perfect condition and therefore I'm responsible for all the equipment/ machinery breakdowns.
I provide all the necessary personal pretective equipment (spectecles/goggles/respiratory mask/etc.) that I've been informed in the Model Making Facilities Training and will inform the workshop supervisor about the deficienci es that I come across.
I would share the material and/or moral damage if I fail to inform the workshop supervisor about false use of equipments/machinery or disobeying workshop users as it is also my own responsibility to provide a safe a safe working environment in the Model Making Facilities.
I have full responsibility on any breakdowns and injuries if I fail to comply with the rules or because of lack of fo cus. I'm also aware of the fact that I'm also responsible for the environment and other facility users.

User	*Workshop Supervisor*	*Supervisor (if Trainer)*

Machinery List					
Wood Lathe		Sliding Mitre Saw		Cordless Circular Saw (ht)	
Scroll saw		Metal Cut-Off Grinder		Hot Wire Cutter	
Disc Sander		Drill Press (Smart)		Belt Sander (ht)	
Combination Sander		Hand Drill (ht)		Hand Planer (ht)	
Oscillating Spindle Sander		Jigsaw (ht)		Plundge Router	
Bandsaw		Reciprocating Sander (ht)			
Table Saw (Desktop)		Multi-purpose Cutter (ht)			

3.1.2 ***Distributed Responsibility***. In the Model Making Facilities, it is strongly believed that every responsibility should be shared by all *Users* and *Supervisors*. In that respect, we expect from all users to watch out for all the safety rules and regulations and behave like a supervisor about all the safety related issues around them; like warning users about their false practice or informing supervisors about all kinds of deficiencies in the facilities.

3.1.3 ***Supervision and Monitoring.*** 'Supervision at all times' is one of the mottos in the Model Making Facilities but that doesn't mean Users has to be monitored 24/7 with a guardian. It means that a Supervisor should be responsible for the Users working inside the DB21 - Machines Room. This includes being in the Model Making Facilities, and instructing students. During 'Normal Hours' (week days between 08:30-17:45) *Workshop Supervisor* is the supervisor. During 'After Hours' (week days between 17:45-24:00 and holidays), trained instructors should be in the facilities and act like a Supervisor (if they are qualified as Supervisor) for their courses. At those times, DB24 - The Office is available to all the Supervisors.

3.2 ***In Case of Emergency and Evacuation.*** A facility user should also be aware of what to do in case of an emergency and how to evacuate the area immediately. Locations of the exits should be well-known.

3.2.1 ***No Levels of Emergency & Emergency Plan.*** In the near future, Model Making Facilities is going to have an Emergency Plan. Until that moment, actions that will be shortly described below need to be taken in case of an emergency.

3.2.2 ***Exits from certain sections.*** DB21 - Machines Room has an emergency exit right across the main entrance (see the upper left hand side of the picture below). The door is always open from the inside but kept locked from outside reach. In case of an emergency, the right move a facility user should take is to inform the supervisor and leave the area from the 'Emergency Door' immediately.

DB22 - Studio has two gates: one that opens to DB21 - Machines Room (on the left hand side below) and the main gate (on the right hand side below). In case of an emergency, a facility user should leave the area from the main exit through the car parking (unless the danger comes from that side).

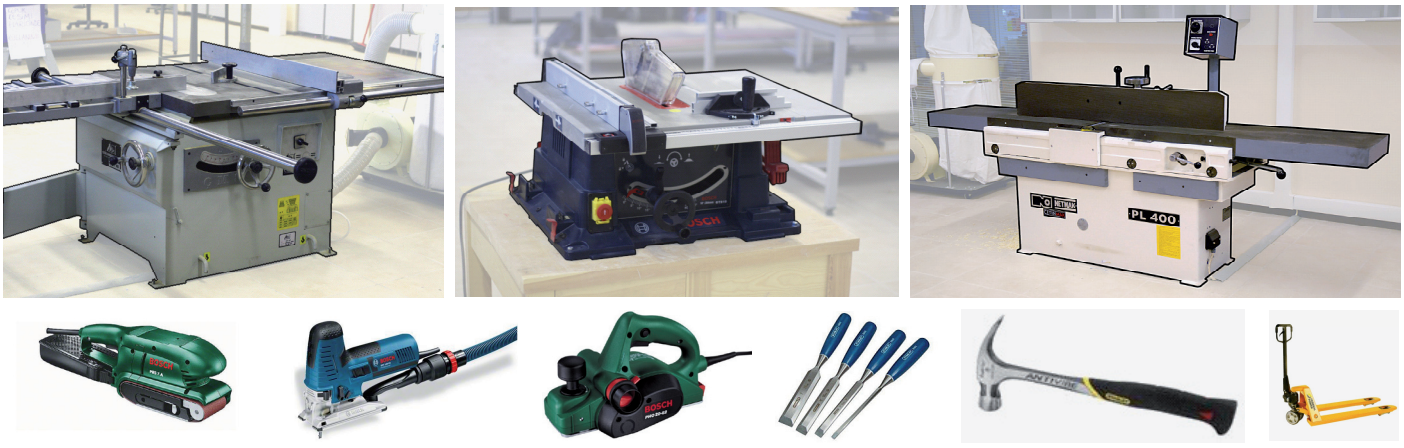
Otherwise, it would be right to pass to DB21 - Machines Room and then, leave the bu ilding through the 'Emergency Door' .

3.2.3 ***Informing the security desk.*** In case of an emergency, the right move a facility user should take is to inform the supervisor and evacuate the area from the 'main gate'. In situations when a Supervisor is absent in the facilities, a User must also inform the security desk during evacuating the facilities.

3.3 ***General Hazards.*** Environments like the Model Making Facilities have a various amount of hazards and possible dangers. A facility user must be aware of those hazards and act accordingly. In addition, one must never forget that it is also possible to come up with a hazard that is not included in trainings or courses.

3.3.1 ***Machines and Equipment.*** Machinery should always be considered as a possible hazard and even the safest looking machinery can hurt its user. This should never be forgotten that statistically, 'metal grinder'; which may look like a harmless tool; leads the list of accidents happening. Also, even the manual tools can be dangerous.

Badly maintained or misused hand tools, power tools and machinery can easily break during operation and hurt you. Always check your tool before using it.



3.3.2 ***Hazardous Substances*** include wood dust, paints, varnishes, adhesives and solvents. These substances can be unhealthy for any facility user. Also called 'Dangerous Goods'; they include materials that are radioactive, flammable, explosive, corrosive, oxidizing, asphyxiating, biohazardous, toxic, pathogenic, or allergenic. Also included are

physical conditions such as compressed gases and liquids or hot materials, including all goods containing such materials or chemicals, or may have other characteristics that render them hazardous in specific circumstances.

From left upper corner, the symbols mean:

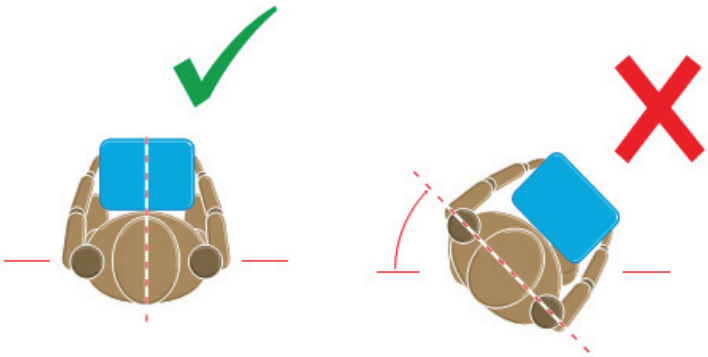
Harmful - Toxic - Corrosive - Dangerous for the Environment - Extremely Flammable - Oxidizing - Ionizing Radiation - (Not used anymore) - Irritant - Nocif - Explosive - (rest are repeat).

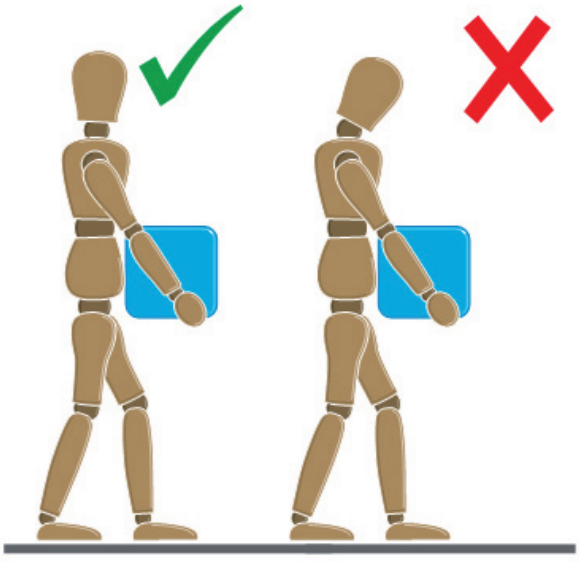
3.3.2.1 ***Wood Dust*** can cause skin disorders and other health problems. A dusty environment like the Model Making Facilities is a fire hazard, even explosive. Dusty floor can get slippery. *Dust Collection* is an important issue to take care of in all the workshop facilities and Model Making Facilities at the IUE offer a state-of-art dust collection system originally designed for the machinery and the capacity of the facilities. The system is operated manually. Users should inform the workshop supervisor to turn the system on when they start operating machinery.

3.3.3 ***Manual Handling*** such as carrying heavy loads is a leading cause of injuries. Keeping your back may protect you from injuring it when carrying heavy loads but may not save you from it. Try to learn more about it and if possible, always get help from someone to carry your heavy load.

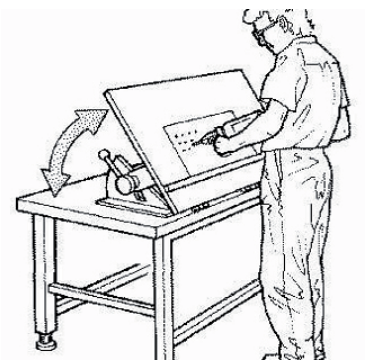
Avoiding Manual Handling:

- Check whether you need to move your work-piece or heavy load at all.
- Consider automation; try to use a conveyor, a pallet truck or any other handling aid.
- Try to rest as much as you can so that your muscles relax.
- Try not to position your body to awkward positions while carrying heavy loads.
- Avoid lifting from floor level or above shoulder height.
- It may not be always enough to have a good posture while carrying heavy loads. You can still get hurt from carrying heafvy loads so, always plan your lift.
- Do not move any faster than walking speed. This will stop carrying action becoming too tiring.





- Redesigning the task may also help.
- Do not forget that working long hours in the same position may hurt you.
- Reduce twisting with a heavy load in your hands and stooping. Create an ergonomic work surface before start working

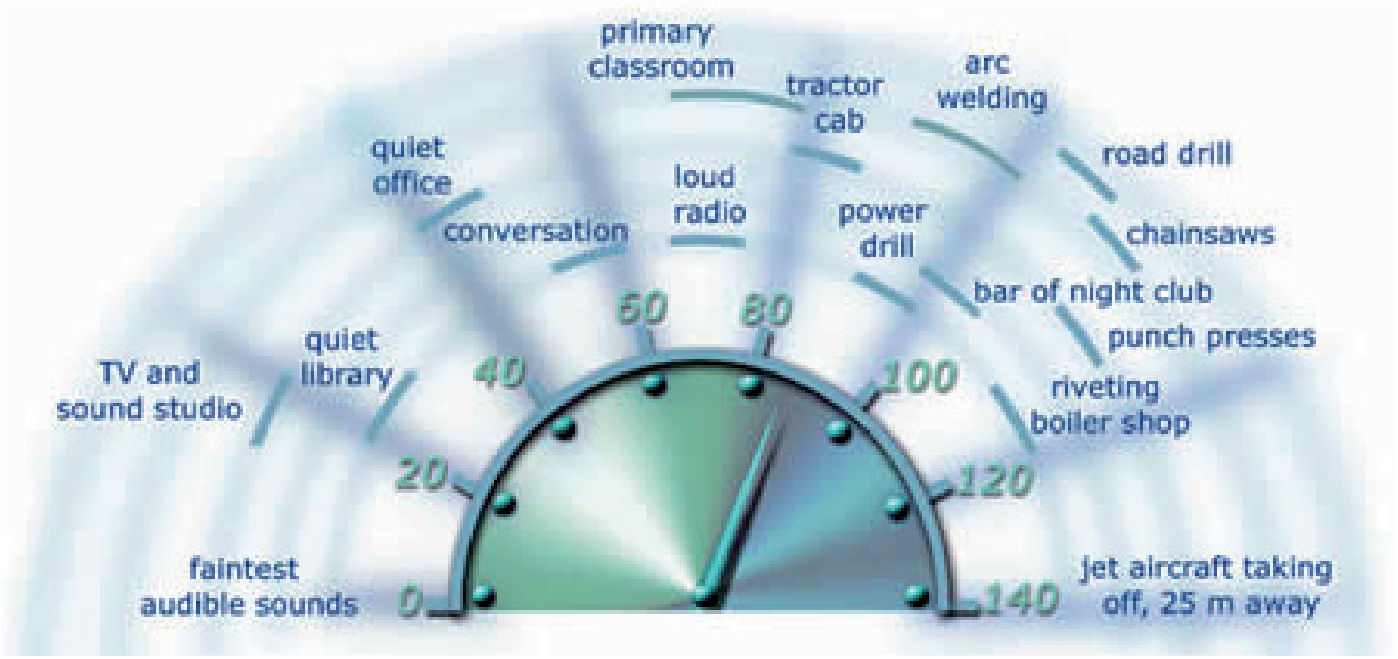


3.3.4 ***Noise*** at environments like Model Making Facilities can damage your hearing. Always consider using hearing protection equipments. What does it mean to be a 'noisy' environment is;

- the noise is intrusive, like a busy road or a vacuum cleaner.
- you have to raise your voice when talking to a friend 2 m. away from you.
- there are people using a power tool or machinery longer than half an hour a day.
- there are noises due to impact, like hammering, pneumatic impact tools etc.)

	Lower exposure action value (decibels)	Upper exposure action value (decibels)
Daily or weekly personal noise exposure ($L_{EP,d}$ or $L_{EP,w}$)	80	85
Peak sound pressure (L_{Cpeak})	135	137

In Model Making Facilities, there are tools, machinery and also actions that raise the healthy working limits shown above. This is why a facility user should always consider using a hearing protection. A limited amount of ear muffs are always available in the Model Making Facilities to be borrowed.



A user should not forget that it is not always loud noise that damages hearing. It is also the exposure to noise that can also damage your hearing. If you plan working long hours in a mediocre noisy environment, it would be wise to protect your ears too. Ear plugs are great equipment for those situations.





3.3.5 ***Electricity*** can kill and even non-fatal shocks can cause severe injuries and burns. Always check the electrical tool before you plug it. Any damage parts of cable must be replaced. Even a broken or cracked tool body can be dangerous.

The main hazards are:
- contact with live parts causing shock and burns.
- faults which could cause fire.
- fire and explosion where electricity could be the source of inginiton.

Do not forget that it is one of the responsibilities of a facility user to check the tool before use. Visual inspection is always a must-do part of working with electrical tools or machinery.

Warn your supervisor when you come up with a damaged tool or abnormal situation, like a weird sound.

The risk of receiving an electric shock will be greater when the user of portable electrical equipment is standing on a surface that is a good electrical conductor (such as a wet floor, the ground outside, a concrete floor or on scaffolding) than if they are standing on a wooden floor or dry carpet and not in contact with earthed metalwork.

The most vulnerable item of any portable equipment is often the cable (sometimes called cord, lead or flex) that supplies the equipment. The cable may deteriorate due to ageing or environmental effects, abuse or misuse, fail because of repeated flexing, or suffer mechanical damage.

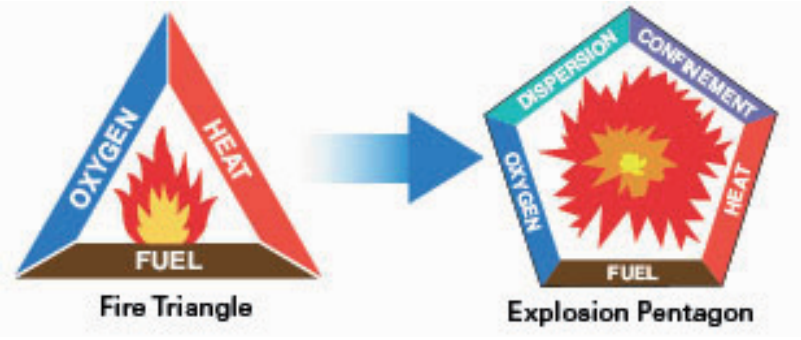
It is not the responsibility of a facility user to fix an electrical tool but keep in mind that there are insulated screwdrivers for those kinds of jobs.

Make sure the tool is 'OFF' before you plug it in.

3.3.6 ***Fire and Explosion*** can occur with common flammable substances, as well as not so obvious materials, such as packaging and wood waste. Dangerous substances like solvents, paints, varnishes, flammable gases, LPG, dust can all be found in environments like Model Making Facilities and should be careful about.

An explosive atmosphere is a mixture of a dangerous substance or substances (gas, mist, dust or vapour) with the air, which has the potential to catch fire or explode.

In an environment like Model Making Facilities where wood dust is always present, one has to be extra careful about not creating a spark. Paints, adhesives are also flammable substances that can can easily catch fire.



First of all, a facility user should be able to identify fire and explosion hazards like dangerous substances present, potential ignition sources, work activities involving dangeous substances, etc; and then, evaluate the risks and decide on precautions. Safety principles can be summerized as:

Ventilation: Good ventilation will mean that any vapours given off from a spill, leak, or release from any process, will be rapidly dispersed.

