

T.C.  
MİLLÎ EĞİTİM BAKANLIĞI



# MEGEP

(MESLEKÎ EĞİTİM VE ÖĞRETİM SİSTEMİNİN  
GÜÇLENDİRİLMESİ PROJESİ)

MAKİNE TEKNOLOJİSİ

TEKNİK YABANCI DİL 3  
(İNGİLİZCE)

ANKARA 2007

**Milli Eğitim Bakanlığı tarafından geliştirilen modüller;**

- Talim ve Terbiye Kurulu Başkanlığının 02.06.2006 tarih ve 269 sayılı Kararı ile onaylanan, Mesleki ve Teknik Eğitim Okul ve Kurumlarında kademeli olarak yaygınlaştırılan 42 alan ve 192 dala ait çerçeve öğretim programlarında amaçlanan mesleki yeterlikleri kazandırmaya yönelik geliştirilmiş öğretim materyalleridir (Ders Notlarıdır).
- Modüller, bireylere mesleki yeterlik kazandırmak ve bireysel öğrenmeye rehberlik etmek amacıyla öğrenme materyali olarak hazırlanmış, denenmek ve geliştirilmek üzere Mesleki ve Teknik Eğitim Okul ve Kurumlarında uygulanmaya başlanmıştır.
- Modüller teknolojik gelişmelere paralel olarak, amaçlanan yeterliği kazandırmak koşulu ile eğitim öğretim sırasında geliştirilebilir ve yapılması önerilen değişiklikler Bakanlıkta ilgili birime bildirilir.
- Örgün ve yaygın eğitim kurumları, işletmeler ve kendi kendine mesleki yeterlik kazanmak isteyen bireyler modüllere internet üzerinden ulaşabilirler.
- Basılmış modüller, eğitim kurumlarında öğrencilere ücretsiz olarak dağıtılır.
- Modüller hiçbir şekilde ticari amaçla kullanılamaz ve ücret karşılığında satılamaz.

# İÇİNDEKİLER

AÇIKLAMALAR .....	iii
GİRİŞ .....	1
ÖĞRENME FAALİYETİ-1 .....	3
1. MAIN CONCEPTS ABOUT MACHINERY .....	3
1.1. Machine Manufacturing.....	3
1.1.1. Machine Manufacturing Technician .....	3
1.1.2. Machine Manufacturing Technician’s Duties .....	4
1.1.3. A Machine Manufacturing Technician’s Working Sectors.....	5
1.2. Industrial Moulding .....	6
1.2.1. Moulder.....	6
1.2.2. Industrial Moulder’s Duties .....	6
1.2.3. A Moulder’s Working Sectors .....	6
1.3. Industrial Modeling Supported By Computers .....	7
1.3.1. Industrial Model Maker’s Duties .....	7
1.4. Draftsman .....	7
1.4.1. His/Her Duties.....	8
1.5. Textile Machinery Repairer.....	8
1.5.1. His/Her Duties.....	8
UYGULAMA FAALİYETİ .....	9
ÖLÇME VE DEĞERLENDİRME .....	10
ÖĞRENME FAALİYETİ-2.....	11
2.THE TOOLS AND EQUIPMENTS THAT ARE USED IN MACHINERY .....	12
2.1. Machine Tools Used In Manufacturing .....	12
2.1.1. Lathe Machine.....	12
2.1.2. Milling Machine.....	18
2.1.3. Drilling Machine .....	22
2.1.4. Grinding Machine .....	25
2.1.5. Saw Machines .....	28
2.1.6. Shaper and Press .....	29
2.1.7. Wire Edm ( Electrical Discharge Machining ) Machines .....	31
2.1.8. Ram Tarret Milling Machines .....	32
2.1.9. The Machines Used For The Production Of Ready–Made Clothes .....	32
2.2. CNC Machines.....	34
2.2.1. Advantages of CNC machines .....	35
2.2.2. Where are CNC machines used ?.....	37
2.2.3. Sections of CNC machines.....	37
2.3.Tools .....	38
2.3.1. File .....	38
2.3.2. Filing .....	38
2.3.3. Reamer .....	39
2.3.4. Tap .....	39
2.3.5. Scraper .....	40
2.3.6. Chisel .....	40
2.3.7. Bench Vise .....	41
2.4. Different Types of Tools .....	42
2.4.1. “V” Blocks .....	42
2.4.2. Callipers .....	42

2.4.3. Screws .....	43
2.4.4. Die .....	44
2.4.5. Soldering .....	44
2.4.6. Rivet .....	45
2.4.7. Micrometer .....	46
2.5. Marking and Universal Tools .....	46
2.5.1. Marking .....	46
2.5.2. Set Square .....	46
2.5.3. Steel Ruler .....	47
2.5.4. Compasses .....	47
2.5.5. Tape Meter .....	47
2.5.6. Straightening Plate .....	47
2.5.7. Surface Plate .....	48
2.5.8. Protractor With Angle .....	48
2.5.9. Universal Protractor .....	49
2.5.10. Center Punch .....	49
2.5.11. Scriber .....	49
2.5.12. Punching Tools .....	49
2.5.13. Hammer .....	50
2.5.14. Saw Handle .....	50
2.5.15. Mallets .....	51
2.5.16. Number Punches .....	51
2.5.17. Drill Bit .....	52
2.5.18. Drill Chuck .....	52
2.5.19. Morse Taper Sleeve .....	52
2.5.20. Sleeve Wedge .....	52
2.5.21. Open-Ended Spanner .....	52
2.5.22. Ring Spanner .....	53
2.5.23. Hexagonal Spanners .....	53
2.5.24. Socket Tools .....	54
2.5.25. Adjustable Wrench .....	54
2.5.26. Screwdriver .....	54
2.5.27. Cross-Head Screwdriver .....	54
2.5.28. Pliers .....	55
2.5.29. Cutting Pliers .....	55
2.5.30. Long Nosed Pliers .....	56
2.5.31. Puller .....	56
2.5.32. Wheel Grinder .....	56
2.5.33. Abrasive Disk .....	57
2.5.34. Shears Used in Hands .....	57
2.6. Industrial Accidents and Security Precaution .....	57
2.6.1. Industrial Accidents that may be in the workshop .....	58
2.6.2. Points we have to care to prevent industrial accidents .....	58
UYGULAMA FAALİYETİ .....	60
ÖLÇME VE DEĞERLENDİRME .....	61
MODÜL DEĞERLENDİRME .....	63
TECHNICAL DICTIONARY .....	66
ÖNERİLEN KAYNAKLAR .....	87

# AÇIKLAMALAR

<b>KOD</b>	<b>222YDK015</b>
<b>ALAN</b>	<b>Makine Teknolojisi</b>
<b>DAL/MESLEK</b>	<b>Alan Ortak</b>
<b>MODÜLÜN ADI</b>	<b>Teknik Yabancı Dil (İngilizce) 3</b>
<b>MODÜLÜN TANIMI</b>	Ait olduğu meslekle ilgili İngilizce kelime ve kavramların tanınmasını, okunmasını, ve yazılmasını hedefleyen öğrenme materyalidir.
<b>SÜRE</b>	40/32
<b>ÖN KOŞUL</b>	Teknik Yabancı Dil 2 modülünü başarmış olmak
<b>YETERLİK</b>	Makinecilik ile ilgili temel kavramların ve kullanılan araç-gereçlerin İngilizcecelerini okumak.
<b>MODÜLÜN AMACI</b>	<b>Genel Amaç</b> Gerekli ortam sağlandığında, makinacılıkla ilgili temel kavram ve araç-gereçlerin İngilizcecelerini dilbilgisi kurallarına uygun olarak okuyup ifade edebileceksiniz. <b>Amaçlar</b> ➤ Makinacılıkla ilgili temel kavramların İngilizcecelerini doğru olarak okuyabileceksiniz. ➤ Makinacılıkta kullanılan araç ve gereçlerin İngilizcecelerini doğru olarak okuyabileceksiniz.
<b>EĞİTİM ÖĞRETİM ORTAMLARI VE DONANIMLARI</b>	Dil laboratuvarı; Kulaklık, bilgisayar ve ekipmanları, kütüphane, projeksiyon vb. Bireysel öğrenme ortamları; İngilizce sözlük, yardımcı teknik kitaplar. İnternet ortamı, bilgi teknolojileri vb. İşletmeler ve üniversiteler
<b>ÖLÇME VE DEĞERLENDİRME</b>	Her faaliyet sonrasında o faaliyetle ilgili değerlendirme soruları ile kendi kendinizi değerlendireceksiniz. Modülün sonunda kazandığınız yeterlikle ilgili kendinizi değerlendirebileceksiniz. Öğretmen modül sonunda size ölçme aracı (uygulama, soru-cevap) uygulayarak modül uygulamaları ile kazandığınız bilgi ve becerileri ölçerek değerlendirecektir.



# GİRİŞ

## Sevgili Öğrenci,

İnsanlığın ileri gitmesinde en önemli unsurlardan birisi üretim ve buna bağlı olarak, araştırma ve geliştirmedir. Ar-Ge' ye yıllık bütçelerinden fazla pay ayıran ülkeler her geçen gün daha iyi bir hayata başlıyorlar.

Üretimin teknolojiyle paralel gelişmesi gerekir. Çünkü teknolojisini yenileyemeyen ülkeler ve bu ülkelerin insanları geri kalmaya mahkumdur.

Yeni teknoloji mesleğinde çok iyi ve dil bilen insanlar sayesinde gelişir. Çalışkan insanlar, dergi, kitap ve internet dökümanlarını okuyabilir böylece kendi branşlarındaki ve mesleklerindeki son teknolojiyi yabancı dil ve teknik yabancı dil öğrenerek takip edebilirler. Böylelikle ülkelerine daha etkili ve yararlı bireyler olurlar. Tembel insanlar, yeterli yabancı dilleri olmadığı için son teknolojiyi takip edemezler. Bu yüzden kendi fabrikaları veya atölyeleri ile sınırlı kalırlar.

Teknik İngilizce 3 modülüyle sizlerin Mesleki İngilizce'nizi daha üst seviyeye çıkarmayı hedefledik. Bu sayede kendi mesleğiniz ile ilgili terimlerin ve sözcüklerin İngilizce karşılıklarını öğrenebilecek ve dünyadaki gelişmeleri yakından izleyebileceksiniz.