Ignition: Ignition sources can be very varied and they include sparks from electrical equipment or welding and cutting tools, hot surfaces, open flames from heating equipment, smoking materials etc. They must be separated from flammable substances as mush as possible.

Containment: Are your flammable substances kept in suitable containers? Use of lidded containers and spillage catchment trays, for example, can help to prevent spillages spreading.

Exchange: Can you exchange a flammable substance for a less flammable one? You may be able to think of other ways of carrying out the job more safely.

Separation: Are flammable substances stored and used well away from other processes and general storage areas? Separating your hazards in this manner will contribute to a safer workplace.

Flammable substances can be summed up in 4 categories as:

Flammable Liquids: Flammable liquids can give off large volumes of flammable vapours at room temperature. These vapours, when mixed with air, can ignite, often violently. Spills on clothing can represent a serious risk of injury if ignited. In order to prevent fire and explosion, a facility user should:

-store flammable liquids in a separate storage area

-dispense and use them in a safe place where there is good ventilation and no source of ignition

-keep containers closed when not in use.

-dispense liquids over a tray and keep some non-flammable absorbent material if possible.

Flammable Dusts: Finely divided flammable dusts dispersed in the workplace atmosphere can, if ignited, explode violently and cause a lot of damage. In order to prevent fire and explosion, a facility user should:

-keep plant dust-tight

-keep the working area dust-free by regular cleaning, and vacuuming spillages as they occur

Flammable Solids: Some types of plastic foam, packaging materials, polyester wadding and textiles will ignite easily and burn fiercely, giving off a lot of dense black smoke. In order to prevent fire and explosion, a facility user should:

-not store these materials close to heaters or electrical equipment which could run hot and act as a local ignition source

-make sure that gangways and exits from storage and working areas are kept clear of packaging materials, finished products containing flammable solids etc.

Flammable Gases: Gases in cylinders are often stored at very high pressures, and so their uncontrolled release can be physically dangerous. A small amount of released gas can fill a large area with a potentially explosive mixture. This is particularly true of liquefied gases such as LPG. In order to prevent fire and explosion, a facility user should:

-store cylinders suitably restrained and their valves protected from impact
-protect hoses from potential causes of damage that could cut, scuff or weaken them.

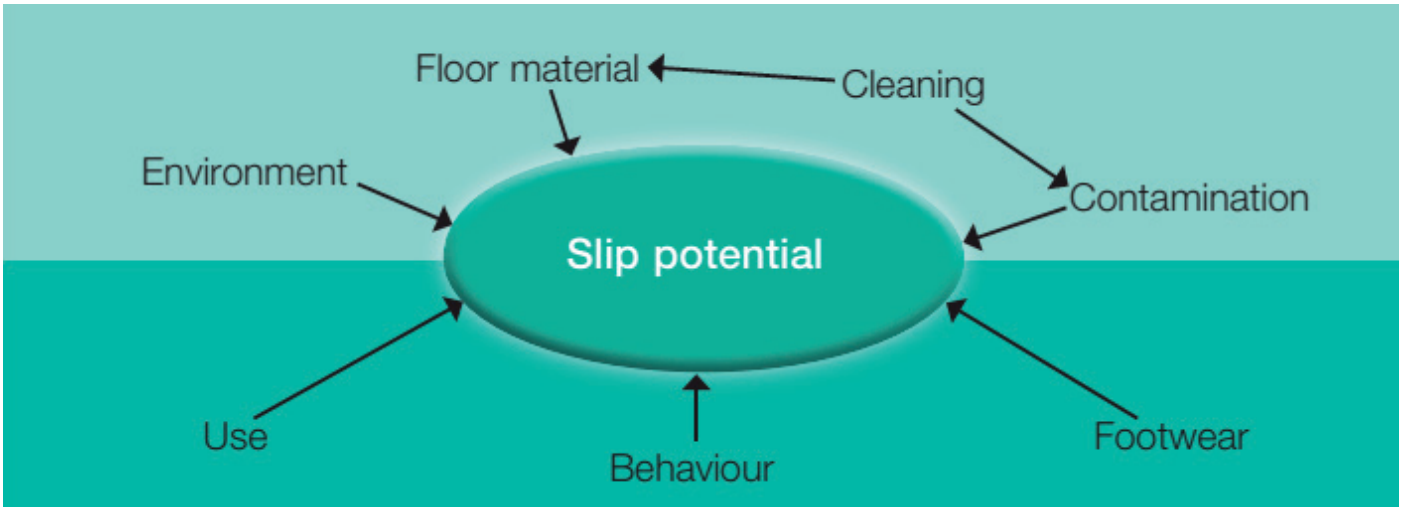
Wood dust: Woodwaste usually has a dust explosion risk where the mean particle size is less than 200 microns and where as little as 10% of the mixture contains dust less than 80 microns in size.

Sources of ignition include naked flames, faulty or unsuitable electrics and impact sparks. The sanding or hogging of off-cuts containing metal inclusions may produce friction sparks. Hot work involving the careless use of welding or flame cutting equipment can result in many incidents. Site electrical equipment away from dusty areas. If this is not practicable, make sure it is adequately protected.

Responsibilities of the Facility User in case of fire or explosion are to instantly inform the supervisor present in Model Making Facilities and evacuate the area as was told during the Model Making Facilities Training.

3.3.7 ***Slips, trips and falls (and safe use of stepladders)*** are one of the hazards that can easily be ignored but can also result in serious injuries if not taken seriously. According to HSE statistics, on average, they cause over a third of all major injuries and over 40% of all reported injuries to members of the public.

There are some factors that may contribute to slip, trip and fall accidents. While most of these factors seem to be in the responsibility of the facility supervisors, there are also issues that all users need to be careful of.



Above everything else, all users are in charge of wearing the right footwear, which has a non-slippery and flat tread. High heals, open shoes, slippers are not welcome in environments like MMF.

Keeping the floor clean, being aware of the floor and informing the facility supervisors about bad conditions are other responsibilities of all the users. Working in a dirty, dusty, wet floor increases the risk of slips, trips and falls. Users should always be aware of:

- Wet areas on the floor
- Piles of dust and thin layer of dust on the floor
- Pieces of materials and tools, etc. as obstacle on the floor
- Damaged floor or floor surface
- Lines of walking
- Lighting

3.3.8 ***Heat Exhaustion*** may be caused by high temperature and humidity; direct sun or heat, limited ventilation or physical exertion etc.

Although the Model Making Facilities are generally kept in good working conditions, Users should be aware of what to do in unhealthy conditions, like hot summer days.

Heat stress occurs when the body's means of controlling its internal temperature starts to fail. Air temperature, work rate, humidity and work clothing are all factors which can cause heat stress. It may not be obvious to someone passing through the workplace that there is a risk of heat stress. The body reacts to heat by increasing the blood flow to the skin's surface and by sweating and radiation & convection through the skin. The main reasons of heat stress could be sumed up as:

- Sweat evaporation is limited by the clothing and the humudity
- High work rate
- Too much sweating and as a result, dehydration
- Increasing heart rate

Heat stress may end up as ***Heat exhaustion*** or ***Heat Stroke.***

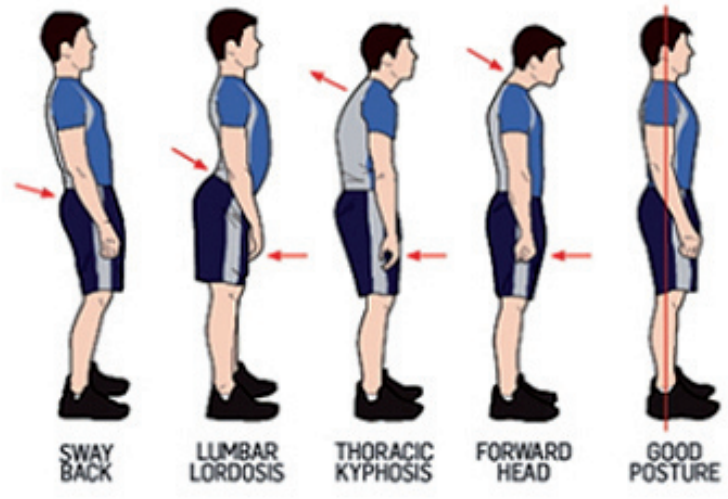
Heat Exhaustion:	**Heat Stroke**
• Heavy sweating • Heavy thirst • Panting/rapid breathing • Rapid pulse • Headache • Blurred vision • Exhaustion, weakness • Clumsiness • Confusion • Dizziness or fainting • Cramps	• No sweating • Red or flushed, hot dry skin • Any symptom of heat exhaustion but more severe • Difficult breathing • Pinpoint pupils • Bizarre behavior • Convulsions • Confusion • Collapse

Cumulative Traumas occur from repetitive physical activities. Also known as Repetitive Strain Injuries (RSI) or Upper Limb Disorders (ULD), vibration can lead to two forms of permanent ill health known as hand-arm vibration syndrome (HAVS) and carpal tunnel syndrome (CTS). Symptoms of both may come and go, but with continued exposure to vibration they may become prolonged or permanent and cause pain, distress and sleep disturbance. This can happen after only a few months of exposure, but in most cases it will happen over a few years.

Users should avoid long exposure to vibration and may also put on gloves that reduces vibration transmitted to hands.

Ergonomics issues such as poor posture, excessive force, gripping and repetitive motions can lead to injuries.

With long working hours in poor posture can harm your skeleton and muscles.



3.4 ***General Health and Safety Regulations.*** Facilities like the Model Making Facilities in the IUE have special regulations for health and safety of their users. Some rules & regulations are global and may occur in al the facilities while some are unique to one.

Users like you will possibly be facing unfamiliar risks from the job you will be doing and from your surroundings. You will need to be provided with clear and sufficient instruction, training and supervision to to enabled to work without putting yourselves and other people at risk.

As a trained user, do not forget that, you are as responsible from your surroundings as the workshop supervisors.

You must never forget that you have the most important duty of taking care of your own health.

3.4.1 ***Training is mandatory.*** There probably is no need to explain this. Working in such environments need special trainings as tools and machinery that are used can be fatal.

3.4.2 ***Hours of operation - After Hours and Closed Hours.*** DB22-The Studio is only open to the faculty members. Faculty members (including 1st year students after the add/drop period) may enter the Model Making Facilities by swiping their ID cards to the RFID reader. The space should be available for use; which means only courses directly related to the facilities are being held in DB22. Al the other times, a faculty student or lecturer should be able to use this section during normal hours (08:30-18:00) and as a group, users may get permission to work here during after hours (18:00-24:00) but must sign the 'After-Hours Facility Use Application Form' provided by the workshop supervisor (it could also be downloaded from the facilities website:

mmfacilities.wordpress.com

DB21 - Machines Room is open during normal hours (08:30-18:00). Users may also use the facility between after hours (18:00-24:00) but in this case, a constant supervision by the course lecturers (or workshop supervisor in extraordinary situations) is essential. In al the cases, the Machines Room is closed from 24:00 to 08:30.

3.4.3 ***Clothing.*** .As we have found out that Model Making Facilities could be a dangerous place, a facility User should be aware of how to act in it. This includes clothing. During model making, (not only in Model Making Facilities) one normaly uses tools that have lots of moving parts, like cuters, drilers, etc. If not behaved carefuly, those moving parts can catch clothing parts and so body parts.

3.4.3.1 ***Hair***. Loose hair is possibly one of the few dangers of getiting caught to a machine or a power tool. Al the loose hair must be tied up from al the parts of the head. Making a ponytail is usualy not enough as it may fal front when you bend your head.

3.4.3.2 ***Loose clothing/sleeves***. Just like loose hair, loose clothing is dangerous in facility environments as they can easily be caught by moving parts of machinery. The best is to wear tight fiting clothes and pull the sleeves up.

3.4.3.3 ***Wrist watches, accessories and jewellery***. Cloths, accessories and jewelery like bracelets, necklaces and even rings can cause danger. This is why, it is always right to leave every accessories and jewelery in your bags before starting working in the Model Making Facilities.

3.4.3.4 ***Shoes, Foot protection***. In facilities like the Model Making Facilities, shoes are no less important than any other safety issue. In heavy industries, workers are obliged to wear protective footware with a steel reinforced shoe toe. In the MMF, users are just obliged to wear closed and flat shoes which means sandals, flip-flops, high heels and any other open shoes are not allowed.

Tripping, dropping heavy things (hand tools, raw materials, etc.) or stubbing your toes are potential hazards.

3.4.4 ***Personal Protection Equipments (PPE)*** are another important component of all the health and safety related issues in Model Making Facilities. Choose good quality products which are CE marked. PPE can be classified as;

3.4.4.1. ***Eye Protection.*** Whatever we are doing in an atelier environment, we might be injured; not because we're hammering something or using a sharp blade. You're one target if there is someone else is working inside and you are one target for all the sharp metal edges of the machinery or of the tables and walls. This is why it is essential to have eye protection before entering DB21-Machines Room.

A high quality goggle or a spectecle could be used a life time. Get yourself one and feel free that your eyes are as safe as possible.

3.4.4.2. ***Respiratory Protection.*** In any environment that dust or fume is produced, a facility user should protect him/herself from the dust or fume in the air. Equipments that protect the lungs; also caled as 'breathing masks'; have various types like al the PPEs. A facility user should pick the right equipme

nt for the environment that he/she works. Just like eye protection equipments, a high quality one would protect more as it would be more comfortable to breath with. It should still be known that a respiratory protection equipment is not a life long equipment and needs to be renewed.

3.4.4.3. ***Hearing Protection.*** Noise at work can damage your hearing. Environments like Model Making Facilities can get too noise during dense days like finals period or workshop activities. A user may borrow one of the ear mufs provided by the MMF. Another way to protect your hearing is to have ear plugs with you. They are simple to use, mostly silicon based equipments. Because of hygiene related issues, MMF do not provide ear plugs.

3.4.4.4. ***Skin Protection.*** In Model Making Facilities there may be substances that can irritate skin. Even wood dust can be considered as alergic to some skin types. Users may pick work gloves from a bunch provided by the MMF or have one that fits their hands and be comfortable.

3.4.4.5. ***Dust Coats and Overalls.*** There is no dress code about dust coats in the MMF but users may pick dust coats provided by the MMF. It is also possible to keep one dust coat or overall in the lockers provided by the MMF.

3.4.5. ***Forbidden.*** Many dangers exist in Model Making Facilities. These can only be avoided through good practice and by folowing health and safety essentials.

3.4.5.1. ***Eating and Drinking*** or bringing food drink into Model Making Facilities is a hazard. Food or drink may get contaminated or accidents may happen when something harmful is consumed by mistake (e.g. water may be confused with thinners).

This rule applies to both DB21-Machines Room and DB22-The Studio

3.4.5.2. ***Working alone i***ncreases danger highly in Model Making Facilities. In cases of working alone, a simple(!) slip and fal may result so much worse than it should be.

3.4.5.3. ***Letting untrained 'friends' in the facilities*** is not permited. It must be well understood that Model Making Facilities is a unique environment with its own rules and regulations and someone unaware of these rules and regulations is also unaware of the hazards. That is unacceptable.

Session 2

Training Session 2 is the first practice based section of the training program which consists of manual hand tool safety and usage. It also includes general health and safety issues regarding the usage of the tools.

4. Hand Tools Safety and Usage

4.1. ***Before you start.*** Being in a workshop facility like Model Making Facilities has some important issues to be aware of about health and safety. These issues can be classified as:

4.1.1. ***Work Environment.*** One has to make sure that the close environment of his/her working should be clean and tidy of anything that may distract him/her or create dangerous situations. Scrap pieces, liquid on the floor may make you slip; consumables like screws or bolts, tools that are left on the work bench may move and fall as you work and distract you too. Distraction is one of the main reasons for an accident happening.

4.1.2. ***Personal Protection.*** There is nothing more important than a Model Making Facilities user's health and safety. When it comes to health and physical integrity; grades, projects or even graduation may loose all their significance. Projects can always be finished but health may not. So, do not forget the importance of your own health.

Being careful and knowing hazards may not help if you do not protect your body with the equipments available. Use PPE and be aware of your sorrounding. Do not play with tools and always carry them in a sturdy box instead of carrying them in your hand or your pocket.

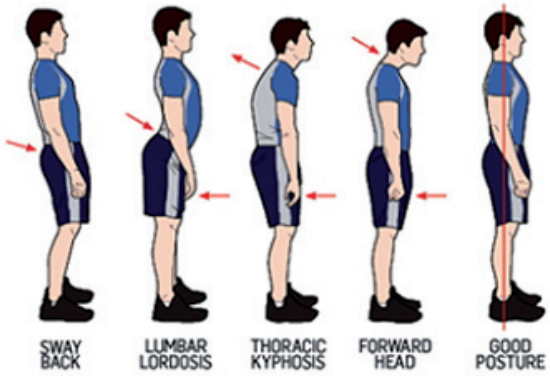
4.1.3. ***Tool and Workpiece Check.*** Taking precaution may be crucial when working with tools, power tools and machinery to avoid accidents. Checking the workpiece and tools visually can avoid accident before they happen.

A cracked or loose tool handle may fling off while using it or a nail in your workpiece may break and hit you or someone else while you try sawing it.

Always check your tool, machine and workpiece before using them.

4.1.4. ***Clamping.*** Use a vise or clamps to secure the workpiece whenever possible. Do not try to hold a workpiece with one hand while operating the tool with the other. Make sure the vise is attached to workbench securely and is free of cracks and other defects.

4.1.4. ***Balance and Posture.*** How you use your energy is important when it comes to working in Model Making Facilities. Using it wisely would give you enough energy to work longer hours without tiring out. In this context, how you position your body; which is called your 'balance and posture'; is directly related.



Always position your body in a way that feels comfortable and that will prevent you from losing balance and hurting yourself. Try to find tools that are designed to allow your wrist to stay straight and avoid using hand tools with your wrist bent.

4.1.5. ***Exertion of force*** is a state how you should never find yourself in. It means using too much force while using a tool or machinery. If you find yourself forcing a tool too much, there may be a couple of reasons which are;

-You are using a tool in a bad condition (dull, cracked, etc.)

-You are using the wrong sized tool for the job.
-You are using the wrong tool for the job.

4.1.6. ***Misuse*** is as obvious as it sounds. Do not be that dumb guy trying to slice a pizza with a saw or the one trying to steer the car with a locking pliers! Select and use the right tool for the job. Do not use tools for jobs they are not designed for. For example; do not use a screwdriver as a chisel, do not use wrenches as hammers, etc. Doing so would not only damage the tool and the workpiece but it may cause accidents.

4.2. ***Manual Handtools*** are the tools that are controlled with labor force (human power).

4.2.1. ***Cutters and Knives***

- Always wear a protective spectecle when using a cutter or a knife.
- Keep the retractable blade as short as possible that would lower the possiblity of braking.
- Do not carry them in your pocket or walk around with them pointing in your hand.
- Make sure the blade is sharp and suitable for the job. Use a robust one if necessary.
- Your body parts except your hand you hold the blade are also important. Make sure they are not in line of cutting.
- While you may use a smal cutter for a detail job, using a heavy-duty cutter would be wise to cut a 3mm cardboard or a plywood.
- Do not use excessive force. Change the blade or the knife if it is weak for the job.

4.2.2. ***Saws.*** Saws come in various shapes and sizes for various tasks. It is your job to find the right saw for the right task. Ergonomics of a saw (as with all the tools) becomes important with long hours of use. Saw handle should be desgined to keep your wrist straight.

- Do not forget to visually check the saw blade's condition and workpiece for defects.
- Check visually which side the cuting teeth point at. Tool cuts in that direction.
- Cut using strong, steady strokes. Use much of length of the cutting edge. That wil save you time and energy. Technique is everything!
- Do not make the mistake of holding workpiece with one hand and saw with the other. Either use a vise or clamp your workpiece to a bench.
- Hacksaws are not designed to cut wood but they can but that would ruin your tool however. Do not use a hacksaw to saw wood.

4.2.3. ***Hammers and Mallets*** are basically designed for striking other things. They come in various shapes and sizes for various tasks. It is your job to find the right hammer or mallet for the right task. Especially, weight of a hammer is important. Choosing the wrong hammer may cause accidents, break your workpiece or nail you're using.

Always wear protective spectecles when using striking tools like hammer

- Do not forget to visualy check the head of the hammer. Cracked and loosely attached heads could be dangerous and should not be used.
- Hammer heads are produced according to which side they are going to be hit. They may not be strong on other sides and break easily.
- Hiting two metal to each other creates a sound that is unhealthy to ears. Be aware.

Mallets are used when;

- We strike a tool handle. A hammer can easily break plastic or wooden handles.
- We have to strike a workpiece but don't want to damage it.
- We need to make small adjustments to a machinery's moving parts.

4.2.4. ***Screwdrivers*** have one basic purpose on earth and that is just screwing screws. They come in various shapes and sizes for various tasks. It is your job to find the right screwdriver for the right task. Especialy, handles of screwdrivers can easily hurt your hand. Finding one with a rubber handle may ease your job (if you don't start using a power screwdriver).

- If you work with electrical equipment, shut the electricity down first and use a screwdriver with appropriate insulation rating for electrical job.
- Screwdrivers are not chisels or prying tools.
- Do not lean or push on a screwdriver with excessive force as it may slip off and hurt you.
- Hammering a screwdriver is a big mistake as the handle can easily break.

4.2.5. ***Wrenches and Spanners*** are the same things in diferent continents. They come in various shapes and sizes for various tasks. It is your job to find the right one.

- Pipe wrenches are designed for heavy-duty jobs. It may however not be enough for the job you are trying to accomplish. In those situations, find a bigger one instead of extending the handle with a pipe for example.

- Always pull rather than push. A slip of the tool from your hand would cause a less dangerous situation while pulling. Your posture is vital to prevent accidents such accidents.
- Support the head of the wrench with your hand to prevent slipping.

- There are many types of spanners/wrenches as can be seen from the picture above. As examples, from left to right: Adjustable/crescent wrench, pipe wrench, scoket wrench, combination wrench and allen wrench. It should not be forgotten that the ones in the picture are not all the types of spanners/wrenches that can be found.

4.2.6. ***Wood Chisels*** are tools for carving wood only. They are too sharp and the sharp edge can get damaged easily. They come in various shapes and sizes for various tasks. It is your job to find the right one.

-Do not forget to visually check the chisel's sharp cutting edge. It is also important to check workpiece for metal pieces like nails, staples, bolts and etc as they may easily damage the cutting edge.

. Never hold workpiece with one hand and use a chisel with the other. A chisel can easily create deep cuts in your body parts. Always chip or cut away from your body, not towards your body.

- Use a mallet, not a hammer to strike the chisel. A hammer would brake the handle of a chisel.
- Make finish cuts with your hands instead of using a mallet. Chisels are probably one of the oldest tools known to men. Respect them!
- Do not use a chisel as prying tool as it can easily bend.

Chisels are probably one of the oldest tools known to men. Respect them!

4.2.7. ***Shears and Snips*** are designed for cuting metal and come in various shapes and sizes for various tasks. It is your job to find the right saw for the right task.

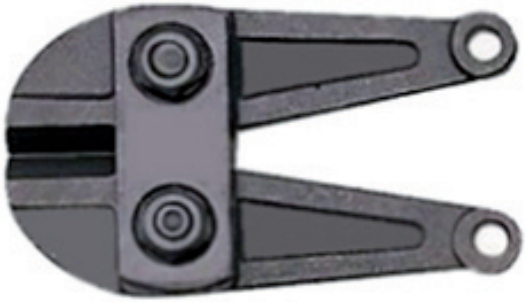
-It gets harder to cut metal as the shear goes deep in the metal sheet because the shear may get stuck. Various types of shears are designed especially for cutting in straight lines, in curves to left or right. Try to find them for your job.
- Do not hammer the handle or use your foot to exert pressure on the cutting edges.
- Do not forget to visually check the cutting edge's condition and your workpiece too before you start shearing.

4.2.8 ***Pliers*** come in various shapes and sizes for various tasks. It is your job to find the right pliers for the right task. Some pliers are used for gripping, some for twisting wires and others for a combination of tasks including wire cutting.

- Universal pliers is a combination tool. Its front end is for gripping and it also has sharp edge like wire cutters. Its main function is not being used as a wrench. Use a wrench to fasten or loosen bolts and nuts.
- Side cutters and pincers (nippers) may get dangerous if the cut piece is not oriented to a safe spot. Try to cover head of the pliers as you cut or at least turn it to a safe spot.

4.2.9 ***Bolt and cable cutters*** are designed to cut bolts and cables. They are slightly different than side cutters and nippers with their working geometry.

- Do not rock the cutter while cutting.
- There are cutters for hardened metals and nails. Their mechanical design is different from side cutters. Always prevent injuries from flying metal by wrapping the head.
- Be aware of your surroundings. Also make sure cut pieces will not bounce of walls.



Do not forget to wear protective spectecles!

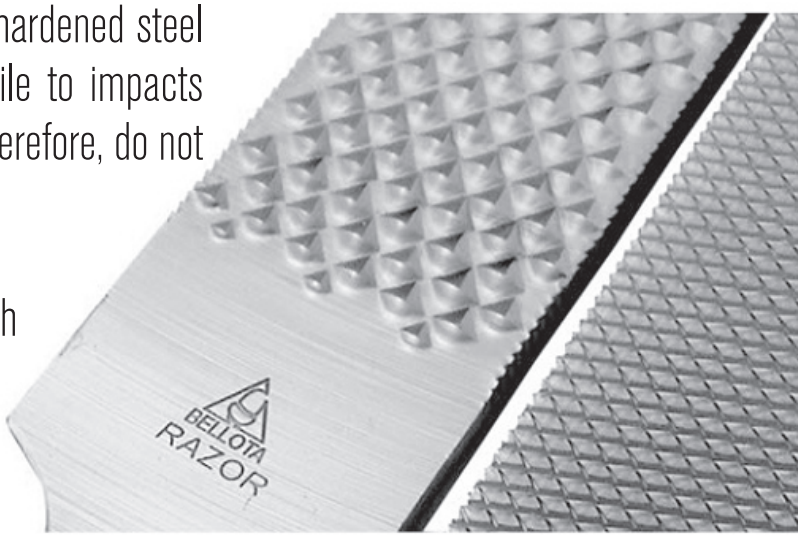
4.2.10 ***Vises and clamps*** are tools to hold workpieces steady. Clamps are tools to hold workpieces steady like vises but they are mobile while vises are mounted on benches. They come in various shapes and sizes for various tasks. Vises are usually mounted on workbenches to secure workpieces in place while holding on them. There are also ones that are specialy designed for machineries.

- Vises themselves must be in condition and be securely bolted on the workbench with no missing or loose bolts.
- Vise jaws may leave texture marks on the workpiece. Use jaw liners to avoid that to happen.
-Do not use jaws as an anvil. Some vises are equipped with a built-in anvil.

Clamps are tools to hold workpieces steady like vises but they are mobile while vises are mounted on benches. They come in various shapes and sizes for various tasks. As examples in the picture aside, there are F-clamps, C-clamps, spring clamps and etc.

4.2.11 ***Files and Rasps*** are tools to shape metal and wood by removing chips. They come in various shapes and sizes for various tasks. It is your job to find the right one. Files have smaller cuting teeth and therefore are for shaping metal. Rasps have bigger cutting teeth and therefore they are for shaping wood and softer material.

They both are produced out of hardened steel and that makes them too fragile to impacts (they can break easily if hit). Therefore, do not use a cracked or dull tool.



Clean the tool with a metal brush when you are finished working with a file or rasp.

Session 3

Training Session 3 is the other practical based section of the training program which consists of power tool and machinery safety and usage. It also includes general health and safety issues regarding the usage of the machines.

5. Power Tools Safety and Usage

5.1. ***Before you start.*** Being in a workshop facility like Model Making Facilities has some important issues to be aware of about health and safety. These issues can be classified as:

5.1.1. ***Work Environment.*** One has to make sure that the close environment of his/her working should be clean and tidy of anything that may distract him/her or create dangerous situations. Scrap pieces, liquid on the floor may make you slip; consumables like screws or bolts, tools that are left on the work bench may move and fall as you work and distract you too. Distraction is one of the main reasons for an accident happening.

5.1.2. ***Personal Protection.*** There is nothing more important than a Model Making Facilities user's health and safety. When it comes to health and physical integrity; grades, projects or even graduation may loose all their significance. Projects can always be finished but health may not. So, do not forget the importance of your own health.

Being careful and knowing hazards may not help if you do not protect your body with the equipments available. Use PPE and be aware of your sorrounding. Do not play with tools and always carry them in a sturdy box instead of carrying them in your hand or your pocket.

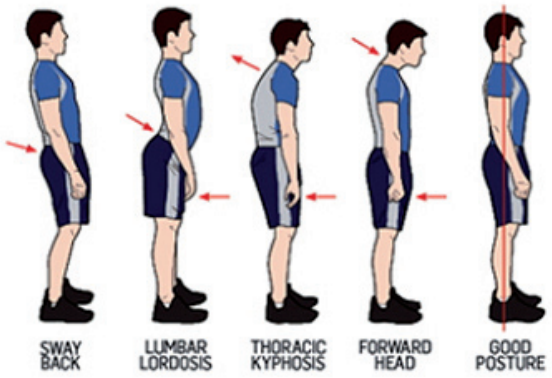
5.1.3. ***Tool and Workpiece Check.*** Taking precaution may be crucial when working with tools, power tools and machinery to avoid accidents. Checking the workpiece and tools visually can avoid accident before they happen.

A cracked or loose tool handle may fling off while using it or a nail in your workpiece may break and hit you or someone else while you try sawing it.

Always check your tool, machine and workpiece before using them.

5.1.4. ***Clamping.*** Use a vise or clamps to secure the workpiece whenever possible. Do not try to hold a workpiece with one hand while operating the tool with the other. Make sure the vise is attached to workbench securely and is free of cracks and other defects.

5.1.5. ***Balance and Posture.*** How you use your energy is important when it comes to working in Model Making Facilities. Using it wisely would give you enough energy to work longer hours without tiring out. In this context, how you position your body; which is called your 'balance and posture'; is directly related.



Always position your body in a way that feels comfortable and that will prevent you from losing balance and hurting yourself. Try to find tools that are designed to allow your wrist to stay straight and avoid using hand tools with your wrist bent.

5.1.6. ***Exertion of force*** is a state how you should never find yourself in. It means using too much force while using a tool or machinery. If you find yourself forcing a tool too much, there may be a couple of reasons which are;

-You are using a tool in a bad condition (dull, cracked, etc.)
-You are using the wrong sized tool for the job.
-You are using the wrong tool for the job.

5.1.7. ***Misuse*** is as obvious as it sounds. Do not be that dumb guy trying to slice a pizza with a saw or the one trying to steer the car with a locking pliers! Select and use the right tool for the job. Do not use tools for jobs they are not designed for. For example; do not use a screwdriver as a chisel, do not use wrenches as hammers, etc. Doing so would not only damage the tool and the workpiece but it may cause accidents.

5.2. ***Electric and Battery Powered Handtools*** are hand held tools that run on electricity or rechargable batteries. There are also another type of tools that run on pressured air which are called pneumatic tools. A Model Making Facilities User must never forget that these tools are powerful tools that can be quite dangerous with their moving parts and harm human body easily. Personal protection is essential as always.

5.2.1. ***Hot Glue Gun*** is a powertool that heats up and melts a solid glue rod that is capable of gluing various types of materials together. The main danger of the tool is the heated up body of the tool and hot molten glue.

- Before use, check the tool and its cord for defects. Never use a hot glue gun with a damaged body or power cord.
- If you have let the gun sit for a while, molten glue will build up in the nozzle. This built-up glue may gush out uncontrollably when you press the trigger.
- Make sure the gun is placed away from flammable items and prevent glue drops drip-

ping on a thin piece of paper, wood or on carpet as this may result in fire.
- Do not touch the hot glue or the area of contact as you may sustain deep burns.
- Clamp or press the pieces together for a short time after applying the hot glue.

5.2.2. ***Electric Drill*** is the tool basically used to drill holes into materials and most types are also widely used as screwdrivers. Some advanced ones have capability of braking stone by the act of pulsing, and they are also called as rotary hammers.

- Always wear a protective spectrecle/goggle or a face shield. In addition wear a dust mask and if necessary hearing protector.
- Before use, check the tool and its cord for defects. Never use a power drill with a damaged body or power cord. Also check the drill bit and do not use a dull or damaged one.
- Make sure the tool is ***'OFF'*** before you plug it to a power supply or mains plug. Unplug the tool before changing or adjusting bit or attachments.
- Never hold a workpiece with one hand and use a drill with the other. Secure your workpiece by using a vise or clamping it to a stationary workbench.
- Do not apply excessive force on a drill. If you find yourself in such a condition, you should consider changing the drill bit with a new and sharp one.
- Slow the rate of the feed and reduce the applied force before the drill bit breaks through the other surface.
- Use a slow rate of drilling for hard and/or thick materials, fast rate for small and/or thin materials. In addition, drill a small 'pilot hole' bfore drillling large holes.
- Most drills can rotate to both sides. You should not apply force while the rotation is to wrong side. Most drill bits are produced to be used while rotation is clockwise.
- Do not stop the drill until you take the drill bit out of the drilled workpiece.

- Use the auxiliary (second) handle for larger work or continous use of the tool.
- The position of your body while using a tool is important. Do not overreach or bend. Keep your proper footing, balance and posture. Also always try to keep your wrist straight.

5.2.3. ***Battery Powered Drill*** is the tool basically used to drill holes into materials and most are also widely used as screwdrivers. Battery powered drills are identical to their electric power brothers with their use, buttons and physical properties.

All rules, regulations and details of use that apply to electric drills also apply to battery power drills; so they are not mentioned here. Please check ***5.2.2*** for details.

5.2.4. ***Jigsaw*** is the tool that is used to saw materials into pieces. They may vary on their power. If right saw blade for the material to be sawn is picked, the tool can saw almost every type of material including plastics, wood and soft metal types.

Sawing hard metals (carbon steels, etc.) with a jigsaw is not possible. Other tools should be considered.