Mesleğinizde ve hayatınızda başarı dileklerimizle.

## PREFACE

### Dear Student,

One of the most considerable reasons why the humanity advance is production and research and development. The countries which invests more money from their incomes to RESEARCH&IMPROVEMENT is getting an easier and more comfortable life style. Because The countries which do not renew their technology become underdeveloped day by day.

New technology is developed by those who are good at their profession and know a foreign language. Hardworking people can read the magazines, books and internet documents in English so can follow the recent technology regarding their own branches or jobs by learning foreign languages and technical foreign languages. They broaden their mind. So they can be more effective and useful people for their country. Lazy people can not follow the recent technology since they do not have enough foreign language. So they are limited with their factories or workshops.

We have aimed to improve your occupational English into a higher level with the module "Technical English 3". In this case, you can learn the technical words and terms in English and follow the recent technology in the world more closely.

We wish you success in your job and life.



# ÖĞRENME FAALİYETİ-1

## AMAÇ

Bu faaliyetle makinacılıkla ilgili temel kavramların İngilizce karşılıklarını öğrenebileceksiniz.

You are going to learn basic English terms and concepts on machinery in this activity.

## ARAŞTIRMA

- Dear student, you can prepare a pocket dictionary for yourself by finding the words concerned with machine production, industrial moulding, industrial modeling.
- Research the composite materials.
- Research the epoxide materials.
- Sevgili öğrenci, bu faaliyet öncesinde yapmanız gereken öncelikli araştırmalar şunlardır:
- Makine imalat, endüstriyel kalıpcılık, endüstriyel modelleme ile ilgili İngilizce kelimeleri bularak kendinize küçük bir cep sözlüğü hazırlayınız.
- Kompozit malzemeleri araştırınız.
- Epoksi malzemeleri araştırınız.

## 1. MAIN CONCEPTS ABOUT MACHINERY

### 1.1. Machine Manufacturing

Machines makes life easier and more qualified. Manufacturing machines is very essential for the improvement of a country and locomotive of economy.



Picture 1.1: A machine facturer

#### 1.1.1. Machine Manufacturing Technician

A machine manufacturing technician is someone who is able to operate manufacturing machine tools, produce machine parts, control, care and adjust machine tools. The most common machine tools that a machine tool operator uses are turning, milling, grinding and drilling machine tool.

## 1.1.2. Machine Manufacturing Technician's Duties

- To draw technical drawings

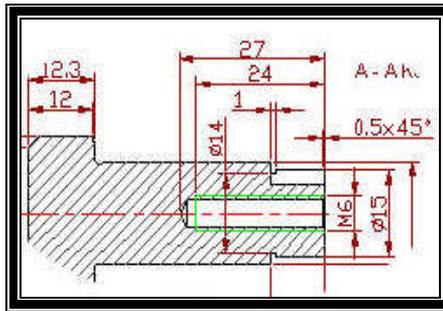


Figure 1. 2: A technical drawing

- To do basic manufacturing works
- To assemble the machine parts

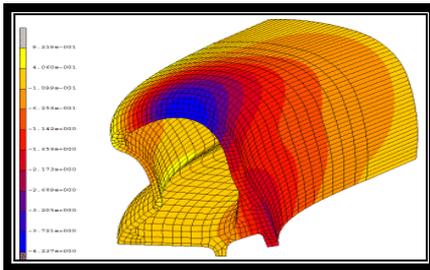


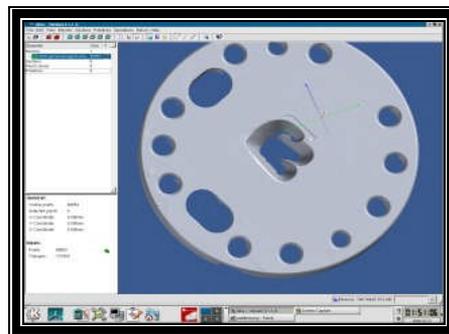
Figure 1. 3: Three dimension technical pictures

- To draw two or three dimensional parts by means of CAD/CAM programmes



a)

b)



Picture 1.1: a) Some machine Parts , CAD model of a part

- To work with and operate a CNC machine tool



Picture 1.2: CNC machine

- To obey safety rules while working

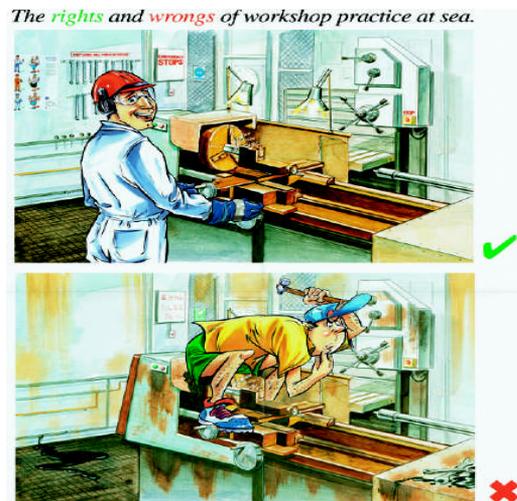


Figure1. 4: We must be careful while working

### 1.1.3. A Machine Manufacturing Technician's Working Sectors



A machine manufacturing technician can work in the following areas:

- Manufacturing factories
- Workshops
- Automotive sectors
- Ship Manufacturing sector
- As an installation worker
- She / he can establish her / his own workshop.

## 1.2. Industrial Moulding

### 1.2.1. Moulder



**Picture 1.3: Mould**

Moulder is someone who can make a mould for a part using machine tools and hand tools and manufacture of the part using the mold.

### 1.2.2. Industrial Moulder's Duties

- To draw technical drawings,
- To draw 2D technical drawings and to do 3D part modelling on the CAD program,
- To machine parts on the machine tools namely milling, turning, grinding, drilling machine tools, CNC machine tools, etc.
- To make dies for sheet metals,
- To make combined dies for sheet metals,
- To make moulds for plastic part,



**Picture 1. 4: Industrial Moulder**

### 1.2.3. A Moulder's Working Sectors

- Works for producing any kinds of moulds,
- Machining of parts using machine tools,
- In automotive sectors,
- In chemistry sectors,
- In nourishment sectors.

### 1.3. Industrial Modeling Supported By Computers

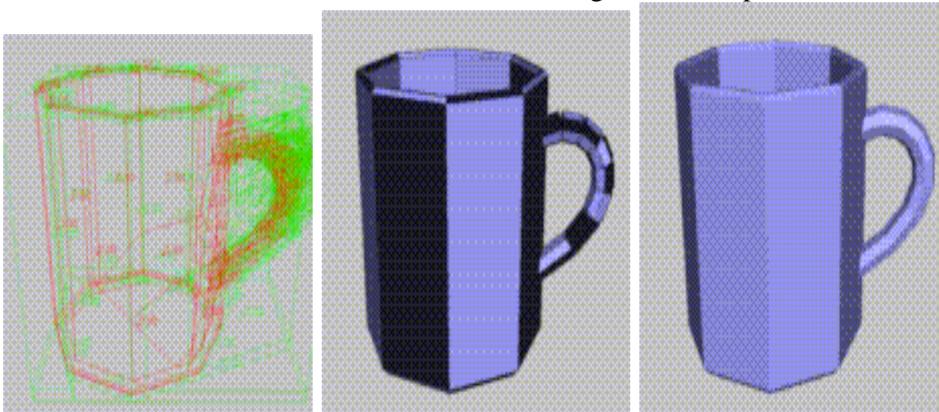
First, part models are designed on the computer then they are made using wood, plastic or metal.

Industrial model makers working on computers generate complex shapes by adding, subtracting, and intersecting virtual solid model for the pattern for a valve body mould, the shape of the valve body itself is subtracted from a solid block. .

CNC machining lets the shop produce precisely detailed patterns that we could never have made by hand. This pattern is ready for serial production.

#### 1.3.1. Industrial Model Maker's Duties

- On the computer he / she draws 2D technical drawings and makes 3 dimensional part model and designs moulds for the part.
- He / she does the solid and surface modeling on the computer.



**Figure 1.9: Solid Model**

- He / she makes the model with the composite materials.
- He / she makes the model with the epoxide materials.
- He / she produces the model using rapid prototype machine.
- He / she obeys the safety rules.

### 1.4. Draftsman

A draftsman can draw 2D technical drawings, and can do 3D part modelling using a CAD program.

### 1.4.1. His/Her Duties

- Preparing technical drawings of parts by hand when necessary,
- Calculating and designing the mechanical systems,
- Preparing 2 or 3 dimensionals part models using a CAD program,
- Doing the animations of the products on the computer,



Picture 1.5: A draftsman is using a CAD program on a computer

## 1.5. Textile Machinery Repairer

One of the most important things in human life is dressing. So a lot of machines are used for textile and ready made clothes.

The textile machinery repairer is a person who repairs, sets the mechanical, electrical, electronic and pneumatic systems and do maintenance of ready-made clothes machines.

### 1.5.1. His/Her Duties

- Doing the maintenance of the machines regularly.
- Determining the failures of the machines.
- Changing the faulty parts of machines.
- Doing the basic machinery works.
- Doing the planning and work organization.
- Obeying the safety rules.

## UYGULAMA FAALİYETİ

İŞLEM BASAMAKLARI	ÖNERİLER
<ul style="list-style-type: none"><li>➤ Makinacılıkla ilgili temel kavramlar konusunda geçen İngilizce kelimeleri listeleyiniz. ( List the machine production sectors in English. )</li><li>➤ Belirlediğiniz kelimeleri birkaç defa yazarak doğru yazılışlarını öğreniniz. ( Pronounce the industrial molding terms in English. )</li></ul>  <ul style="list-style-type: none"><li>➤ Bir makine imalatçısının çalışabildiği alanların İngilizcelerini yazınız.</li></ul>	<ul style="list-style-type: none"><li>➤ Yeni öğrendiğiniz İngilizce kelimeleri yüksek sesle tekrar ediniz.</li><li>➤ Bu kelimeleri hazırlayarak kendinize bir cep sözlüğü hazırlayınız.</li><li>➤ Makine imalat, endüstriyel kalıpcılık gibi sektörleri internetten takip edebilirsiniz.</li><li>➤ Mesleğinizle alakalı yeni öğrendiğiniz İngilizce kelimeleri internetten takip ederek yeni bilgileri öğrenebilirsiniz.</li><li>➤ Makinacılıkla ilgili öğrendiğiniz kavramların İngilizcelerini arkadaşlarınızla karşılıklı konuşarak pekiştiriniz.</li></ul> 

## ÖLÇME VE DEĞERLENDİRME

Answer these questions with *Yes* or *No*

1. Can a machine manufacturing technician draw a technical picture ?
2. Can a machine manufacturing technician work on milling and turning machine tool?
3. Can an industrial moulder use a CAD program for part modelling ?
4. An industrial moulder cannot work in the automotive sector.
5. A person who works in industrial modeling can make a model from composite materials.
6. A person who works in industrial modeling cannot make a model from epoxide materials.