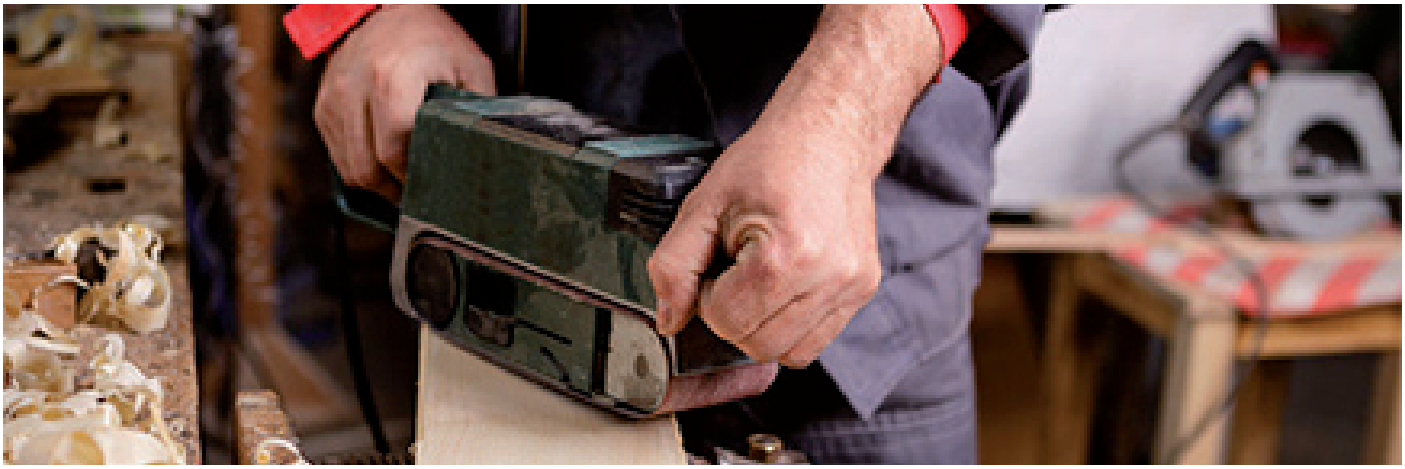
- Always wear a protective spectrecle/goggle or a face shield. In addition wear a dust mask and if necessary hearing protector.
- Before use, check the tool and its cord for defects. Never use a jigsaw with a damaged body or power cord. Also check the saw blade and do not use a dull or damaged one.
- Make sure the tool is ***'OFF'*** before you plug it to a power supply or mains plug. Unplug the tool before changing or adjusting bit or attachments.
- Never hold a workpiece with one hand and use a drill with the other. Secure your work-piece by using a vise or clamping it to a stationary workbench.

- Do not apply excessive force on a saw. If you find yourself in such a condition you should consider changing the saw blade with a new and sharp one.
- Slow the rate of the feed and reduce the applied force before the saw blade breaks through the other edge and cuts the workpiece into two pieces.
- Use a slow rate of drilling for hard and/or thick materials, fast rate for small and/or thin materials.

- If the jigsaw has a built-in dust extraction port, attach it to a vacuum dust extractor whenever possible.
- Make sure the saw blade is not in contact with the workbench or the workpiece when you switch the tool on.
- Hold the jigsaw with both hands while operating it and make sure that other parts of your body are not in line with the cut line.
- Do not try to move the tool away from the cutting line of your workpiece while the tool is still on. Always wait for the saw blade to stop moving.

5.2.5. ***Belt Sander*** is a type of sander in which the sanding is done by a sanding paper with a belt shape. A user may find hand-held belt sanders in various sizes but the operation principles would be the same.

- Always wear a protective spectrecle/goggle or a face shield. In addition, certainly wear a dust mask and if necessary hearing protector.
- Before use, check the tool and its cord for defects. Never use a belt sander with a damaged body or power cord. Also check the sanding belt and do not use a worn, torn or damaged one.
- Make sure the tool is ***'OFF'*** before you plug it to a power supply or mains plug. Unplug the tool before changing or adjusting attachments.



- Never hold a workpiece with one hand and use a belt sander with the other. Secure your workpiece by using a vise or clamping it to a stationary workbench.
- Do not apply excessive force on a saw. If you find yourself in such a condition you should consider changing the sanding belt with a new one.
- If the belt sander has a built-in dust extraction port, attach it to a vacuum dust extractor whenever possible or at least keep its dust filter/bag on the tool when in use.
- Make sure the sanding belt is not in contact with the workbench or the workpiece when you switch the tool on.
- Hold the belt sander with both hands while operating it and make sure that other parts of your body are not in line with the sanding route.

5.2.6. ***Random Orbit Sander*** is a type of sander in which the sanding is done by a sanding paper with a circular shape.

They are also called 'Orbital Sander'.

- Always wear a protective spectrecle/goggle or a face shield. In addition wear a dust mask and if necessary hearing protector.
- Before use, check the tool and its cord for defects. Never use a sander with a damaged body or power cord. Also check the sanding paper and do not use a worn,torn or damaged one.
- Make sure the tool is ***'OFF'*** before you plug it to a power supply or mains plug. Unplug the tool before changing or adjusting attachments.
- Never hold a workpiece with one hand and use a orbital sander with the other. Secure your workpiece by using a vise or clamping it to a stationary workbench.

- Do not apply excessive force on a sander. If you find yourself in such a condition you should consider changing the sanding paper with a new one.
- If the sander has a built-in dust extraction port, attach it to a vacuum dust extractor whenever possible or at least keep its dust filter/bag on the tool when in use.
- Make sure the sanding paper is not in contact with the workbench or the workpiece when you switch the tool on.
- Hold the sander with both hands while operating it.

5.2.7. ***Hand Planer*** is a tool that is used to plane wood to achieve a smooth surface before additional machining. The tool basically has a rotating roll underneath that has 3-4 cutting blades attached to it.

- Always wear a protective spectrecle/goggle or a face shield. In addition, certainly wear a dust mask and if necessary hearing protector.
- Before use, check the tool and its cord for defects. Never use a planer with damaged body or power cord. Also check the blades visually and do not use the machine with worn, torn or damaged blades.
- Make sure the tool is ***'OFF'*** before you plug it to a power supply or mains plug. Unplug the tool before changing or adjusting blades/attachments.

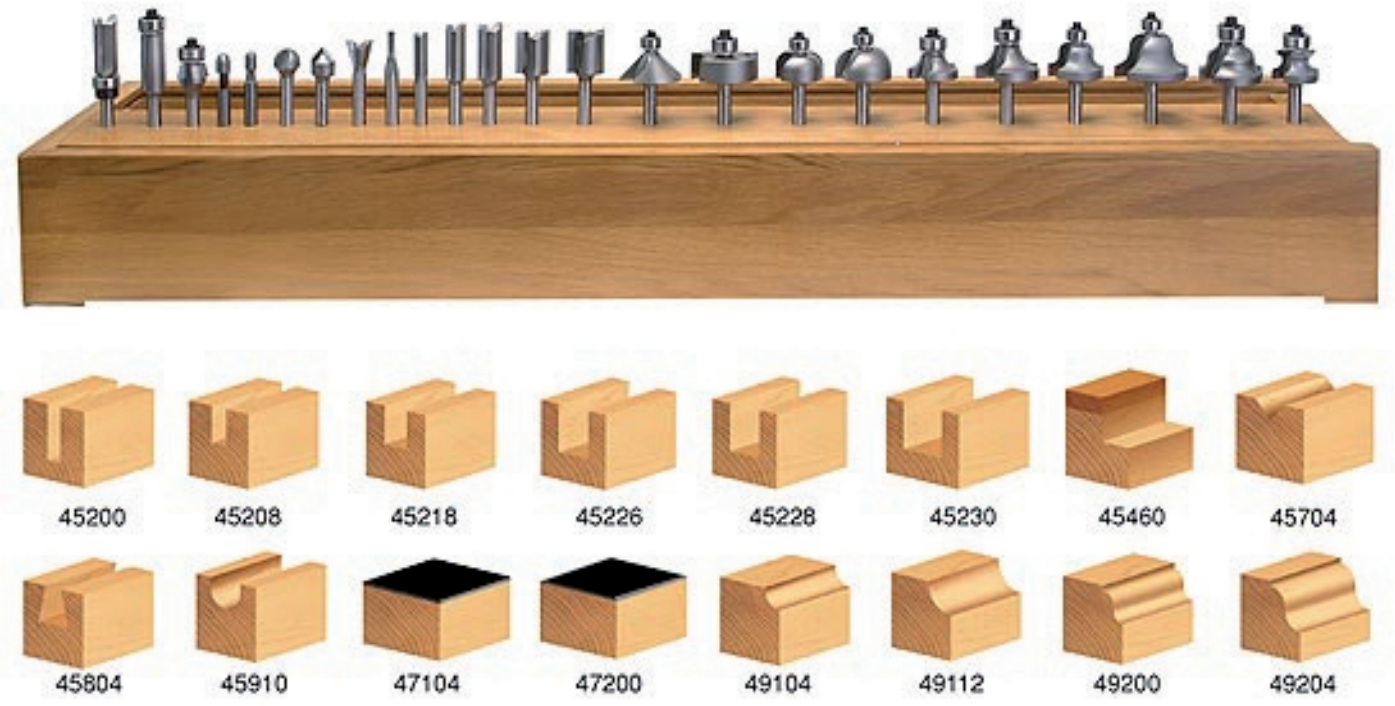
- Never hold a workpiece with one hand and use an orbital sander with the other. Secure your workpiece by using a vise or clamping it to a stationary workbench.
- Do not apply excessive force on a sander. If you find yourself in such a condition you

should consider changing the sanding belt with a new one.
- If the planer has a built-in dust extraction port, attach it to a vacuum dust extractor whenever possible or at least keep its dust filter/bag on the tool when in use.
- Make sure the planer is not in contact with the workbench or the workpiece when you switch the tool on. Because the rotating blade roll would act like a wheel and the tool would fling away like a racing car.
- Hold the planer with both hands while operating it and make sure that other parts of your body are not in line with the cutting route.
- Do not leave the planer on thebase of the machine. In stead, lay it aside. This would prevent the planer to accidentally fling as you hold it.

5.2.8. ***Hand Router*** is a tool that is operated by hand and is used to shape edges and carve, engrave (generally) wood.

There are a various type of blades that help create various shapes on workpieces.

The machine can either be operated manually by hand or attached upside down to a specially designed workbench as to be used as a stationary router. In that case, the workpiece is moved by hand.



- Always wear a protective spectrecle/goggle or a face shield. In addition, certainly wear a dust mask and if necessary hearing protector.
- Before use, check the tool and its cord for defects. Never use a router with damaged body or power cord. Also check the blades visually and do not use the machine with worn, torn or damaged blades.
- Make sure the tool is ***'OFF'*** before you plug it to a power supply or mains plug. Unplug the tool before changing or adjusting blades/attachments.
- Never hold a workpiece with one hand and use a router with the other. Secure your workpiece by using a vise or clamping it to a stationary workbench.

- Do not apply excessive force on a router If you find yourself in such a condition you should consider changing the router bit with a new one.
- If the router has a built-in dust extraction port, attach it to a vacuum dust extractor whenever possible or at least keep its dust filter/bag on the tool when in use.
- Make sure the router bit is not in contact with the workbench or the workpiece when you switch the tool on. Because the rotating blade roll would act like a wheel and the tool would fling away dangerously.
- Hold the router with both hands while operating it and make sure that other parts of your body are not in line with the cutting route.
- Do not leave the router on the base of the machine. In stead, lay it aside. This would prevent the powertool to accidentally fling as you hold it.

5.2.9. ***Hand-held Circular Saw*** is a tool that is used to saw panels of material to create more managable pieces for further machining. Of course in addition to panel material, circular saws can be used to saw materials with any size and shape.

Cordless circular saws are good especially for site works where reach to electricity is not possible.

Like most powertools; with different types of blades, different types of material can be sawn with a circular saw. It is still not possible and appropriate to saw hard metal with a hand-held powertool.

- Always wear a protective spectrecle/goggle or a face shield. In addition, certainly wear a dust mask and if necessary hearing protector.
- Before use, check the tool for defects. Never use a saw with a damaged body. Also check the blade visually and do not use the machine with worn, torn or damaged blade.
- Make sure the tool is ***'OFF'*** before you plug it to a power supply or mains plug. Unplug the tool before changing or adjusting blade/attachments.

- Never hold a workpiece with one hand and use a circular saw with the other. Secure your workpiece by using a vise or clamping it to a stationary workbench.

- Do not apply excessive force on a circular saw. If you find yourself in such a condition you should consider changing the blade with a new, sharp one or with the right type.
- If the circular saw has a built-in dust extraction port, attach it to a vacuum dust extractor whenever possible or at least keep its dust filter/bag on the tool when in use.
- Make sure the blade is not in contact with the workbench or the workpiece when you switch the tool on. Because the rotating blade roll would act like a wheel and the tool would fling away dangerously.
- Hold the circular saw with both hands while operating it and make sure that other parts of your body are not in line with the cutting route.
- Do not detach any covers of a circular saw like the blade guard.

5.2.10 ***Multi Cutter*** is a tool that is used to trim, flush sawing, sanding and plunge-cutting. With its changable cutting/sanding head, these tools provide a range of applications including trimming at the corners.

Like most powertools; with different types of blades, different types of material can be sawn with a multi cutter.

- Always wear a protective spectrecle/goggle or a face shield. In addition wear a dust mask and if necessary hearing protector.
- Before use, check the tool for defects. Never use a power tool with a damaged body or power cord. Also check the cutter and do not use a dull or damaged one.
- Never hold a workpiece with one hand and use a cordless multi cutter with the other unless it is stationary. Secure your workpiece by using a vise or clamping it to a stationary workbench.
- Do not apply excessive force on a powertool. If you find yourself in such a condition, you should consider changing the cutter with a new and sharp one.
- Use a slow rate of machining for hard and/or thick materials, fast rate for small and/or thin materials.
- Hold power tool by insulated gripping surfaces, when performing an operation where the cutting accessory may contact hidden wiring.

- Use the machine only for dry sanding.
- Keep hands away from the sawing range. Do not reach under the workpiece.
- Contact with electric lines can lead to fire and electric shock. Damaging a gas line can lead to explosion. Penetrating a water line causes property damage. So, be careful!

5.2.11. ***Sabre Saw*** is a tool that is used for sawing wood, plastic, metal and building materials. It is suitable for straight and curved cuts. It is especially suitable to machine stationary workpieces.

- Always wear a protective spectrecle/goggle or a face shield. In addition, certainly wear a dust mask and if necessary hearing protector.
- Before use, check the tool and its cord for defects. Never use a sabre saw with damaged body or power cord. Also check the blade visually and do not use the machine with worn, torn or damaged blade.
- Make sure the tool is ***'OFF'*** before you plug it to a power supply or mains plug. Unplug the tool before changing or adjusting blades/attachments.
- Never hold a workpiece with one hand and use the saw with the other. Secure your workpiece by using a vise or clamping it to a stationary workbench.
- Do not apply excessive force on a sabre saw. If you find yourself in such a condition you should consider changing the blade with a new, sharp one or with the right type.
- If the sabre saw has a built-in dust extraction port, attach it to a vacuum dust extractor whenever possible or at least keep its dust filter/bag on the tool when in use.

- Make sure the blade is not in contact with the workbench or the workpiece when you switch the tool on. Because there is a danger of kickback and the tool might fling away.
- Hold the sabre saw with both hands while operating it and make sure that other parts of your body are not in line with the cutting route.
- Do not detach any covers of a sabre saw like the blade guard.
- Do not try to move the tool away from the cutting line of your workpiece while the tool is still on. Always wait for the saw blade to stop moving.

5.2.12. ***Delta Sander*** is a type of sander, designed to work especially in tight surfaces, corners and hard-to-reach spaces.

It is one of the contemporary tools for home-use and any type of woodworking.

- Always wear a protective spectrecle/goggle or a face shield. In addition, certainly wear a dust mask and if necessary hearing protector.
- Before use, check the tool and its cord for defects. Never use a sander with damaged body or power cord. Also check the sandpaper attached on the machine visually and do not use the machine with worn, torn or damaged sandpaper.
- Make sure the tool is ***'OFF'*** before you plug it to a power supply or mains plug. Unplug the tool before changing or adjusting san paper/attachments.

- Never hold a workpiece with one hand and use the sander with the other. Secure your workpiece by using a vise or clamping it to a stationary workbench.
- Do not apply excessive force on a sander. If you find yourself in such a condition you should consider changing the sandpaper with a new, sharp one or with the right type.
- If the sander has a built-in dust extraction port, attach it to a vacuum dust extractor whenever possible or at least keep its dust filter/bag on the tool when in use.
- Make sure the sander is not in contact with the workbench or the workpiece when you switch the tool on. Because there is a danger of kickback and the tool might fling away.
- Hold the sander with both hands while operating it.

5.2.13. ***Shears*** is a tool that is used to cut flexible, soft, sheet materials including soft metal sheets like tin up to a certain thickness.

PVC, cardboard, leather, fabric are other suitable materials to be cut.

- Always wear a protective spectrecle/goggle or a face shield.
- Before use, check the tool. Never use a shears with damaged body. Also check the blade attached on the machine visually and do not use the machine with worn, dull or damaged blade.
- Never hold a workpiece with one hand and use the shears with the other. Secure your workpiece by using a vise or clamping it to a stationary workbench.
- Do not apply excessive force on a shears. If you find yourself in such a condition you

should consider changing the blade with a new, sharp one or with the right type.
- Make sure the sander is not in contact with the workbench or the workpiece when you switch the tool on. Because there is a danger of kickback and the tool might fling away.
- Use a slow rate of machining for hard and/or thick materials, fast rate for small and/or thin materials.
- Hold power tool by insulated gripping surfaces, when performing an operation where the cutting accessory may contact hidden wiring.

- Make sure that other parts of your body are not in line with the cutting route.
- Do not detach any covers of a shears like the blade guard.
- Do not try to move the tool away from the cutting line of your workpiece while the tool is still on. Always wait for the saw blade to stop moving.

5.2.14. ***Angle Grinder*** is a multipurpose powertool that can function as a grinder, sander, wire brush or a cut-off tool.

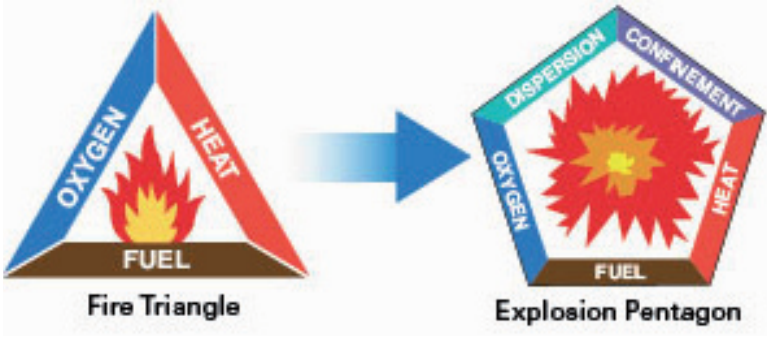
Various types of changable heads can be used for various types of functions.