	YES	NO
1		
2		
3		
4		
5		
6		

Cevaplarınızı cevap anahtarı ile karşılaştırınız.

## DEĞERLENDİRME

Cevaplarınızı cevap anahtarı ile karşılaştırınız. Doğru cevap sayınızı belirleyerek kendinizi değerlendiriniz. Yanlış cevap verdiğiniz ya da cevap verirken tereddüt yaşadığınız sorularla ilgili konuları faaliyete geri dönerek tekrar inceleyiniz

Tüm sorulara doğru cevap verdiyseniz diğer faaliyete geçiniz.

# ÖĞRENME FAALİYETİ-2

## AMAÇ

Bu faaliyetle makinacılıkta kullanılan Türkçe kelimelerin İngilizce karşılıklarını öğrenebileceksiniz.

You will learn basic English words in machine manufacturing industry in this activity.

## ARAŞTIRMA

Some machine tools which are used in machine manufacturing are given below. Match the Turkish name of the machine tool with English name.

### Takım Tezgahları

1. Torna Tezgahı
2. Freze Tezgahı
3. Matkap Tezgahı
4. Taşlama Tezgahı
5. Testere Makinesi
6. Pres Tezgahı
7. Tel Erezyon Tezgahı
8. Plastik Enjeksiyon Makinesi

### Machine Tools

1. Lathe Machine Tool (Turning Machine Tool)
2. Drilling Machine Tool
3. Grinding Machine Tool
4. Sawing Machine
5. Injection Moulding Machine
6. Press Machine
7. Wire EDM Machine Tool
8. Milling Machine

.

## 2. TOOLS AND EQUIPMENT THAT ARE USED IN MACHINERY

### 2.1. Machine Tools Used In Manufacturing

#### 2.1.1. Lathe Machine



**Picture 2.1: Lathe machine**

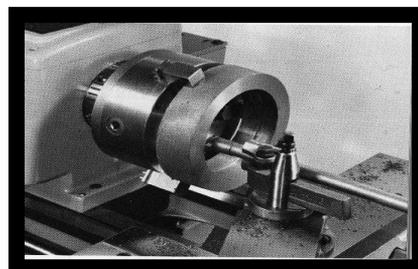
Lathe is a machine tool that is used to machine cylindrical parts. The workpiece is put in a chuck and tightened. While the workpiece rotates around its axis the cutting tool moves parallel to the workpiece axis and cuts the part.

➤ **The Works of a Lathe**

- Machining every kind of inner or outer cylindrical surface (Picture 2.2).

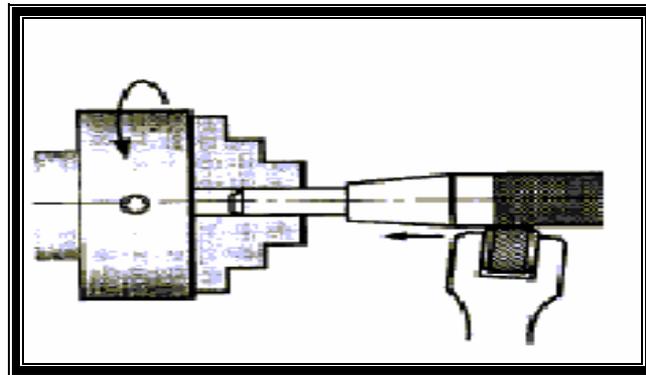


**Picture 2.2: The works of a lathe**



**Picture 2.3: Conical Surfaces**

- Machining every kind of inner or outer conical surfaces (Picture 2.3).
- Knurling (Figure 2.1).

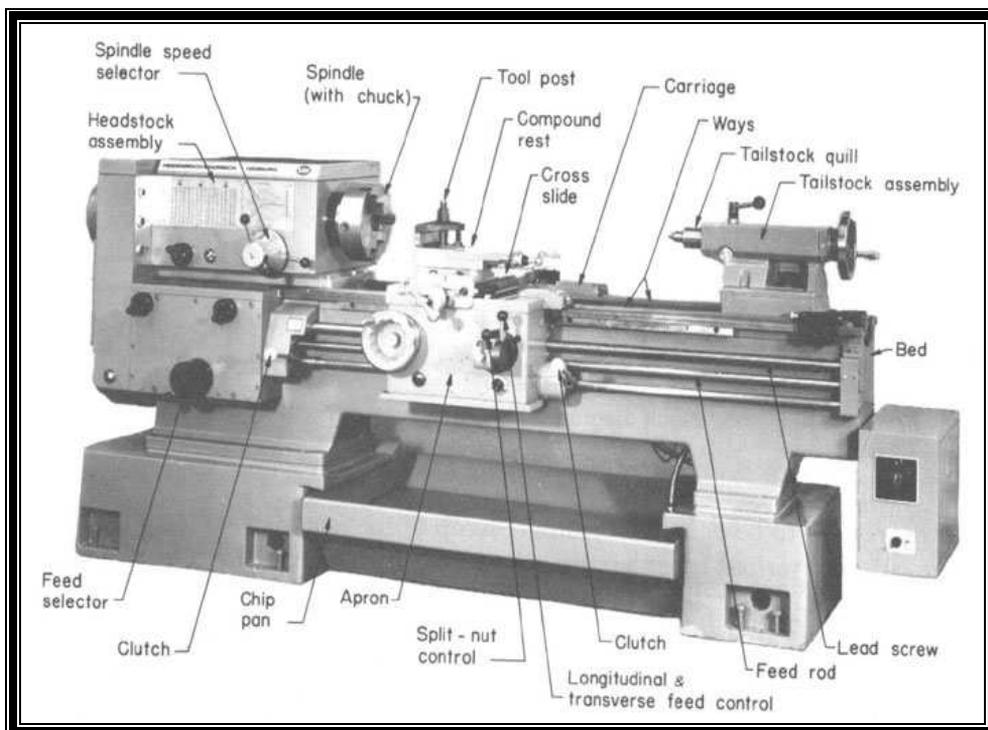


**Figure 2.1: Knurling**

- Machining thread and helix.
- Spring winding etc.

Today, lathes are improved and changed into CNC (Computer Numerical Control )

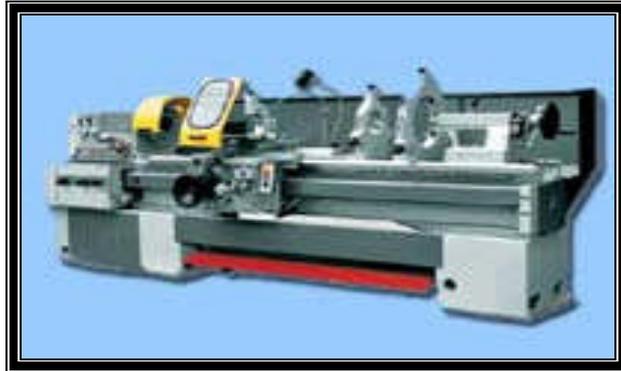
➤ **Typical Engine Lathe Parts**



**Picture 2.4: Typical Engine Lathe Parts**

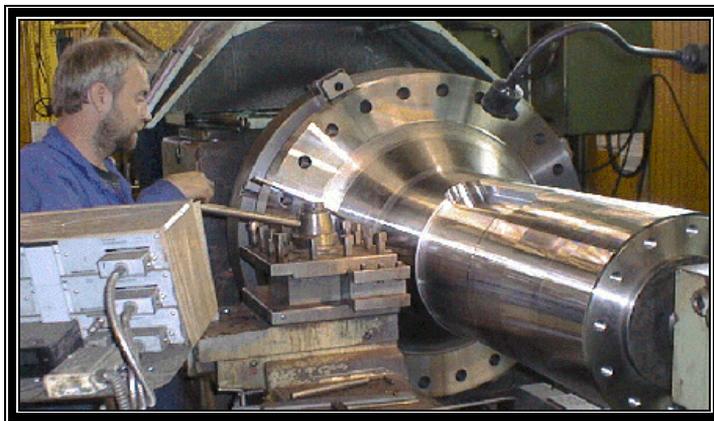
➤ **Types Of Lathe**

- **Universal lathe:** It is the most useful lathe for lathe works. It is used in industry and education.



**Picture 2.5: Universal Lathe**

- **Specific lathe :** It is planned for specific production.
  - **Heavy Duty Lathe:** It is used for bigger materials.



**Picture 2.6 : Heavy Duty Lathe**

- **Vertical Lathe:** It is used for heavy materials.



**Picture 2.7: Vertical Lathe**

- **Copy Lathe :** It can copy a profile .



**Picture 2.8: Copy Lathe**

- **Turret Lathe :** It has a turret that holds cutting tools. The turret can be rotated quickly to use a cutter.



**Picture 2.9: Turret Lathe**

- **CNC Lathe:** Computer Numeric Control Lathe. It is controlled by a computer. The operator writes a program on the computer. When the program is run the cutter moves automatically according to the program.



**Picture 2.10: CNC Lathe**

- **Lathe Tool Cutters**
  - **According to their materials**

### **High Carbon Steel**

It contains 0.6-1.4 carbon. This material is one of the earliest cutting materials used in machining. It starts to be soft at about 220°C . This softening process continues as the temperature rises. As a result cutting using this material for tools is limited to speeds up to 10 m/min for machining mild steel with lots of coolant.

### **High Speed Steel (HSS)**

This cutting tool contain about 7% carbon, 4% chromium plus additions of tungsten, vanadium, molybdenum and cobalt. These metals maintain their hardness at temperature up to about 600°, but soften rapidly at higher temperatures. These materials are suitable for cutting materials at speeds maximum rates of 35 m/min to 80 m/min.

### **Cemented Carbides**

This material usually consists of tungsten carbide or a mixture of tungsten carbide, titanium, or tantalum carbide in powder form, sintered in cobalt or nickel. it is normally made in the form of tips which are brazed or clamped on a steel shank. The clamped tips are generally used as throw away inserts.



Picture 2.11: Cementit Carbide Inserts

- **Lathe tool cutters according to their shapes**
  - Right and left rough tool cutters.
  - Right and left tool cutters.
  - Facing tool cutters.
  - Grooving (recessing) tool cutters.
  - Thread tool cutters.
  - Inner and outer beam tool cutters.
  - Hole tool cutters.

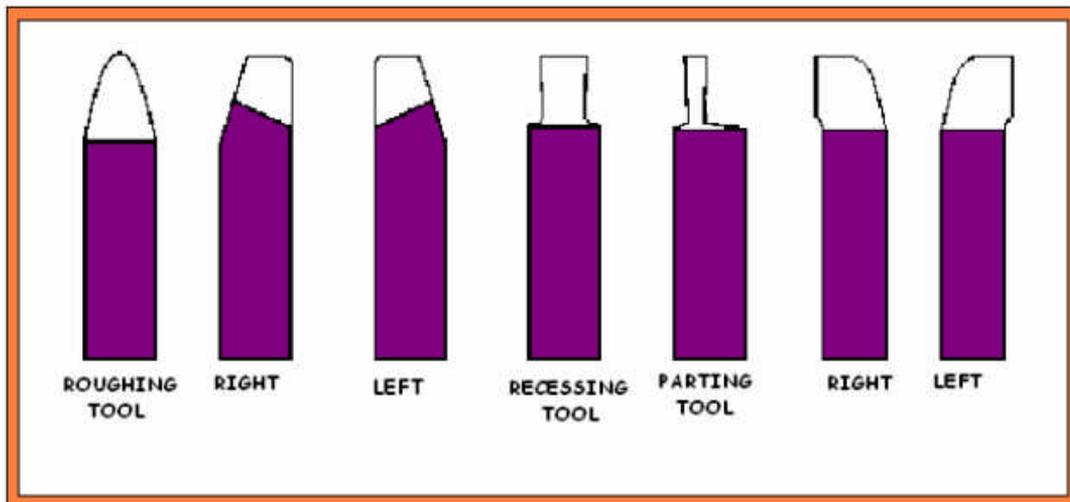


Figure 2.2: Lathe tool cutters according to their shapes

## 2.1.2. Milling Machine



**Picture 2.12: Vertical Milling Machine**

Milling machine is used for machining prismatic parts. The workpiece is mounted on the table and the cutting tool is mounted in the spindle of the machine. The cutter rotates around its axis and the workpiece is moved under the cutting tool. Cutting tools generally have more than one cutting tooth or insert.

### ➤ **Milling Machine Operations**

- Machining of surfaces,
- Making various slots,
- Drilling processes,
- Dividing operations,
- Cutting gear wheel,
- Cutting helixes.

### ➤ **Types of Milling Machine**

- **Horizontal Milling Machine**

The Horizontal Milling Machine is a very robust and useful machine. A variety of cutters are available to remove/shape material that is normally held in a strong machine vice. This horizontal miller is used when a vertical miller is less suitable. For instance, if a lot of material has to be removed by the cutters or there is less of a need for accuracy a horizontal milling machine is chosen.

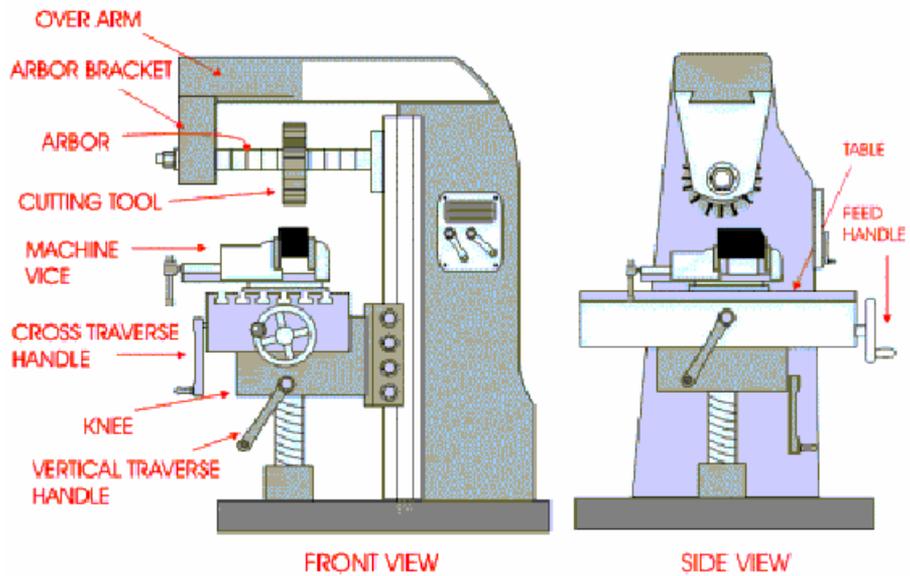
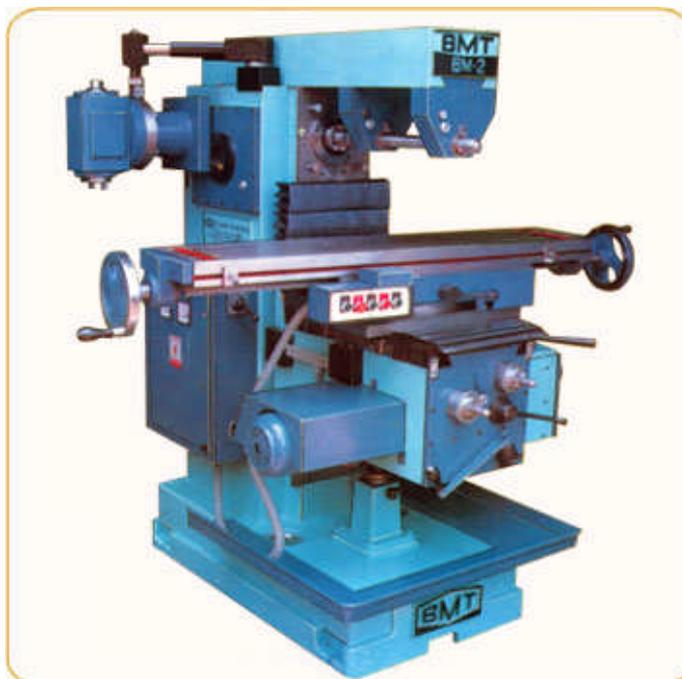


Figure 2.3: Part of Horizontal Milling Machine

- Universal Milling Machine.



Picture 2.13: Universal Milling Machine

- **Vertical Milling Machine.**
- **Ram Turret Milling Machine.**  
This type of milling machine is used for making moulds.
- **Copy Milling Machine.**



**Picture 2.14: Copy Milling Machine**

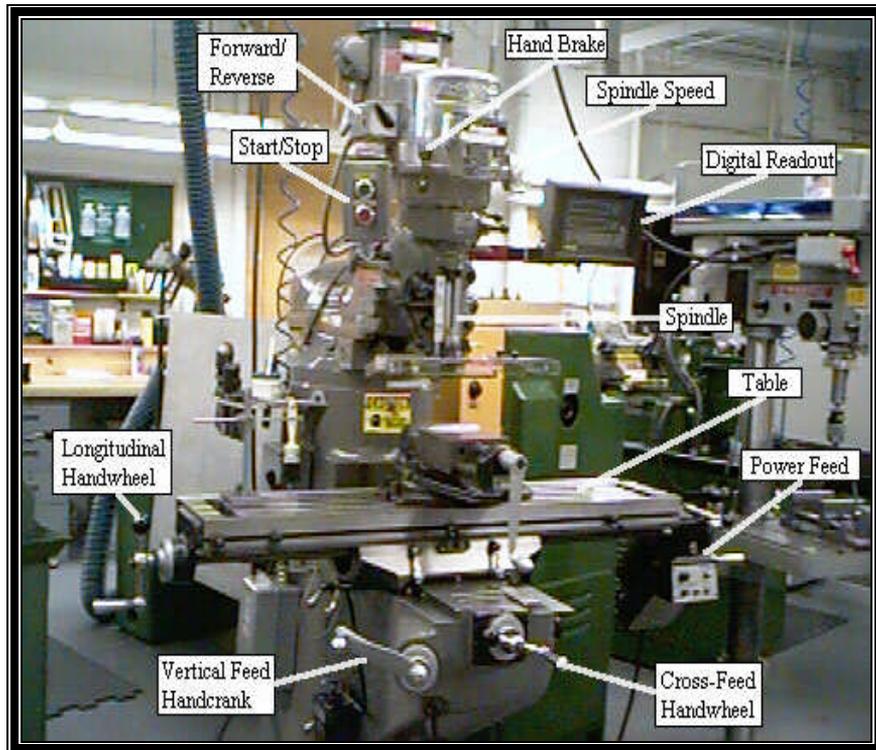
- **CNC ( Computer Numerical Control ) – NC ( Numerical Control ) Milling Machine.**



**Picture 2. 15: CNC ( Computer Numerical Control )**

➤ **Sections of Milling Machines**

- Body.
- Work Table.
- Saddle.
- Column.