- Always wear a protective spectrecle/goggle or a face shield.
- Before use, check the tool. Never use a angle grinder with damaged body. Also check

the blade attached on the machine visually and do not use the machine with worn, dull or damaged blade.
- Never hold a workpiece with one hand and use the angle grinder with the other. Secure your workpiece by using a vise or clamping it to a stationary workbench.
- Do not apply excessive force on angle grinder. If you find yourself in such a condition you should consider changing the blade with a new, sharp one or with the right type.
- Make sure the sander is not in contact with the workbench or the workpiece when you switch the tool on. Because there is a danger of kickback and the tool might fling away. Also, never lay the power tool down until the accessory has come to a complete stop.
- Hold power tool by insulated gripping surfaces, when performing an operation where

the cutting accessory may contact hidden wiring.
- Make sure that other parts of your body are not in line with the cutting route.
- Do not detach any covers of a shears like the blade guard.
- Do not try to move the tool away from the cutting line of your workpiece while the tool is still on. Always wait for the saw blade to stop moving.
- Make sure that the bystanders is kept at a certain distance from the work area.
- Do not run the power tool while carrying it at your side.
- Do not operate the power tool near flammable materials.
- Do not position your body in the possible direction of a kickback.
- Do not restart the cutting operation in the workpiece.Let the wheel reach full speed and carefully re-enter the cut.

- When cutting or grinding metal with an angle grinder, there's a high risk of fire. A user has to make sure that there is not wood pieces, chips, dust in and around the work area.



5.2.15. ***Multi Rotary Tool*** is a highly functional, multipurpose cutting, sanding, grinding, etc., hand-held tool. It is especially used by hobbyists, as well as it is functional in hard-to-reach areas.

It is functional with wood, plastics, soft metal and any light building materials.

- Always wear a protective spectrecle/goggle or a face shield.
- Before use, check the tool. Never use a tool with damaged body. Also check the bit attached on the machine visually and do not use the machine with worn, dull or damaged bits.
- Try not to hold a workpiece with one hand and use the tool with the other. Secure your workpiece by using a vise or clamping it to a stationary workbench.

- Do not apply excessive force on the tool. If you find yourself in such a condition, you should consider changing the bit with a new, sharp one or with the right type.
- Make sure the tool is not in contact with the workbench or the workpiece when you switch the tool on. Because there is a danger of kickback and the tool might fling away. Also, never lay the power tool down until the accessory has come to a complete stop.
- Hold power tool by insulated gripping surfaces, when performing an operation where the cutting accessory may contact hidden wiring.
- Make sure that other parts of your body are not too close to the bit while working.
- Do not try to move the tool away from the cutting line of your workpiece while the tool is still on. Always wait for the saw blade to stop moving.
- Do not run the power tool while carrying it at your side.
- Do not operate the power tool near flammable materials.
- Do not position your body in the possible direction of a kickback.
- Do not restart the cutting operation in the workpiece.Let the wheel reach full speed and carefully re-enter the cut.

5.2.16. ***Heat Gun*** is basically a tool that produces constant hot air flow. It is functional especially in stripping paints and varnishes, shaping, welding and shrinking materials.

The tool is also suitable for soldering and tinning, loosening of adhesive joints and the defrosting of water lines.

- Always wear a protective spectrecle/goggle or a face shield.
- Before use, check the tool. Never use a tool with damaged body.
- Do not operate the power tool near flammable materials.
- Be extra careful when working close to inflammable materials as hot air or hot nozzle can ignite dust or gases.
- Never direct the hot air at the same position for longer periods of time. Heating certain materials like plastics, varnished or paint can develop inflammable gases.
- Make sure that other parts of your body are not itoo close to hot air jet.
- Never use the power tool as a hairdryer and never direct the tool to other persons.
- Do not pack the tool before the nozzle cools down.
- Consider having protective gloves against heat.

6. Green Square Machines

6.1. ***Before you start.*** Being in a workshop facility like Model Making Facilities has some important issues to be aware of about health and safety. These issues can be classified as:

6.1.1. ***Work Environment.*** One has to make sure that the close environment of his/her working should be clean and tidy of anything that may distract him/her or create dangerous situations. Scrap pieces, liquid on the floor may make you slip; consumables like screws or bolts, tools that are left on the work bench may move and fall as you work and distract you too. Distraction is one of the main reasons for an accident happening.

6.1.2. ***Personal Protection.*** There is nothing more important than a Model Making Facilities user's health and safety. When it comes to health and physical integrity; grades, projects or even graduation may loose all their significance. Projects can always be finished but health may not. So, do not forget the importance of your own health.

Being careful and knowing hazards may not help if you do not protect your body with the equipments available. Use PPE and be aware of your sorrounding. Do not play with tools and always carry them in a sturdy box instead of carrying them in your hand or your pocket.

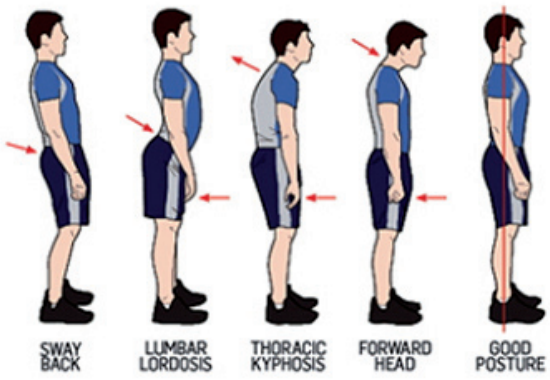
6.1.3. ***Tool and Workpiece Check.*** Taking precaution may be crucial when working with tools, power tools and machinery to avoid accidents. Checking the workpiece and tools visually can avoid accident before they happen.

A cracked or loose tool handle may fling off while using it or a nail in your workpiece may break and hit you or someone else while you try sawing it.

Always check your tool, machine and workpiece before using them.

6.1.4. ***Clamping.*** Use a vise or clamps to secure the workpiece whenever possible. Do not try to hold a workpiece with one hand while operating the tool with the other. Make sure the vise is attached to workbench securely and is free of cracks and other defects.

6.1.5. ***Balance and Posture.*** How you use your energy is important when it comes to working in Model Making Facilities. Using it wisely would give you enough energy to work longer hours without tiring out. In this context, how you position your body; which is called your 'balance and posture'; is directly related.



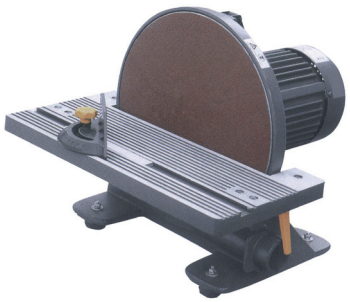
Always position your body in a way that feels comfortable and that will prevent you from losing balance and hurting yourself. Try to find tools that are designed to allow your wrist to stay straight and avoid using hand tools with your wrist bent.

6.1.6. ***Exertion of force*** is a state how you should never find yourself in. It means using too much force while using a tool or machinery. If you find yourself forcing a tool too much, there may be a couple of reasons which are;

-You are using a tool in a bad condition (dull, cracked, etc.)
-You are using the wrong sized tool for the job.
-You are using the wrong tool for the job.

6.1.7. ***Misuse*** is as obvious as it sounds. Do not be that dumb guy trying to slice a pizza with a saw or the one trying to steer the car with a locking pliers! Select and use the right tool for the job. Do not use tools for jobs they are not designed for. For example; do not use a screwdriver as a chisel, do not use wrenches as hammers, etc. Doing so would not only damage the tool and the workpiece but it may cause accidents.

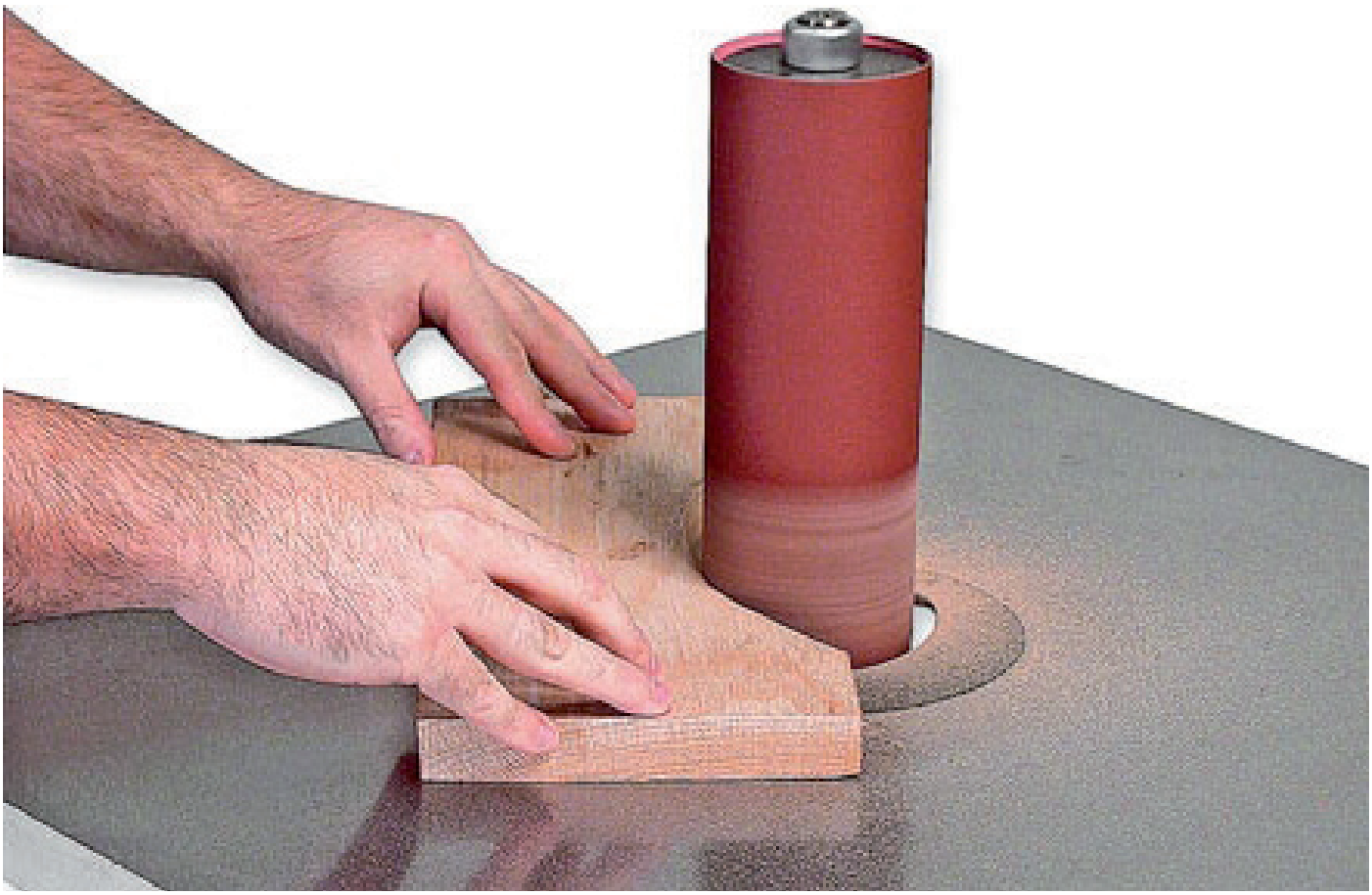
6.2. ***Machines*** are the machinery of the Model Making Facilities that could be considered as potentially the 'least' dangerous machines. A user can use a GSM after he/she recieves the proper training. All the other safety related issues are valid. GSM consists of 2 jigsaws: Proxxon DSH/E, 3 disc sanders: Tamiş TZ10/BG, 1 oscillating spindle sander: Çelik M.S.ORS and 1 wood lathe: Foreman MC1100A.



6.2.1. ***Oscillating Spindle Sander*** is basically a rotating cylindrical drum covered with a gritted paper sleeve (sandpaper). It is used to smooth saw marks on rounded cuts, smooth rough curved edges and sand the inside surfaces of deep hole cuts. A spindle sander is often used in finishing woodwork.

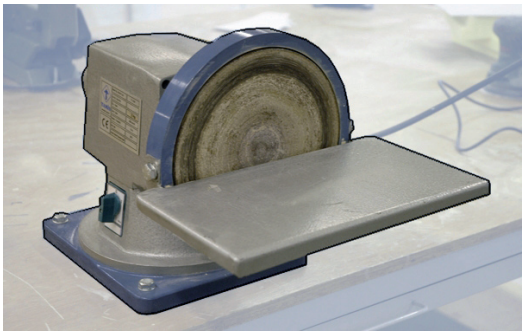
Oscillation move is the repetitive variation, typically in time, of some measure about a central value (often a point of equilibrium) or between two or more different states. In case of a sander, the drum both rotates and oscillates at the same time.

- Oscillating Spindle Sander is better at sanding concave curves because of the cylindrical shape of the sanding spindle. It is also possible to sand convex curves or lines but you might always have the concave shape of the spindle of the workpiece.
- Before use, check the tool, its cord and the sandpaper for defects. Never use a sander with a dull or ripped sandpaper, damaged body parts and/or any guards missing.
- Always wear a protective spectrecle/goggle or a face shield. In addition, certainly we-

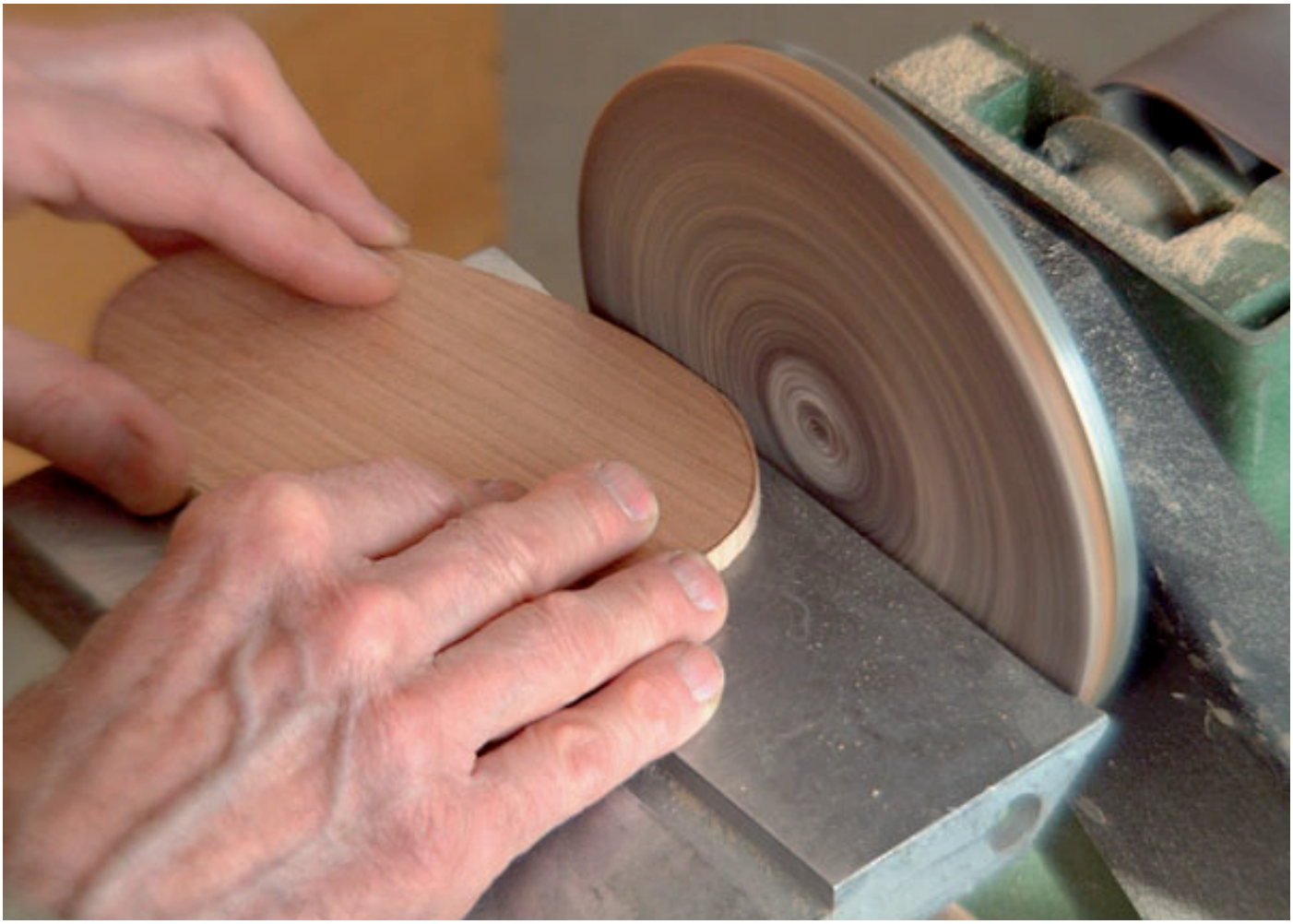


ar a dust mask and if necessary hearing protector.
- Make sure that all the moving parts (like working surface, guards, reference surfaces, etc.) are locked firmly.
- If the sander has speed adjustments, always use lower speed for hard and/or thick materials and fast spped for soft and/or thin material.
- Do not apply excessive force on a sander. If you find yourself in such a condition you should consider changing the sandpaper with a new, sharp one or with the right type.
- If the sander has a built-in dust extraction port, attach it to a vacuum dust extractor whenever possible or at least keep its dust filter/bag on the tool when in use.
- Make sure the work piece is not in contact with the sandpaper when you switch the tool on. Because there is a danger of kickback and the workpiece might fling away.
- Always apply enough pressure to hold the workpiece on the working surface.
- Never leave a sander unattended when it is on. Always wait for the sanding spindle to come to a full stop.
- When you are finished working on the sander, clean the machine from dust.

6.2.2. ***Disc Sander*** is most commonly implemented as a stationary machine that consists of a replaceable circular shaped sandpaper attached to a wheel turned by an electric motor or compressed air.



- Disc sander is highly used to achieve convex curves.
- Before use, check the tool, its cord and the sandpaper for defects. Never use a sander with a dull or ripped sandpaper, damaged body parts and/or any guards missing.
- Always wear a protective spectrecle/goggle or a face shield. In addition, certainly wear a dust mask and if necessary hearing protector.
- Make sure that all the moving parts (like working surface, guards, reference surfaces, etc.) are locked firmly.
- If the sander has speed adjustments, always use lower speed for hard and/or thick materials and fast spped for soft and/or thin material.
- Do not apply excessive force on a sander. If you find yourself in such a condition you should consider changing the sandpaper with a new, sharp one or with the right type.
- If the sander has a built-in dust extraction port, attach it to a vacuum dust extractor whenever possible or at least keep its dust filter/bag on the tool when in use.



- Make sure the work piece is not in contact with the sandpaper when you switch the tool on. Because there is a danger of kickback and the workpiece might fling away.
- Always apply enough pressure to hold the workpiece on the working surface.
- Never leave a sander unattended when it is on. Always wait for the sanding disc to come to a full stop.
- When you are finished working on the sander, clean the machine from dust.

6.2.3. ***Combination Sander*** is a combination of a big disc sander on one end and on the other end, an inflatable spindle sander.

All the rules and statement that are made on sections 6.2.1 and 6.2.2 are valid.

- Before use, check the tool, its cord and the sandpaper for defects. Never use a sander with a dull or ripped sandpaper, damaged body parts and/or any guards missing.

- Always wear a protective spectrecle/goggle or a face shield. In addition, certainly wear a dust mask and if necessary hearing protector.
- Make sure that all the moving parts (like working surface, guards, reference surfaces, etc.) are locked firmly.
- If the sander has speed adjustments, always use lower speed for hard and/or thick materials and fast spped for soft and/or thin material.
- Do not apply excessive force on a sander. If you find yourself in such a condition you should consider changing the sandpaper with a new, sharp one or with the right type.
- If the sander has a built-in dust extraction port, attach it to a vacuum dust extractor whenever possible or at least keep its dust filter/bag on the tool when in use.
- Make sure the work piece is not in contact with the sandpaper when you switch the tool on. Because there is a danger of kickback and the workpiece might fling away.
- Always apply enough pressure to hold the workpiece on the working surface.
- Never leave a sander unattended when it is on. Always wait for the sanding disc to come to a full stop.
- When you are finished working on the sander, clean the machine from dust.

6.2.4. ***Scrollsaw*** is a type of saw that is useful for cutting intricate curves in cases where a jigsaw or coping saw is not appropriate. It is capable of creating curves with edges.

- Before use, check the tool, its cord and the blade for defects. Never use a scrollsaw with a dull or damaged blade, damaged body parts and/or any guards missing. Blade teeth should be pointing down, not up.
- Always wear a protective spectrecle/goggle or a face shield. In addition, certainly wear a dust mask and if necessary hearing protector.
- Make sure that all the moving parts (like working surface, guards, reference surfaces, etc.) are locked firmly.
- If the scrollsaw has speed adjustments, always use lower speed for hard and/or thick materials and fast spped for soft and/or thin material.
- Try not to stop the power tool in the middle of a cut. Always work out of the workpiece. Also, moving the workpiece back towards yourself is not a good idea when the power tool is on as the blade may break easily.- When making curved cuts, the blade is actually forced to bend which may end up with a broken blade. To prevent this, you should always move the workpiece forward as the blade goes through the curve.

- Do not apply excessive force on the tool. If you find yourself in such a condition, you should consider changing the blade with a new, sharp one or with the right type.
- Make sure the workpiece is not in contact with the blade when you switch the tool on. Because there is a danger of kickback and the workpiece might fling away.
- Always apply enough pressure to hold the workpiece on the working surface.
- Make sure that other parts of your body are not in line with the cutting route.
- Do not detach any covers of a scrollsaw like the blade guard.
- Do not restart the cutting operation in the workpiece. Let the wheel reach full speed and carefully re-enter the cut.
- Wood dust is an important danger while working with a scrollsaw. Make sure that the dust collection system is on.
- Never leave a scrollsaw unattended when it is on. Always wait for the blade to come to a full stop.
- When you are finished working on the scrollsaw, clean the machine from dust.

6.2.5. ***Wood Lathe*** is a machine tool which rotates the workpiece on its axis to perform various operations such as cutting, sanding, knurling, drilling, or deformation, facing, turning, with tools that are applied to the workpiece to create an object which has symmetry about an axis of rotation.

- Before use, check the tool, its cord, headstock for defects. Never use a scrollsaw with a dull or damaged blade, damaged body parts and/or any guards missing.

Never use a wood lathe with cracked or damaged headstock, tailstock, faceplate or any other damaged body parts and/or any guards missing.

- The cutting tool you use should be sharp and in good condition. Check before start.
- Always wear a protective spectrecle/goggle or a face shield.
- Make sure that all the moving parts (like working surface, guards, reference surfaces, etc.) are locked firmly.
- Before starting the machine, turn the work piece by hand to make sure that the tool rest does not get in contact with the work piece.
- If the wood lathe has speed adjustments, always use lower speed for hard and/or thick materials and fast spped for soft and/or thin material. If you are working with a work piece with a square cross section, start with lowest speed.
- Do not apply excessive force on the tool. If you find yourself in such a condition, you should consider changing the blade with a new, sharp one or with the right type.
- Make sure the workpiece is not in contact with the blade when you switch the tool on. Because there is a danger of kickback and the cutting tool might fling away.

- Always apply enough pressure when pushing the cutting tool into the work piece.
- Make sure the tip of the cutting tool gets in contact approximately 1 mm higher than the central axis of the work piece.

- Do not detach any covers of a wood lathe like the blade guard.
- Never leave a wood lathe unattended when it is on. Always wait for the tool to come to a full stop.
- When you are finished working on the wood lathe, clean the machine from dust.

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7. Yellow Triangle Machines

7.1. ***Before you start.*** Being in a workshop facility like Model Making Facilities has some important issues to be aware of about health and safety. These issues can be classified as:

7.1.1. ***Work Environment.*** One has to make sure that the close environment of his/her working should be clean and tidy of anything that may distract him/her or create dangerous situations. Scrap pieces, liquid on the floor may make you slip; consumables like screws or bolts, tools that are left on the work bench may move and fall as you work and distract you too. Distraction is one of the main reasons for an accident happening.

7.1.2. ***Personal Protection.*** There is nothing more important than a Model Making Facilities user's health and safety. When it comes to health and physical integrity; grades, projects or even graduation may loose all their significance. Projects can always be finished but health may not. So, do not forget the importance of your own health.

Being careful and knowing hazards may not help if you do not protect your body with the equipments available. Use PPE and be aware of your sorrounding. Do not play with tools and always carry them in a sturdy box instead of carrying them in your hand or your pocket.

7.1.3. ***Tool and Workpiece Check.*** Taking precaution may be crucial when working with tools, power tools and machinery to avoid accidents. Checking the workpiece and tools visually can avoid accident before they happen.

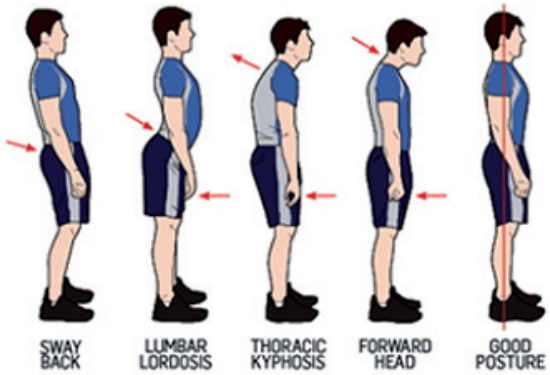
A cracked or loose tool handle may fling off while using it or a nail in your workpiece may break and hit you or someone else while you try sawing it.

Always check your tool, machine and workpiece before using them.

7.1.4. ***Clamping.*** Use a vise or clamps to secure the workpiece whenever possible. Do not try to hold a workpiece with one hand while operating the tool with the other. Make

sure the vise is attached to workbench securely and is free of cracks and other defects. Unless you have to work free hand on a machinery, use the reference surfaces of the machinery.

7.1.5. ***Balance and Posture.*** How you use your energy is important when it comes to working in Model Making Facilities. Using it wisely would give you enough energy to work longer hours without tiring out. In this context, how you position your body; which is called your 'balance and posture'; is directly related.



Always position your body in a way that feels comfortable and that will prevent you from losing balance and hurting yourself. Try to find tools that are designed to allow your wrist to stay straight and avoid using hand tools with your wrist bent.

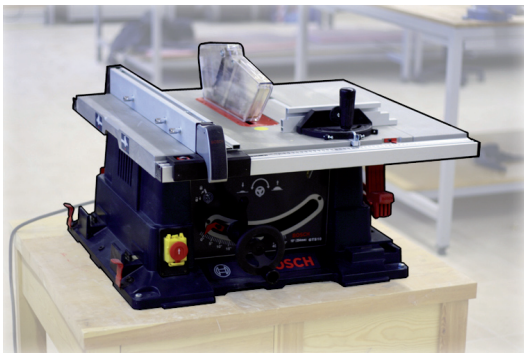
7.1.6. ***Exertion of force*** is a state how you should never find yourself in. It means using too much force while using a tool or machinery. If you find yourself forcing a tool too much, there may be a couple of reasons which are;

-You are using a tool in a bad condition (dull, cracked, etc.)
-You are using the wrong sized tool for the job.
-You are using the wrong tool for the job.

7.1.7. ***Misuse*** is as obvious as it sounds. Do not be that dumb guy trying to slice a pizza with a saw or the one trying to steer the car with a locking pliers! Select and use the right tool for the job. Do not use tools for jobs they are not designed for. For example; do not use a screwdriver as a chisel, do not use wrenches as hammers, etc. Doing so would not only damage the tool and the workpiece but it may cause accidents.

7.2. ***Machines*** are the machinery of the Model Making Facilities that could be considered as potentially 'more' dangerous machines than the GSM. A user can use a YTM after he/she recieves the proper training and in addition to this, the user needs to inform his/her supervisor before using a YTM. All the other safety related issues are valid. YTM consists of 1 table saw: Bosch GTS 10, 1 bandsaw: Metabo BAS 317, 1 Double Bevel Gliding Mitre Saw: Bosch GCM 12 GDL, 1 drill press: Smart DP 51025 F1. Although Universal Systems PLS 6.120D, the laser cutter is considered as a YTM, it will be mentioned in the "Session 4 / Ad-Hoc Training" section.

7.2.1. ***Table Saw*** or sawbench is a woodworking tool consisting of a circular saw blade, mounted on an arbor, that is driven by an electric motor (either directly, by belt, or by gears). The blade protrudes through the surface of a table, which provides support for the material, usually wood, being cut.



- Before use, check the tool, its cord and blade for defects. Never use a table saw with a dull or damaged blade, damaged body parts and/or any guards missing.
- Always wear a protective spectrecle/goggle or a face shield. In addition, certainly wear a dust mask and if necessary hearing protector.
- Make sure that all the moving parts (like reference surfaces, guards, blade, etc.) are locked firmly.
- If the table saw has speed adjustments, always use lower speed for hard and/or thick materials and fast spped for soft and/or thin material.

- The most important danger with a table saw is called a "***kickback***" which is the ability of the machine to throw the workpiece back at the user with a lot of power and speed. To avoid this, never use the rip fence for miter or cross cuts!

- In order to avoid injuries from kickback, do not stand in the line of cutting blade and don't let anyone stand behind yourself.

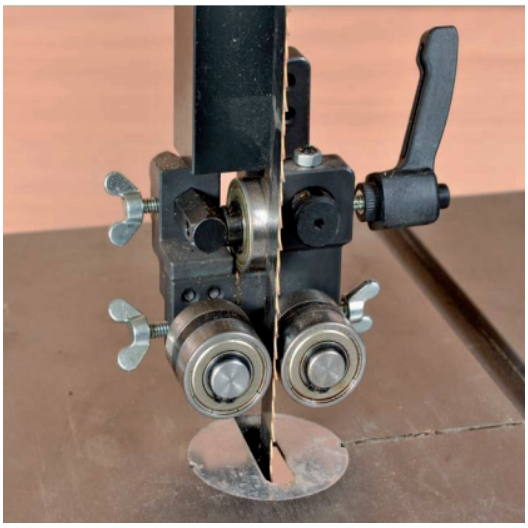
- Try not to stop the power tool in the middle of a cut. Always work out of the workpiece. Also, moving the workpiece back towards yourself is not a good idea when the power tool is on as kickbacks may easily occur.
- Adjust the blade height according to the workpiece thickness. The tip of the blade should exceed approximately 1 mm above the top surface of the workpiece.
- Do not try to saw a workpiece free hand. Always use one of the reference surfaces.
- Do not apply excessive force on the tool. If you find yourself in such a condition, you should consider changing the blade with a new, sharp one or with the right type.
- Make sure the workpiece is not in contact with the blade when you switch the tool on. Because there is a danger of kickback and the tool might fling away.
- Always use a pushstick or a scrap piece to push the workpiece in situations when the distance of the blade and rip fence is closer than 10 cm or when it feels dangerous to hold the workpiece.

- When rip cutting a big piece, get help from another facility user. He/she should recieve the cut pieces from the other side of the table saw.
- Make sure that other parts of your body are not in line with the cutting route.
- Do not detach any covers of a table saw like the blade guard.
- Do not restart the cutting operation in the workpiece. Let the wheel reach full speed and carefully re-enter the cut.
- Wood dust is an important danger while working with a table saw. Make sure that the dust collection system is on.
- Never leave a table saw unattended when it is on. Always wait for the blade to come to a full stop.
- When you are finished working on a table saw, clean the machine from dust.

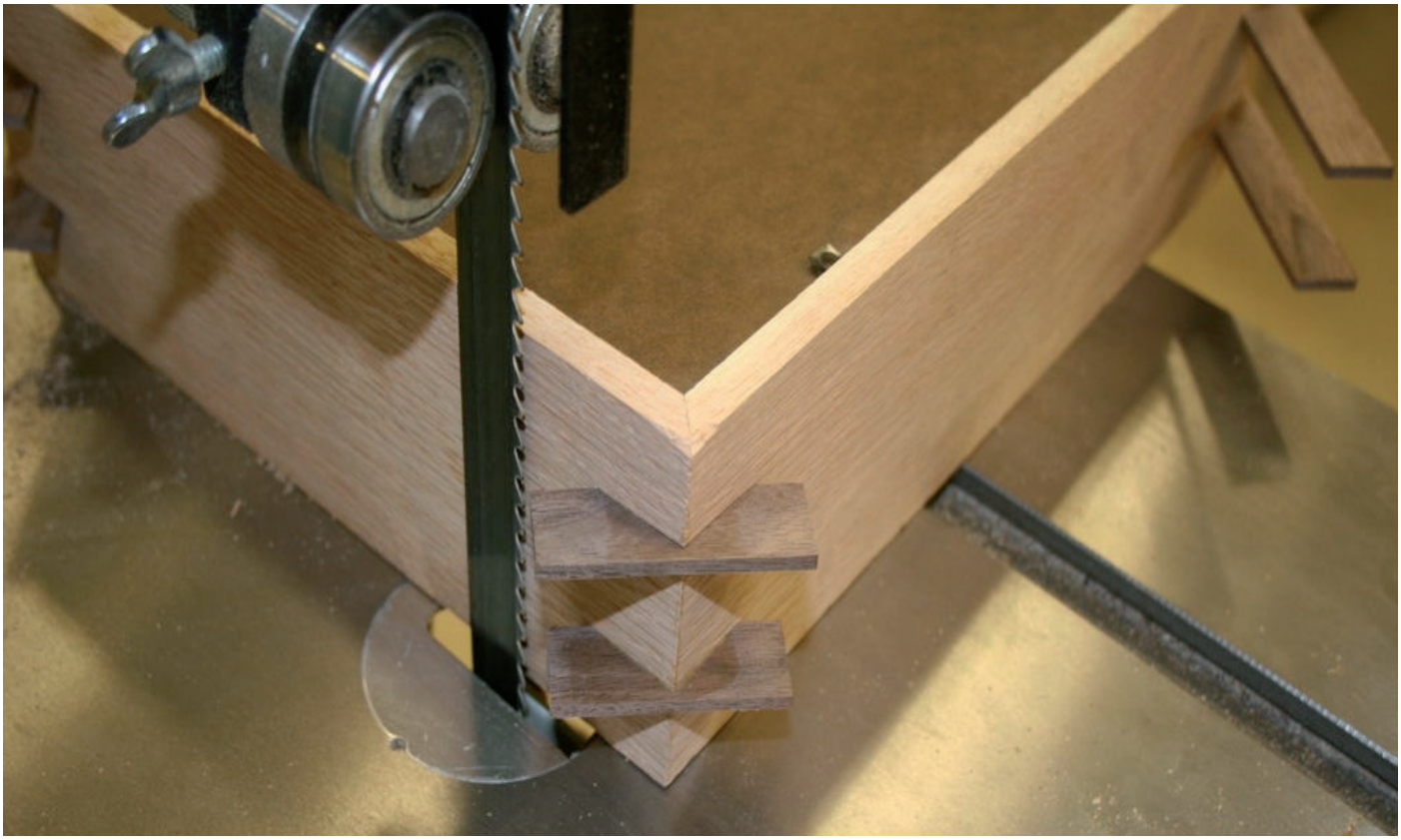
7.2.2. ***Bandsaw*** is a power tool which uses a blade consisting of a continuous band of metal with teeth along one edge to cut various workpieces. They are especially useful for cutting curved shapes.