**Picture 2.16: Sections of Milling Machines**

➤ **Accessories of Milling Machines**

- Arbors
- Boring heads
- Tail stocks
- Collets
- Dividing heads
- Rotary tables



**Picture 2.17: Milling Arbors**



**Picture 2.18: Dividing head**



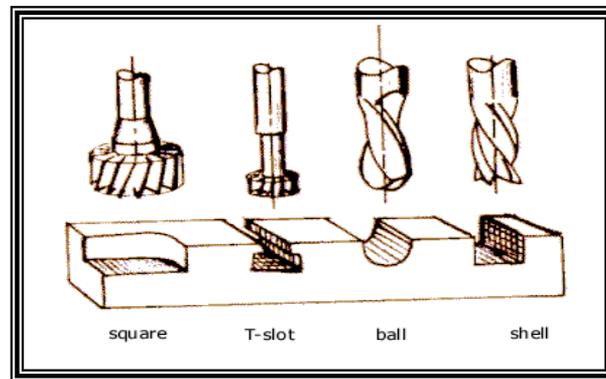
**Picture 2.19: Rotary table**

➤ **Milling Cutters**

- Cylindrical Milling Cutters
- Face Milling Cutters
- End mills
- Slot Cutter
- Side Angle Cutter
- T-Slot Cutter
- Hobbing Milling Cutters
- Form Milling Cutters.



**Picture 2. 20: Types of Milling Cutter**

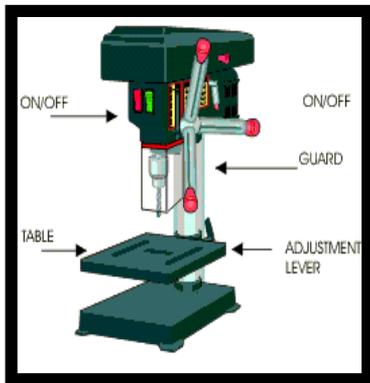


**Figure 2.4: Types of Milling Cutter**

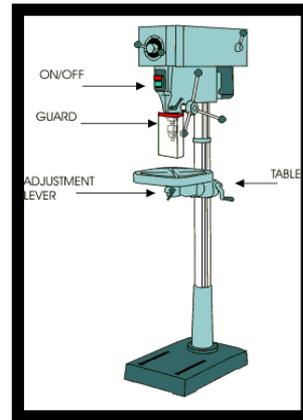
### 2.1.3. Drilling Applications

There are two types of drilling machines, bench drill and pillar drill. The bench drill is used for drilling holes through materials including a range of woods, plastics and metals. It is normally bolted to a bench so that it cannot be pushed over and that larger pieces of material can be drilled safely.

The larger version of the machine drill is called the pillar drill. This has a long column which stands on the floor. This can do exactly the same work as the bench drill but because of its larger size it is capable of being used to drill larger pieces of materials and produce larger holes.



**Figure 2.5: Bench Drill**

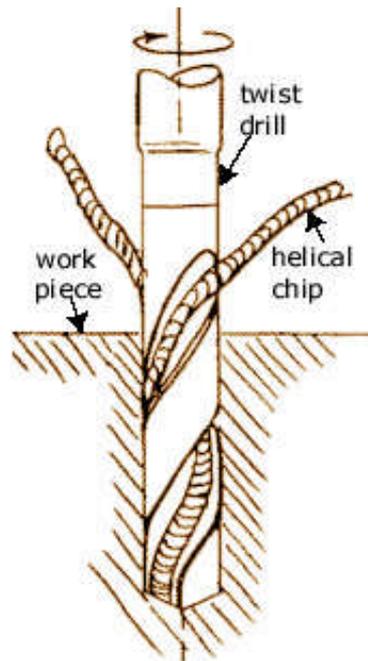


**Figure 2.6: Pillar Drill**

➤ **Application**



**Picture 2.21: Drilling Machine**

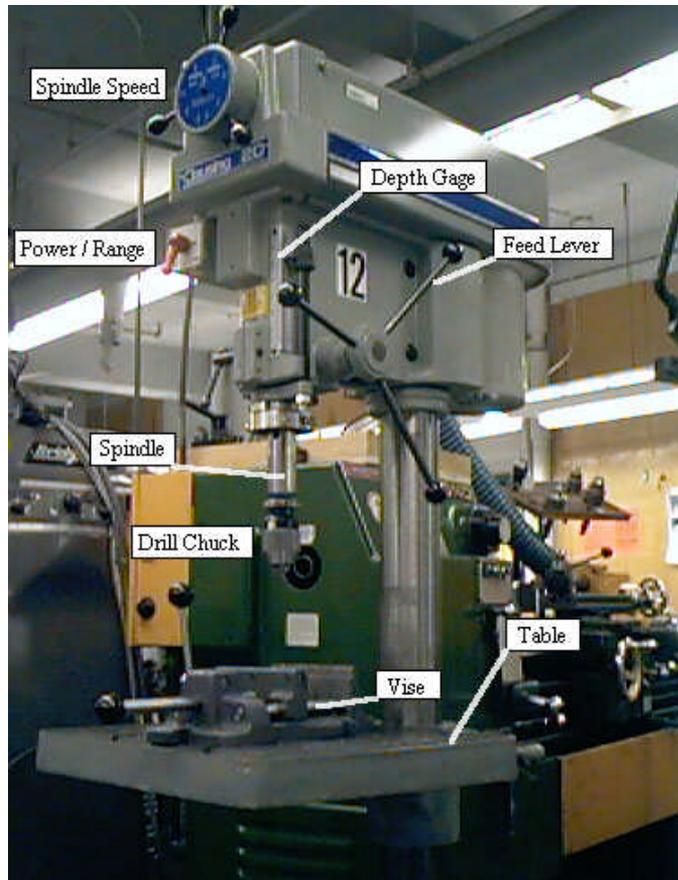


**Figure 2.7: Drilling a hole using a twist drill**

This machine is designed for drilling, counterboring, reaming, tapping, spotfacing, etc. It's widely used in machine works. Generally twist drills are used to make holes.

➤ **Parts of A Drilling Machine**

- Spindle Speed
- Power
- Spindle
- Feed lever
- Drill Chuck
- Vise
- Table
- Depth Gage



**Picture 2.22: Parts of A Drilling Machine**

## 2.1.4. Grinding Machine



**Picture 2. 23: Grinding The Flat Surfaces With A Surface Grinding Machine**

These machines are used for having smooth surfaces. The part is fixed on the magnetic table. When the table moves left and right the rotating grinding wheel machines the part.

The work pieces are grined by means of the abrasive disks on the grinding machines. These machines produce surfaces that have very low surface roughness.

### ➤ **Types of Grinding Machines**

- The surface grinding machines for grinding the flat surfaces. (Picture 2.23)
- The grinding machines for grinding the cylindrical surfaces.



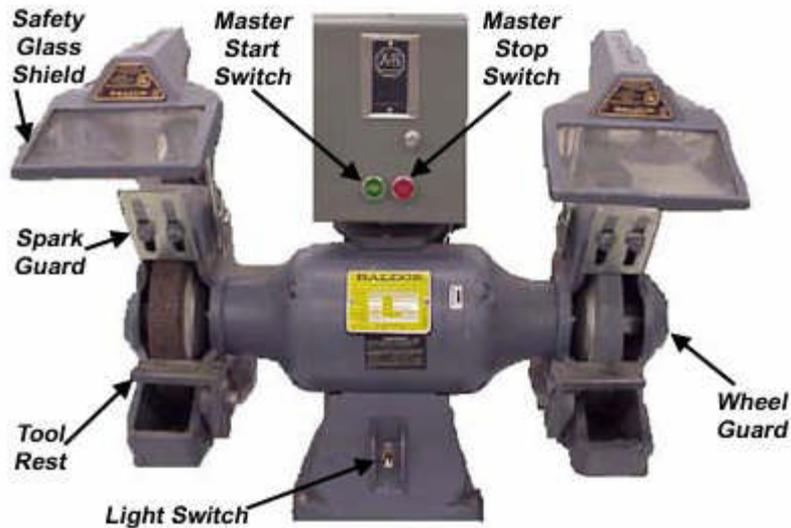
**Picture 2. 24: The Grinding Machine for Grinding Cylindrical Surfaces**

- The Honning machines for honing the parts.



**Picture 2.25: A honing cutter**

- Pedestal grinder (Picture 2.26 ). Pedestal grinder is used to grind parts by hand.



Picture 2.26: A pedestal grinder

➤ **Parts of The Grinding Machine For Grinding The Cylindrical Surfaces**

- The head of the abrasive disk: The part that carries the abrasive disk cover and grind wheel (abrasive disk).
- Spindle box: The box where the work piece is fixed.
- Live Center: It upholds the part.
- Live Worktable: It's used to grind the conicals in angular way.
- Frame: The part carrying the machine wholly.

➤ **Ways of Fixing The Work pieces**

- Fixing with the magnetic work table.
- Fixing to the machine work table.
- Fixing to the universal vise.



Picture 2.27: Grinded workpieces

## 2.1.5. Saw Machines



**Picture 2.28: A saw machine**

Saw machines are used to cut metal materials into smaller pieces. There are also saw machine types that are used for wood cutting. .

➤ **Types of Saw Machines**

➤ **Hack Saw Machine**

- With this hack saw machine the blade saw goes down with head weight.

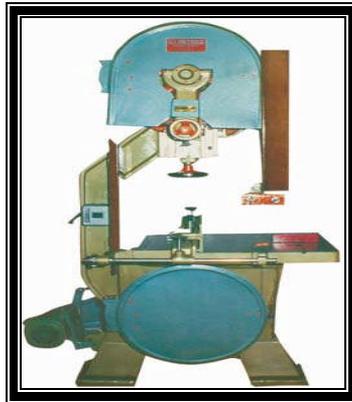
The blade saw moves forward and backward in a definite distance. The blade saw gets its movement from the electrical engine. Its teeth must be forward because it cuts while moving forward.

- Hack Saw Machines with Hydraulic System

.The blade saw moves forward and backward in a definite distance. The blade saw gets its movement from the electrical engine. The blade saw is pushed downward by the hydraulic system.

➤ **Continuously Moving Saw Machines**

- Band saw machine



Picture 2.29: Band saw machine

- Circular sawing machine



Picture 2.30: Circular sawing machine

### 2.1.6. Shaper and Press

**Shaper:** This machine is used for machining surfaces of prismatic parts. However, since they have a single cutter the surface obtained will be rough.

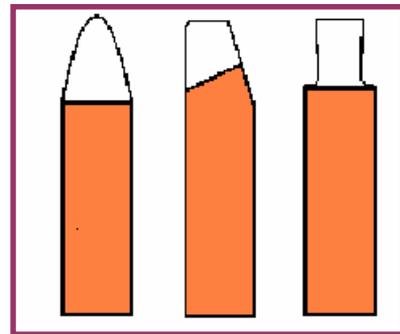
- **Shaper types**
  - Mechanic shaper
  - Hydraulic shaper
- **Where is it used ?**
  - For flat surfaces
  - For profile machining
  - For inner and outer slots
  - For gear wheels



Picture 2.31: Shaper

➤ **The Types Of Shaper Cutting Tools**

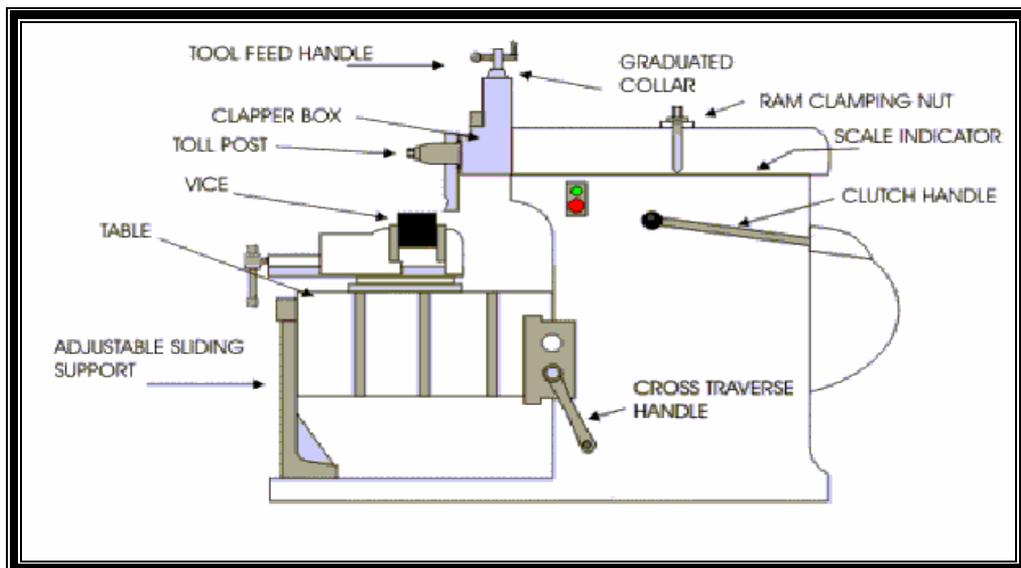
- Carbon Steel cutters,
- High speed steel cutters,
- Cemented carbide cutters.



**Figure 2.8: The Types Of Shaper Cutting Tools**

When machining a part by means of the shaper, we should choose suitable cutting speed according to the material of the cutter and work piece. For instance, if the material is soft, the cutting speed must be high. If the quality of the cutter is high, we choose the cutting speed high. Today, CNC milling machines can do all the machining operations that are performed by shapers. Therefore they are becoming out of date.

➤ **Parts of A Shaper**



**Figure 2.8: Parts of A Shaper**

**Press:** These machines are used for shaping the sheet metal by cutting and bending. The head pushes the upper part of the die downward using the hydraulic cylinder and cuts the sheet metal part.



Picture 2.32: Press

### 2.1.7. Wire EDM ( Electrical Discharge Machining ) Machines

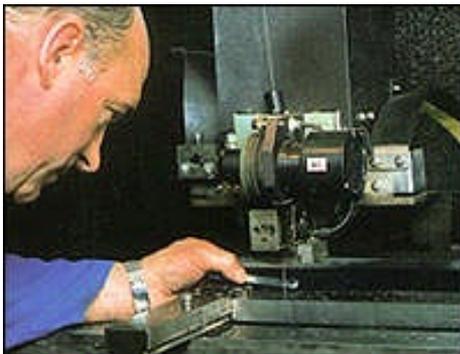
These machines cut metal parts by producing electrical arc by the help of a conductive wire (Picture 2.33).

➤ **How does it work?**

A spark jumps from an electrode (the wire) to the workpiece like a spark plug in a car. The workpiece is eroded away for a few microns around the wire, and the wire as well ! So the wire is constantly run through the part to give a “new “ electrode” all the time. The wire is advanced under computer control to carve conductive material to virtually any shape ,



Picture 2.33: Wire EDM Machine



Picture 2.34: Cutting with Wire EDM

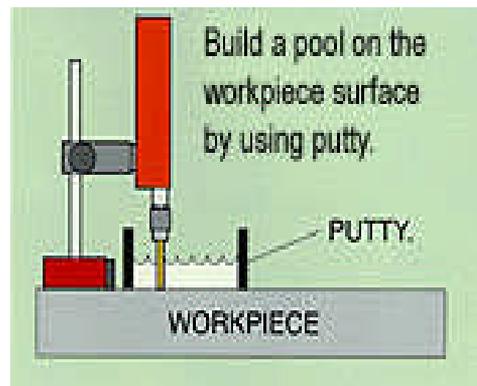


Figure 2.8: Wire EDM

### 2.1.8. Ram Tarret Milling Machines

These machines are used for the production of dies and moulds. Since the head can turn left and right moulds can be machined easier.



Picture 2.35: Ram Tarret Milling Machine

### 2.1.9. The Machines Used For The Production Of Ready-Made Clothes

#### ➤ Cutting Machines

- **Fabric Wrapping Machines :** The machines are used for spreading out the fabric in the length, number and wraps.
- **Cutting Machines With Engines :** It is used for cutting the fabric in the length we wish.
- **Computerized Cutting Machines :** It cuts the shapes of drawing on computer



Picture 2.36: Cutting Machines

➤ **Sewing Machines**



- **Straight Sewing Machines** : It sews two pieces of fabric.
- **Overlok Machines** : It is used for cleaning the edge of fabric. If you wish, it can combine two pieces of fabric.
- **Recme Machines** : It is used for cleaning the bottom of skirt. They do the sensitive sewing. It's done for embellishing. Generally, it's used for sewing the underwear clothes.

- **Buttonhole Machine:** It's used for knitting buttonholes.
- **Buttonhole Sewing Machines:** It's used for sewing the buttonhole.
- **Flatlok Machine:** It's used for combining the fabrics head to head.
- **Fleto Machines:** It's used for making pockets.



Picture 2.37: Buttonhole Sewing Machines

➤ **Machines For The Production Of String**

- Cotton or Wool Fluffer Machines
- Comb Machines
- Pulling Machine
- Open-end String Machine
- Ring string machine ( vater )



Picture 2.38: Cotton or Wool Fluffer Machines

- **Machines For Ironing**
- **Machines For Painting**
- **Machines For Weaving and Knitting**



Picture 2.39: Weaving Machines

## 2.2. CNC Machines

In Industry it is not efficient or profitable to make everyday products by hand. On a CNC machine it is possible to make hundreds or even thousands of the same item in a day. First a design is drawn using design software, then it is processed by the computer and manufactured using the CNC machine.

CNC(Computer Numerical Control) machines are controlled by computers. By adapting computers to the ordinary milling, lathe or drilling machine, CNC have been developed.



Picture 2.40: CNC Milling Machine

The operator writes a CNC program and saves on the control panel of the CNC machine tool. When the program is run, the computer evaluates the program and sends necessary signals to the motors. The motors move the table, cutting tool and make turn the spindle automatically according to the program. Cutting tools can be changed automatically writing tool change command in the CNC program. Rotary and tilting tables can be controlled by the program.

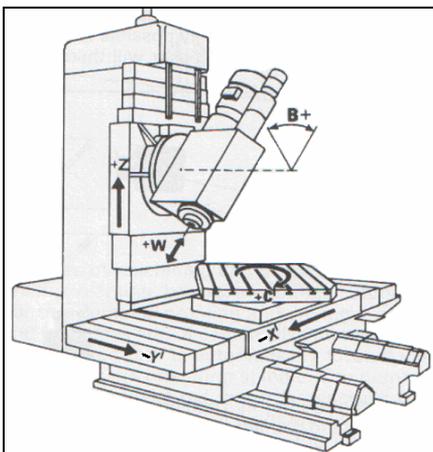


Figure 2.9: Axes on a Milling Machine



Picture 2.41: CNC Control Unit



**Picture 2.42: Tilting Table**

### **2.2.1. Advantages of CNC machines**

➤ **Entering the programs**

CNC programs can be written and saved on the computer of the machine tool. The program that has been entered the memory of the machine can be used again. Necessary changes can be made on the program easily.

➤ **Cutting tool compensation**

When a cutting tool is used it wears and changes the dimensions of the part. This takes a long time to adjust the tools on the classical machines. But CNC machines can control and adjust the cutters according to this wear amount.

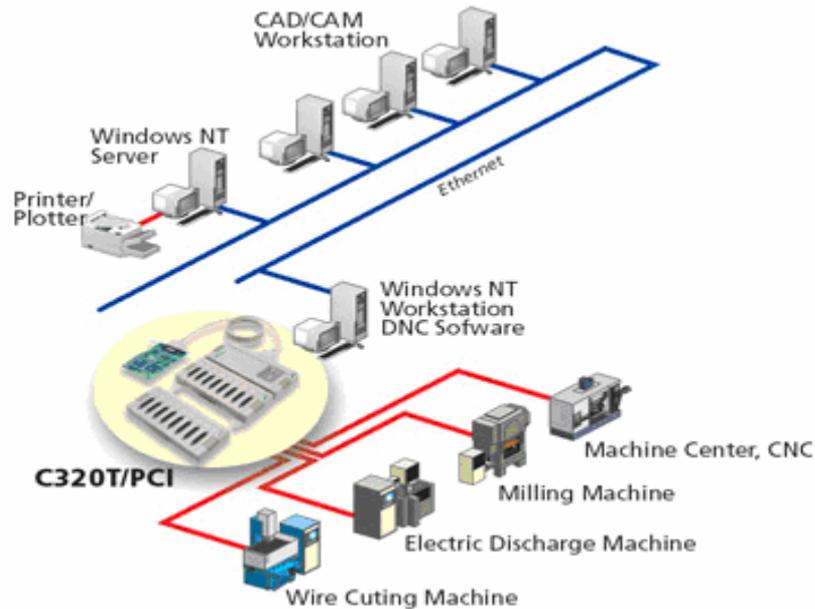
➤ **Simulation**

After finishing programming we can see the part machining on the screen using simulation. We can see the cutting tool movements before machining. So the mistakes can be found and corrected before the production. This enables to start to produce without wasting the raw material.