- Before use, check the tool, its cord and the blade for defects. Never use a bandsaw with a dull or damaged saw, damaged body parts and/or any guards missing.
- Always wear a protective spectrecle/goggle or a face shield. In addition, certainly wear a dust mask and if necessary hearing protector.
- Make sure that all the moving parts (like working surface, guards, reference surfaces, etc.) are locked firmly.
- Blade guard should be adjusted according to the workpiece's thickness. The distance between the blade guard and the highest point of the workpiece should not exceed 5 mm. Blade guides shoul not be farther than 1 mm from the blade.
- If the bandsaw has speed adjustments, always use lower speed for hard and/or thick materials and fast spped for soft and/or thin material.
- Try not to stop the power tool in the middle of a cut. Always work out of the workpiece. Also, moving the workpiece back towards yourself is not a good idea when the power tool is on as the blade may be released from the wheels.

- When making curved cuts, the blade is actually forced to bend which may end up with a broken blade. To prevent this, you should always move the workpiece forward as the blade goes through the curve.

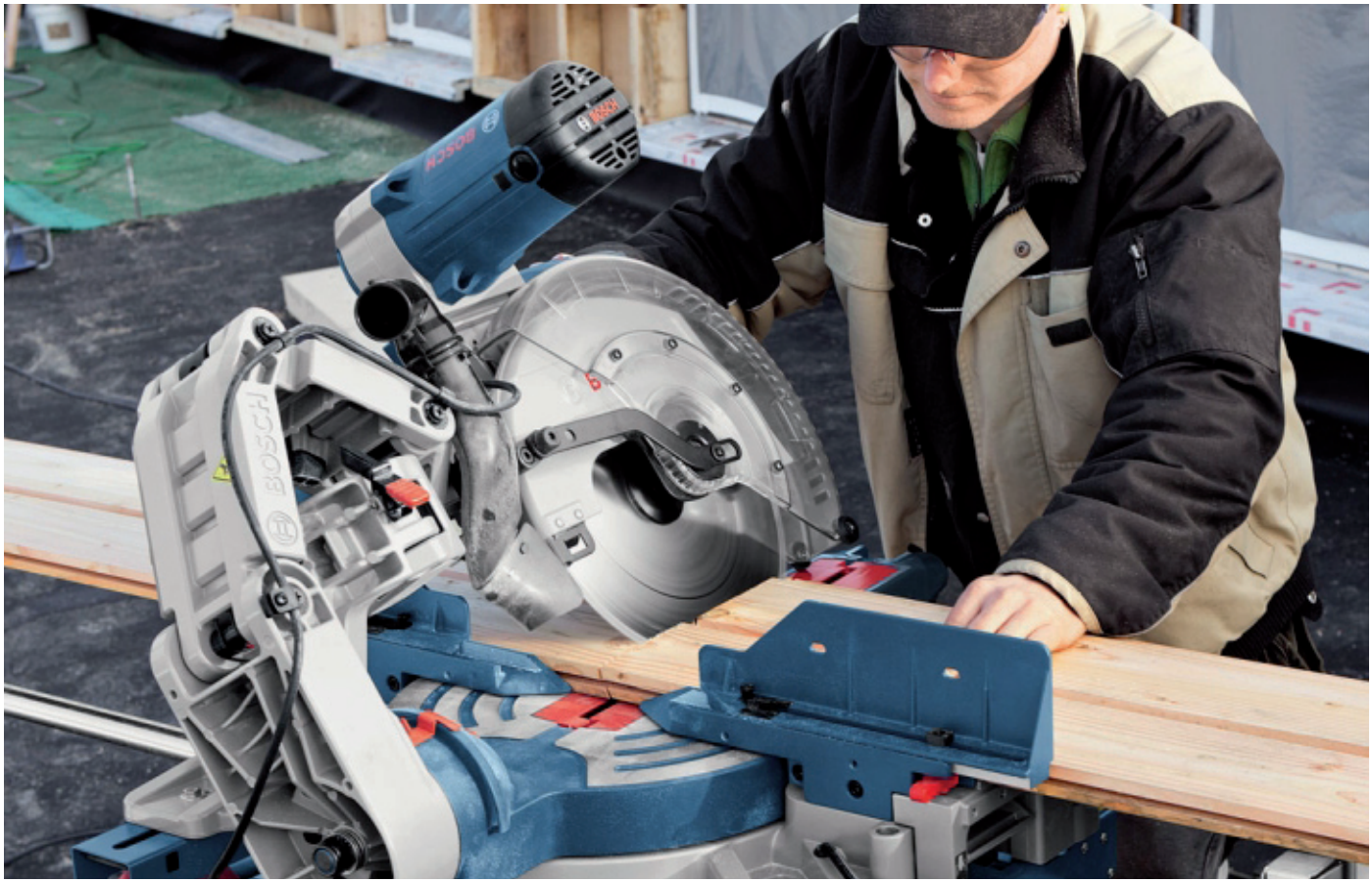


- Do not apply excessive force on the tool. If you find yourself in such a condition, you should consider changing the blade with a new, sharp one or with the right type.
- Make sure the workpiece is not in contact with the blade when you switch the tool on. Because there is a danger of kickback and the tool might fling away.
- Make sure that other parts of your body are not in line with the cutting route.
- Do not detach any covers of a bandsaw like the blade guard.
- Do not restart the cutting operation in the workpiece. Let the wheel reach full speed and carefully re-enter the cut.
- Wood dust is an important danger while working with a bandsaw. Make sure that the dust collection system is on.
- Never leave a bandsaw unattended when it is on. Always wait for the blade to come to a full stop.
- When you are finished working on the bandsaw, clean the machine from dust.



7.2.3. ***Gliding Mitre Saw*** also known as a chop saw or drop saw, is a power tool used to make a quick, accurate crosscut in a workpiece at a selected angle. Common uses include framing operations and the cutting of molding. A circle saw blade on the power tool accomplishes the cutting process.

- Before use, check the tool, its cord and the blade for defects. Never use a mitre saw with a dull or damaged saw, damaged body parts and/or any guards missing.
- Always wear a protective spectrecle/goggle or a face shield. In addition, certainly wear a dust mask and if necessary hearing protector.
- Do not detach any covers of a mitre saw like the blade guard.
- Make sure that other parts of your body are not in line with the cutting route.
- Never cut free hand. Always secure the workpiece against the reference surface.
- Do not restart the cutting operation in the workpiece. Let the wheel reach full speed and carefully re-enter the cut.
- Wood dust is an important danger while working with a bandsaw. Make sure that the dust collection system is on.
- When you are finished working on the mitre saw, clean the machine from dust.



7.2.4. ***Drill Press*** A drill press (also known as a pedestal drill, pillar drill, or bench drill) is a fixed style of drill that may be mounted on a stand or bolted to the floor or workbench.

A drill press can be one of the most dangerous machinery if not treated securely. The rotating bit can easily catch a loose clothing of jewellery and pull the user.

- Before use, check the tool, its cord and the drill bit for defects. Never use a bit with a dull or damaged edges and tip, damaged body parts and/or any guards missing.
- Always wear a protective spectrecle/goggle or a face shield.
- Do not detach any covers of a drill press.
- Never drill metal or hardwood free hand. Always secure the workpiece with either clamps or a vise.
- If the bandsaw has speed adjustments, always use lower speed for hard and/or thick materials and big holes and fast speed for soft and/or thin material and small holes. To drill holes larger than 10 mm in diameter, start with drilling smaller holes first.

- Do not restart the drilling operation in the workpiece. Let the bit reach full speed and carefully re-enter the hole.
- Pull the drill bit down until the tip of it is approximately 1 cm away from the work piece and then start the machine.
- When you are finished working on a drill press, clean the machine from dust.

Session 4 - Ad-Hoc Training

Training Session 4 is the last practical based section of the training program which consists of the 'red circle' power tools and laser cutter safety and usage. It also includes general health and safety issues regarding the usage of the machines. This training session is a long process of learning by doing on the power tools with the workshop supervisor.

8. Red Circle Machines

8.1. ***Before you start.*** Being in a workshop facility like Model Making Facilities has some important issues to be aware of about health and safety. These issues can be classified as:

8.1.1. ***Work Environment.*** One has to make sure that the close environment of his/her working should be clean and tidy of anything that may distract him/her or create dangerous situations. Scrap pieces, liquid on the floor may make you slip; consumables like screws or bolts, tools that are left on the work bench may move and fall as you work and distract you too. Distraction is one of the main reasons for an accident happening.

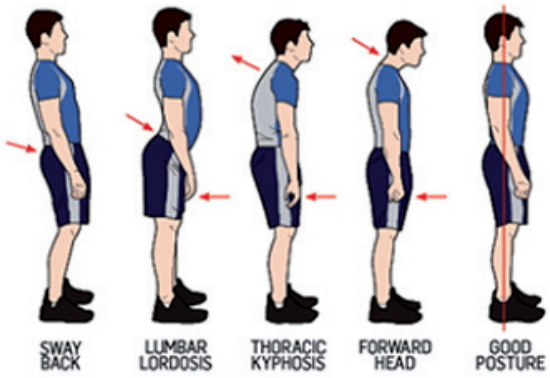
8.1.2. ***Personal Protection.*** There is nothing more important than a Model Making Facilities user's health and safety. When it comes to health and physical integrity; grades, projects or even graduation may loose all their significance. Projects can always be finished but health may not. So, do not forget the importance of your own health.

8.1.3. ***Tool and Workpiece Check.*** Taking precaution may be crucial when working with tools, power tools and machinery to avoid accidents. Checking the workpiece and tools visually can avoid accident before they happen.

A cracked or loose tool handle may fling off while using it or a nail in your workpiece may break and hit you or someone else while you try sawing it.

8.1.4. ***Clamping.*** Use a vise or clamps to secure the workpiece whenever possible. Do not try to hold a workpiece with one hand while operating the tool with the other. Make sure the vise is attached to workbench securely and is free of cracks and other defects. Unless you have to work free hand on a machinery, use the reference surfaces of the machinery.

8.1.5. ***Balance and Posture.*** How you use your energy is important when it comes to working in Model Making Facilities. Using it wisely would give you enough energy to work longer hours without tiring out. In this context, how you position your body; which is called your 'balance and posture'; is directly related.



Always position your body in a way that feels comfortable and that will prevent you from losing balance and hurting yourself. Try to find tools that are designed to allow your wrist to stay straight and avoid using hand tools with your wrist bent.

8.1.6. ***Exertion of force*** is a state how you should never find yourself in. It means using too much force while using a tool or machinery. If you find yourself forcing a tool too much, there may be a couple of reasons which are;

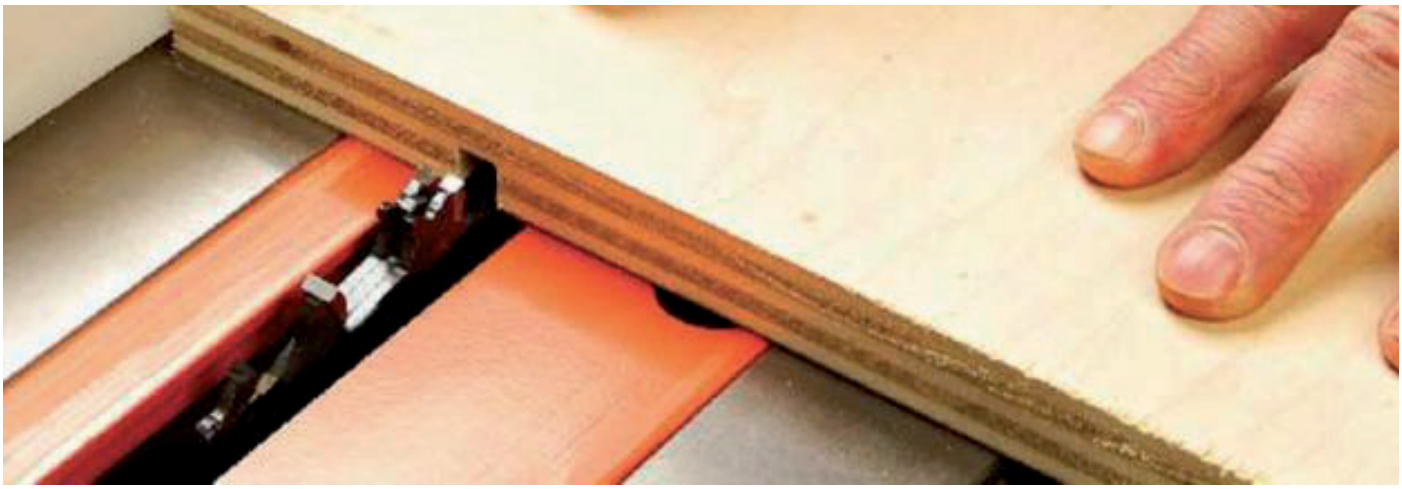
-You are using a tool in a bad condition (dull, cracked, etc.)
-You are using the wrong sized tool for the job.
-You are using the wrong tool for the job.

8.1.7. ***Misuse*** is as obvious as it sounds. Do not be that dumb guy trying to slice a pizza with a saw or the one trying to steer the car with a locking pliers! Select and use the right tool for the job. Do not use tools for jobs they are not designed for. For example; do not use a screwdriver as a chisel, do not use wrenches as hammers, etc. Doing so would not only damage the tool and the workpiece but it may cause accidents.

8.2. ***Machines*** the the machinery of the Model Making Facilities that are potentially the 'most dangerous' machines. A user can use a RCM after he/she recieves the 'advanced' training and in addition to this, the user needs to inform his/her supervisor before using a RCM. Unlike other parts of the training, RCM training is a process of training which means a user's training does not end in a couple of hours. It is a longer process of operation the RCM with the workshop supervisor. All the other safety related issues are valid. RCM consists of 1 table saw: Çelik Makina YDT 40, 1 planer: Netmak PL400, 1 thicknesser (thickness planer): Mızrak MZK 500K and 4 metalworking machinery: Güngör KF No.2 milling machine, Güngör GM 13 table top drill press, Güngör NG400 mini lathe and Bosch GSM 200 bench grinder.

8.2.1. ***Table Saw*** or sawbench is a woodworking tool consisting of a circular saw blade, mounted on an arbor, that is driven by an electric motor (either directly, by belt, or by gears). The blade protrudes through the surface of a table, which provides support for the material, usually wood, being cut.

- Before use, check the tool, its cord and blade for defects. Never use a table saw with a dull or damaged blade, damaged body parts and/or any guards missing.
- Always wear a protective spectrecle/goggle or a face shield. In addition, certainly wear a dust mask and if necessary hearing protector.
- Make sure that all the moving parts (like reference surfaces, guards, blade, etc.) are locked firmly.



- If the table saw has speed adjustments, always use lower speed for hard and/or thick materials and fast spped for soft and/or thin material.
- Try not to stop the power tool in the middle of a cut. Always work out of the workpiece. Also, moving the workpiece back towards yourself is not a good idea when the power tool is on as kickbacks may easily occur.
- Adjust the blade height according to the workpiece thickness. The tip of the bladeshould exceed approximately 1 mm above the top surface of the workpiece.
- Do not try to saw a workpiece free hand. Always use one of the reference surfaces.
- Do not apply excessive force on the tool. If you find yourself in such a condition, you should consider changing the blade with a new, sharp one or with the right type.

- The most important danger with a table saw is called a "***kickback***" which is the ability of the machine to throw the workpiece back at the user with a lot of power and speed. To avoid this, never use the rip fence for miter or cross cuts!

- In order to avoid injuries from kickback, do not stand in the line of cutting blade and don't let anyone stand behind yourself.

- Make sure the workpiece is not in contact with the blade when you switch the tool on. Because there is a danger of kickback and the tool might fling away.
- Always use a pushstick or a scrap piece to push the workpiece in situations when the distance of the blade and rip fence is closer than 10 cm or when it feels dangerous to hold the workpiece.- When rip cutting a big piece, get help from another facility user. He/she should recieve the cut pieces from the other side of the table saw.
- Make sure that other parts of your body are not in line with the cutting route.
- Do not detach any covers of a table saw like the blade guard.
- Do not restart the cutting operation in the workpiece. Let the wheel reach full speed and carefully re-enter the cut.
- Wood dust is an important danger while working with a table saw. Make sure that the dust collection system is on.
- Never leave a table saw unattended when it is on. Always wait for the blade to come to a full stop.
- When you are finished working on a drill press, clean the machine from dust.