**Picture 2.43: Simulation**

➤ **Communication with the other units**



**Figure 2.10: Communication with the other units**

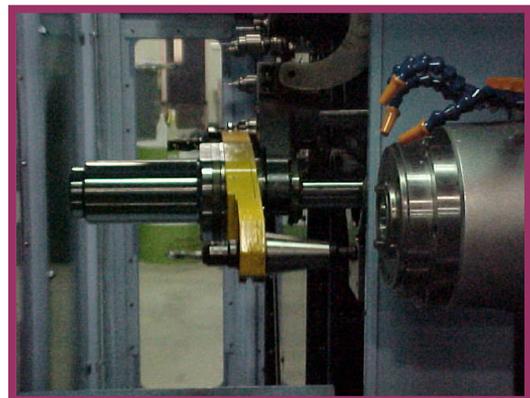
The computer of the machine can connect to other computer. The product that has been drawn and designed in a city and can be produced in another city or country.

➤ **Finding the failure**

If there are some failures in CNC machines, we can check and find them in the electrical parts of the control unit.

➤ **Automatic changes of the cutters**

On CNC machines, cutters can be changed automatically in a few seconds. On classical machines, it takes minutes to do this process. Besides, on some advanced CNC machines, work pieces can be pulled out from the chuck by the control unit.



**Picture 2.44: Tool change**

➤ **Accuracy and mass production**

CNC machines have high accuracy and the products can be machined with exactly the same size. The tolerance required can be obtained more easily. These are the most important things that manufacturers want. Since CNC machine tools are controlled by a program operator mistakes are eliminated. For these reasons CNC machine tools are widely used in mass production.

**2.2.2. Where are CNC machines used ?**

Today, CNC systems are used in many areas such as drilling, milling, bending, grinding, turning, cutting by flame, giving form measuring in three dimensions, wire EDM and robot works.

**2.2.3. Sections of CNC machines**

- Body and slides
- Computer control unit
- Electric motors and spindle
- Ball screw



**Picture 2.45: Ball screws**

- Automatic tool changers ( Tool Magazine )



**Picture2. 46: Tool Magazine**

➤ Other auxiliary components

- Tailstock
- Chip conveyor
- Coolant
- Tool setter
- Automatic door
- Bar feeder
- Chuck



Picture 2.47: Tailstock

Picture 2.48: Chip conveyor

## 2.3. Tools

### 2.3.1. File

A tool that is made of hardened steel. It's used for filing, making smooth and shaping the metal parts by the help of its small cutting edges.

➤ **Types of Files**

There are files with different shapes such as flat, round, square, triangle, half round, etc.



Picture 2.49: File

### 2.3.2. Filing

Filing is a process of shaping by files on the surface of the material and forming it with size, shape we wish and need.

Filing can be done by hands on vises or by means of machines.



**Figure 2.11: Filing process**

### 2.3.3. Reamer

Reamer is a tool that is used for having smoother and more sensitive surface in the hole made by drill or by metal removing. We call this process “reaming”.

#### ➤ Types of reamer

- **Straight reamer** : It’s used on hard materials.



**Picture 2.50: Straight Reamer**

- Reamers used in hands
- Reamers used on machines.
- Taper reamer
- Regulated reamer

- **Helical reamer** : It is sent through the holes and keyways all along.



**Picture 2.51: Helical Reamer**

### 2.3.4. Tap

These tools are used for making threads in the holes. The body of the taps are made of high speed steel (HSS). They are made as hand taps and machine taps.



**Picture 2.52: Taps**

➤ **Tap Holder**

Tap holders are used for holding the taps. The holding section can be fixed or adjustable.



**Picture 2.53: Tap Holders**

**2.3.5. Scraper**



**Picture 2.54: Scrapers**

Deep marks and roughness appear on the surfaces machined by milling, shaper, lathe machines and on the surfaces that have been filed.

These marks and roughness cause the machine parts to erode away early when rubbing against each other. This makes the sensitivity of the machine less.



These marks and roughness are made minimum by scraping.

**Picture 2.55: Scraper work**

**2.3.6. Chisel**

This tool is for cutting the small pieces from materials. The end of the blade is sharpened and hardened.



**Picture2.56: Chisel**

### 2.3.7. Bench Vice

It has two jaws. One of them moves forward and backward. It is fixed on a bench and the process of filing, cutting, curling and assembly is done on it.



**Picture2.57: Bench Vice**

#### ➤ Chamfer Vice

The vice that has been produced to form a chamfer on the work pieces. Its jaws are in arc shape.



**Picture2.58: Chamfer Vice**

#### ➤ 2.3.8. Pipe Vice

The jaws of this vice is designed for grasping the pipes. By grasping the pipe in this kind of vise, we do the cutting or thread cutting on the pipes.



**Picture2.59: Pipe Vice**

#### ➤ Machine and Drill Press Vice

The tools that can be fixed on drill benches and enable to drill the small work pieces safely.



**Picture2.60: Machine and Drill Press Vise**

## **2.4. Different Types of Tools**

### **2.4.1. “V” Blocks**

“V” blocks are used for holding and marking the cylindrical and prismatic work pieces. “V” block is produced by casting and whole surfaces are machined accurately.



**Picture2.61: “V” Blocks**

### **2.4.2. Callipers**

It is one of the most useful measuring tool. It’s used for measuring the distances like inner diameters, outer diameters, width of a part, depths or canals. It’s made of stainless steel.



**Picture2.62: Digital Calliper**



**Picture2.63: Vernier Calliper**

### 2.4.3. Screws and Bolts

Screws and bolts are used for holding and fastening parts. A bolt or screw has a head and body that has thread.



Picture 2.64: Screws and bolts

➤ **Thread types according to shape**

- Triangle thread
- Trapezoidal thread
- Square thread
- Ball thread

➤ **Triangle thread**

They are divided into two; metric and whitworth. Metric threads have  $60^{\circ}$  angles, whitworth threads have  $55^{\circ}$  angle.

Threads are named according to their pitches.

Pitch : The distance between two tooth of the thread.

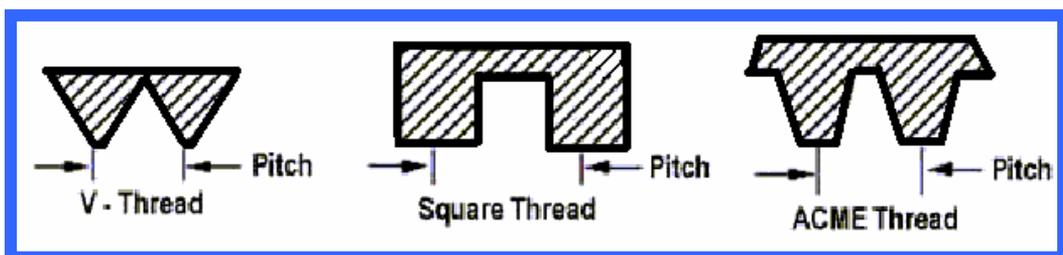


Figure2. 12: Types of threads

Pitch is expressed in millimetre with metric screw and whitworth screws, it's expressed as number of teeth per inch.

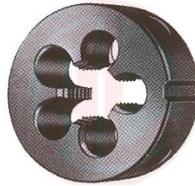
Threads have got standard size. Every manufacturer produces screws and bolts according to the standard

- **Trapezoidal thread:** It is used for spindles that can squeeze both sides.

- **Ball screws :** It is used in the places where pollute easily. They are also used in CNC machine tools.
- **Multi thread:** These screws have more than one thread. Multi thread screws are used in the systems whose turning is little but progress is much. For example, camera movement mechanism and some vise screws.

#### 2.4.4. Die

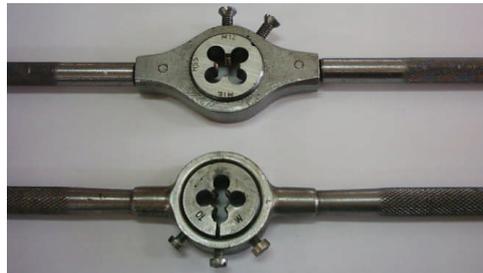
This tool is used to make thread on the surface of a cylindrical part. If the material is a pipe, we use a pipe die.



Picture 2. 65: Die

- **Die Holder**

The apparatus that a die is assembled in the centre of it and is made of alloy steel.



Picture 2.66: Die Holder

#### 2.4.5. Soldering

If we mix tin and lead we get solder. The soldering is the process of connecting without melting the materials themselves but by melting the solder in lower temperature.

It's done in two ways; brazing and soft soldering.



Picture 2.67: Soldering

## 2.4.6. Rivet

Rivets are considered to be permanent fasteners. Riveted joints are therefore similar to welded and adhesive joints.

Rivets have been used in many large scale applications including shipbuilding, boilers, pressure vessels, bridges and buildings etc. In recent years there has been a progressive move from riveted joints to welded, bonded and even bolted joints. A riveted joint, in larger quantities is sometimes cheaper than the other options but it requires higher skill levels and more access to both sides of the joint.

Riveted connections are fixed connections. Riveted connections are more resistant than welded connections.

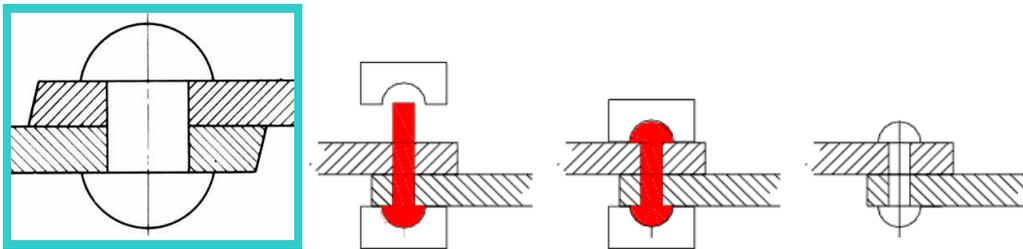


Figure 2.13: Rivet

We can connect the different kinds of materials with each other by riveting. Riveting is used in buildings, steel bridges and railways.