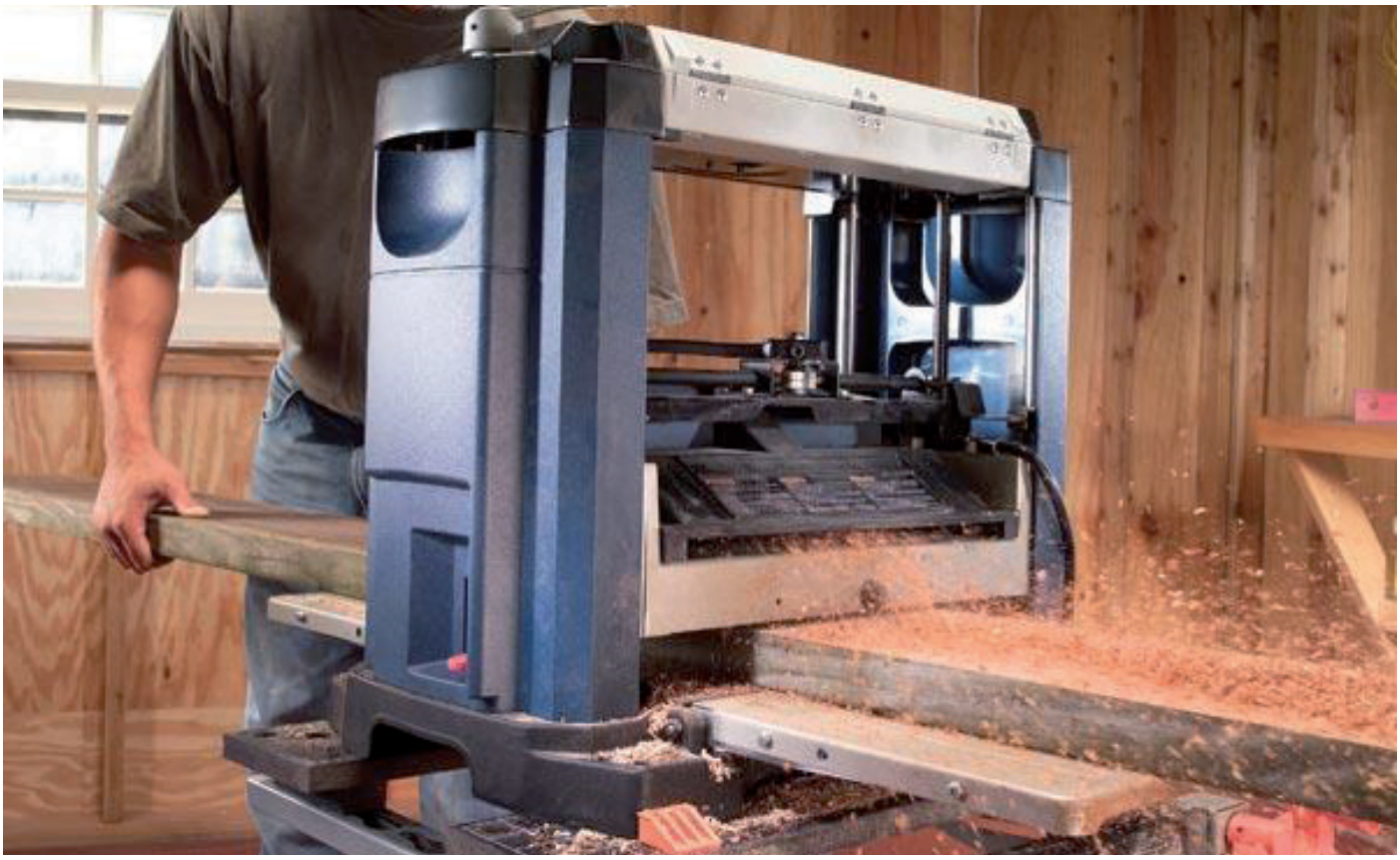
8.2.2. ***Planer/Jointer*** is a woodworking machine used to produce a flat surface along a board's length. The jointer derives its name from its primary function of producing flat edges on boards prior to joining them edge-to-edge to produce wider boards.

- Before use, check the tool, its body, all the covers, moving parts and blade for defects. Never use a planer/jointer with a dull or damaged blade, damaged body parts and/or any guards missing.
- Always wear a protective spectrecle/goggle or a face shield. In addition, certainly wear a dust mask and necessary hearing protector.
- Make sure that all the moving parts (like reference surfaces, guards, blade, etc.) are locked firmly.
- If the planer/jointer has speed adjustments, always use lower speed for hard and/or thick materials and fast spped for soft and/or thin material.
- Moving the workpiece back towards yourself is not a good idea when the power tool is on as kickbacks may easily occur.
- Always try to use a pushstick in order to keep your hands away from the blade.
- Make sure the workpiece is not in contact with the blade when you switch the tool on. Because there is a danger of kickback and the tool might fling away.
- Do not apply excessive force on the tool. If you find yourself in such a condition, you

should consider changing the blade with a new, sharp one or with the right type.
- Do not machine workpieces shorter that 20 cm.
- Make sure that other parts of your body and/or other users are not in line with the cutting route which is the right hand side of the planer/jointer.
- Do not detach any covers of a table saw like the blade guard.
- Do not restart the cutting operation in the workpiece. Let the wheel reach full speed and carefully re-enter the cut.
- Wood dust is an important danger while working with a planer/jointer. Make sure that the dust collection system is on.
- Never leave a planer/jointer unattended when it is on. Always wait for the blade to come to a full stop.
- When you are finished working on a planer/jointer, clean the machine from dust.

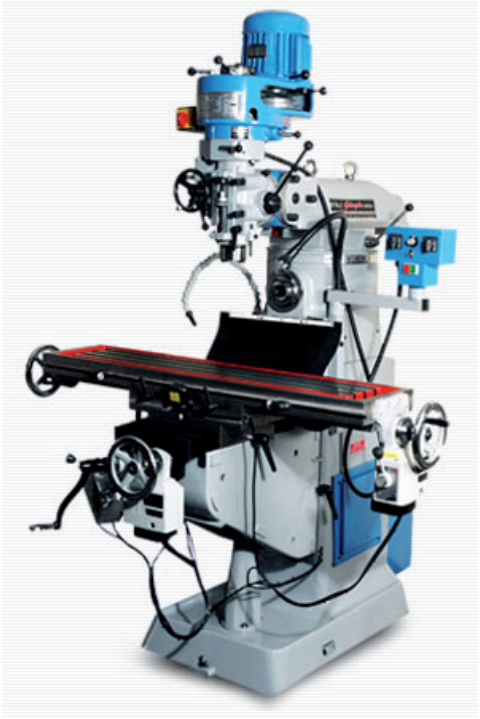
8.2.3. ***Thickness Planer*** (also known in the UK and Australia as a thicknesser or in North America as a planer) is a woodworking machine to trim boards to a consistent thickness throughout their length and flat on both surfaces.

- Before use, check the tool, its body, all the covers, moving parts and blade for defects.
- Never use a thickness planer with a dull or damaged blade, damaged body parts and/or any guards missing.
- Always wear a protective spectrecle/goggle or a face shield. In addition, certainly wear a dust mask and necessarily hearing protector.
- Make sure that all the moving parts (like reference surfaces, guards, blade, etc.) are locked firmly.
- If the thickness planer has speed adjustments, always use lower speed for hard and/or thick materials and fast spped for soft and/or thin material.
- Always try to use a pushstick in order to keep your hands away from the blade.
- Make sure the workpiece is not in contact with the blade when you switch the tool on. Because there is a danger of kickback and the tool might fling away.
- Do not machine workpieces shorter than 30 cm. and do not join (plane) deeper than 2 mm. in one pass.
- Do not work on the machine alone. Have another user help you with recieving.



- Do not detach any covers of a thickness planer like the blade guard.
- Do not restart the cutting operation in the workpiece. Let the wheel reach full speed and carefully re-enter the cut.
- Wood dust is an important danger while working with a thickness planer. Make sure that the dust collection system is on.
- Never leave a thickness planer unattended when it is on. Always wait for the blade to come to a full stop.
- When you are finished working on a thickness planer, clean the machine from dust.

8.2.5. ***Milling machine*** is a machine that processes materials using rotary cutters to remove material from a workpiece advancing (or feeding) in a direction at an angle with the axis of the tool.



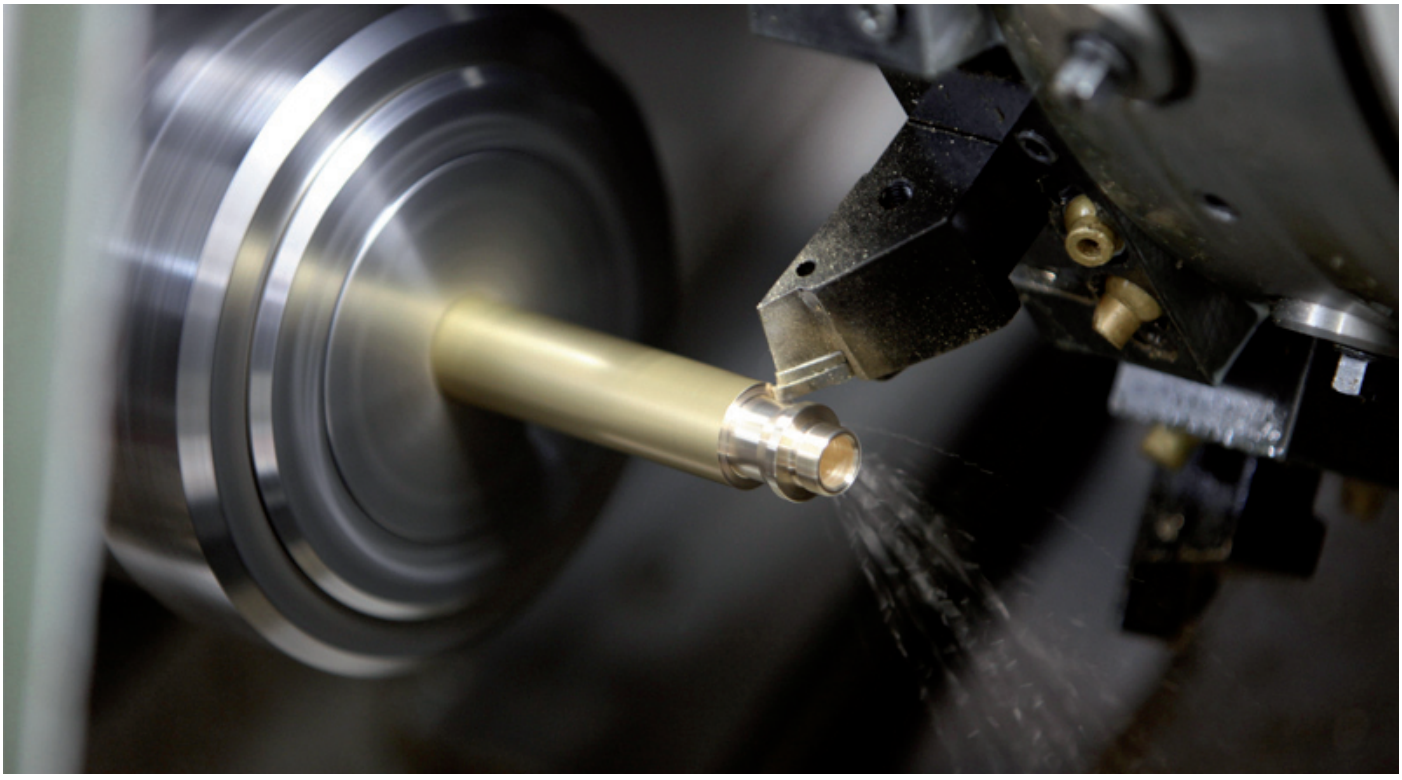
Many types of proceses like face milling, propherla milling, drilling, etc. can be achieved with various cutters with a milling machine. Also, it is possible to process metal, wood and any other softer material types.

- Before use, check the tool, its body, all the covers, moving parts and blade for defects. Never use a milling machine with a dull or damaged blade, damaged body parts and/or any guards missing.
- Always wear a protective spectrecle/goggle or a face shield. In addition, certainly wear a dust mask and necessary hearing protector.
- Make sure that all the moving parts (like reference surfaces, guards, blade, etc.) are locked firmly.
- If the milling machine has speed adjustments, always use lower speed for hard and/or thick materials and fast spped for soft and/or thin material.
- Never cut free hand. Always secure the workpiece against the reference surface.
- Make sure the workpiece is not in contact with the blade when you switch the tool on. Because there is a danger of kickback and the workpiece might fling away.

- When you are finished working on a milling machine, clean the machine from scraps.

8.2.5. ***Lathe*** is a machine tool which rotates the workpiece on its axis to perform various operations such as cutting, sanding, knurling, drilling, or deformation, facing, turning, with tools that are applied to the workpiece to create an object which has symmetry about an axis of rotation.

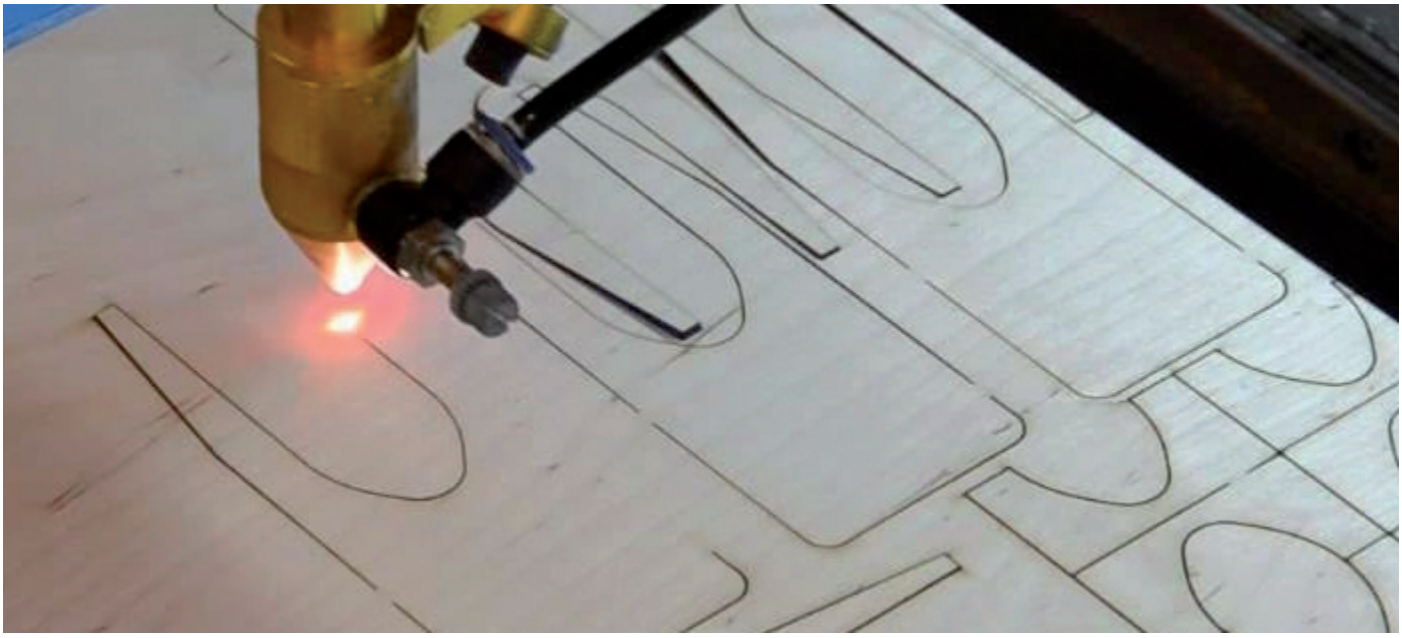
- Before use, check the tool, its body, all the covers, moving parts and blade for defects. Never use a lathe with a dull or damaged blade, damaged body parts and/or any guards missing.
- Always wear a protective spectrecle/goggle or a face shield. In addition, certainly wear a dust mask and necessary hearing protector.
- Make sure that all the moving parts (like reference surfaces, guards, blade, etc.) are locked firmly.
- If the lathe has speed adjustments, always use lower speed for hard and/or thick materials and fast spped for soft and/or thin material.
- Make sure the workpiece is not in contact with the blade when you switch the tool on. Because there is a danger of kickback and the workpiece might fling away.
- When you are finished working on a milling machine, clean the machine from scraps.



8.2.6. ***Laser cutter*** is device that uses a laser beam to cut, engrave or mark materials. . The laser optics and CNC are used to direct the material or the laser beam generated.

The ad-hoc training for the laser cutter at the MMF is optained with the first laser cutting process of the user. It can also be organized for a group of users.

- Users need to book the machine in advance. Especially during submission periods, the laser cutter is highly used so make sure you secured your appointment.
- Make sure that the ventilation is on. If it is not, remind the supervisor.
- Before use, check the tool, its body, all the covers for defects.
- Certain materials are not suitable for laser cutting. ***PVC,*** any type of ***foam*** and f***oam-core*** or ***metals*** are not suitable to be processed.



- Users should never leave the machine unattnded. Laser cutting process is a burning process which means the workpiece may catch fire!
- It is not safe to look directly into the laser beam as it may damage your vision.

8.2.7. ***3D Printer*** is a device that with the technic also called additive manufacturing makes three dimensional solid objects from a digital file. The creation of a 3D printed object is achieved using additive processes. In an additive process an object is created by laying down successive layers of material until the entire object is created.

There is a Makerbot Replicator 5th Gen and a Z18 at the MMF. At the moment there isn't a training session for the 3D printers.

- Users need to book the machine in advance. Especially during submission periods, the 3D printers are highly used so make sure you secured your appointment.

References

Visuals

1. https://www.google.com.tr/url?sa=i&rct=j&q=&esrc=s&source=images&cd=&cad=rja&uact=8&ved=0CAUQjhxqFQoTCNjPmtOEsMcCFUM4GgodWuAIXA&url=http%3A%2F%2Fwww.instructables.com%2Fid%2FShadow-Box-with-Spines-I-made-it-at-TechShop%2Fstep7%2FBand-Saw%2F&ei=jMjRVdjZMcPwaNrAo-AF&bvm=bv.99804247,d.bGg&psig=AFQjCNHHpbSygKvHiAIltha2GWx3PDQBew&ust=1439897969171910