- Large rivet heads

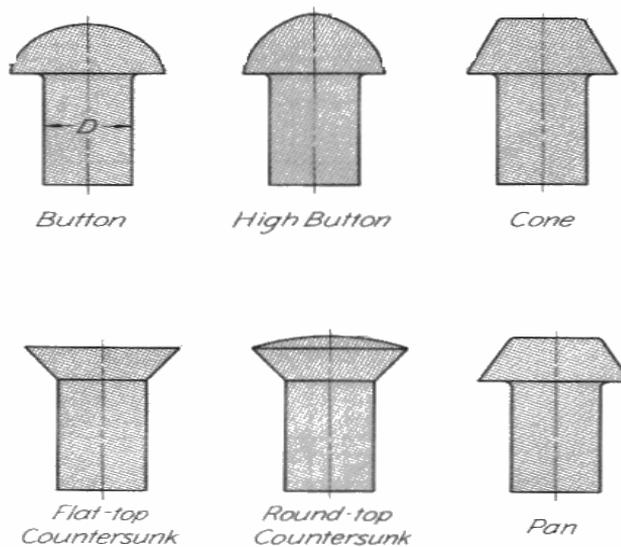


Figure 2.14: Rivet heads

### 2.4.7. Micrometer

This measurement tool can measure more accurately than callipers. It can measure the very thin sheets and circular parts. They can be mechanical or digital. Typical accuracy for a micrometer is 0.01 mm.



Picture 2. 68: Micrometer

## 2.5. Marking and Universal Tools

### 2.5.1. Marking

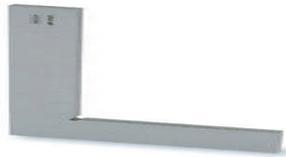
It is the process of copying the production drawing on a material. Marking is the first step in production. It is very essential because the better marking means the better production.



Picture 2.69: Marking process

### 2.5.2. Set Square

Set squares are used for marking, measuring and checking squareness of flat surfaces. They can be used to draw vertical and parallel lines.



**Picture 2. 70: Set Square**

### **2.5.3. Steel Ruler**

It's used for measurement and marking. It's made of spring steel. The width of the ruler is 20 millimeters, its length can be between 100 to 1000 millimeters and its thickness is 0,5 millimeters.



**Picture 2.71: Steel Ruler**

### **2.5.4. Compasses**

These tools are used for drawing a circle or an arc . They're made of steel and their tips are hardened. The compasses must be pointed for a good marking.



**Picture 2.72: Compasses**

### **2.5.5. Tape Meter**

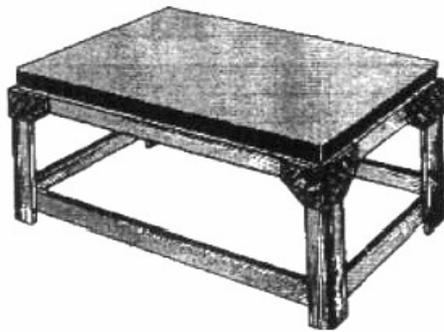
It is a measuring tool that has dividing marks on the tape and used for measuring long materials roughly. Generally, it can be 2,3,5,10,20,30, or 50 meters long and 12 or 13 millimeters wide. It's made of spring stainless steel.



**Picture 2. 73: Tape Meter**

### **2.5.6. Straightening Plate**

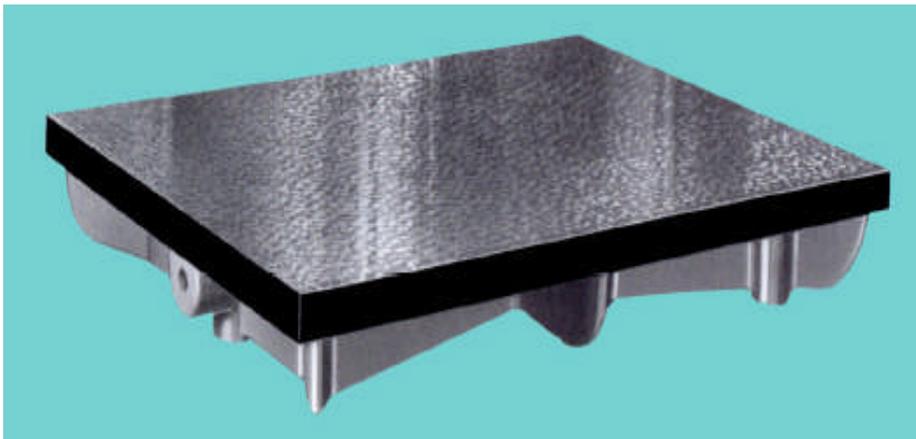
It's made of moulted iron. Its surface is worked and it looks like a table. The largest one is 5-6 meters long 1.2 – 2 meters wide. Its thickness can vary between 100 and 200 millimeters.



**Picture 2. 74: Straightening Plate**

### **2.5.7. Surface Plate**

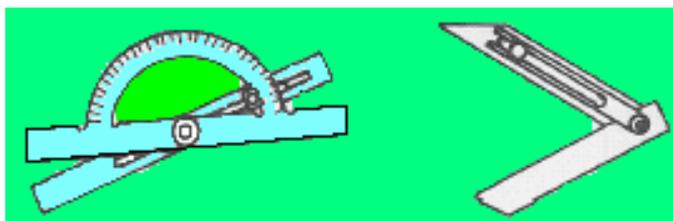
It's made of granite or cast iron materials. Its surface is milled and grinded accurately.. On this plate, we can do the marking only.



**Picture 2. 75: Surface Plate**

### **2.5.8. Angle Protractor**

There is the chart showing the angle section on it. By means of this protractor, the angels between the surfaces and lines can be checked by adjusting the angle we need.



**Figure 2.15: Types of angle protractors**

### 2.5.9. Universal Protractor

It's used for measuring and checking the very sensitive angles. We can measure angles and marking by means of this protractor.



Picture 2.76: An universal protractor

### 2.5.10. Center Punch

The centre punch is made from mild steel with the point hardened and tempered so that it withstands the impact of the material when marking. It is normally used to mark the centre of a hole to be drilled either by hand or on the drilling machine. . Before drilling, it's used for marking a socket that prevents the bit to slide. The tip of the punch is grinded at 30°, 60°, 75°, and 90° angles.



Picture 2.77: A center punch

### 2.5.11. Scriber

It's the marking tool that has about 15° point angle and is used for drawing. It's advised that the tool for drawing should be made of the alloy steel.

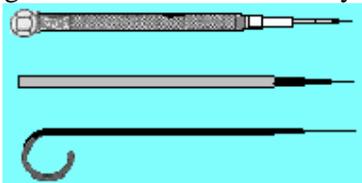


Figure 2.16: Different types of scribers

### 2.5.12. Punching Tools

The tool that has a cylindrical bit at one side and is used for piercing. The piercing process is done by bit of the punch.



**Figure 2.78: Punching Tools**

### **2.5.13. Hammer**

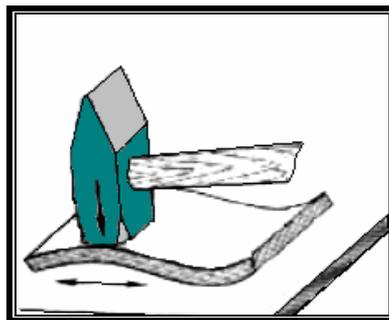
It's a tool for striking. Its head is made of hardened steel. It has a long handle to make the striking easy.



**Picture 2.79: Hammer**

#### ➤ **Straightening**

The process of having the deformed metal to make it straight again..



**Figure1.17: Straightening process**

### **2.5.14. Saw Frame**

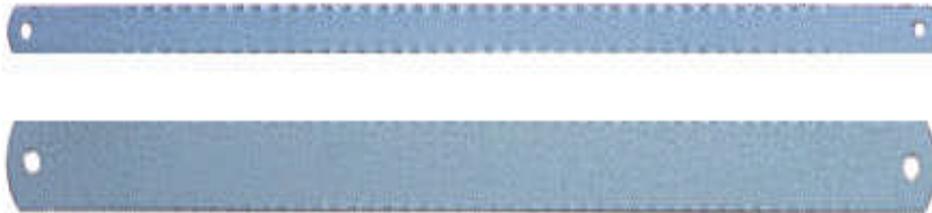
The saw frame is used to hold the saw firmly..



**Picture 2.80: Saw frame**

➤ **Saw Blade**

A saw blade has got so many sharp teeth arranged in order. . The teeth are conical in the cutting direction.



**Picture 2.81: Saw blades**

### **2.5.15. Mallets**

This hand tool is used to hit soft materials. Since the head of a mallet is soft it does not damage when hitting. Their heads can be plastic, brass or lead.



**Picture 2.82: Knops**

### **2.5.16. Number Punches**

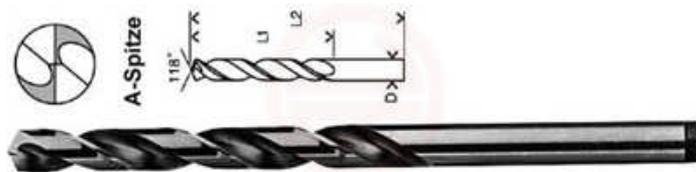
Number punches have numbers from 0 to 9 on them and we use them for numbering the metals.



**Picture 2.83: Number punches**

### 2.5.17. Drill Bit

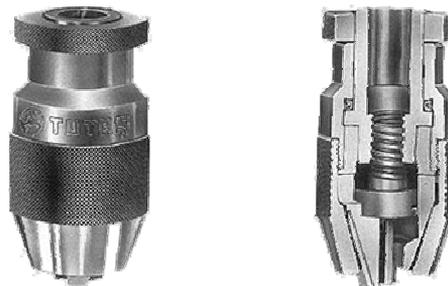
Drill bits are cutting tools used to create cylindrical holes. Bits are held in a tool called a [drill](#) chuck, which rotates them and provides axial force to create the hole. They are used to drill metals and wood.. To drill steel and alloy steel, we use  $118^\circ$  of bit angle and to drill the soft and fragile materials, we use  $130^\circ$  of bit angle.



Picture 2.84: A drill bit

### 2.5.18. Drill Chuck

Drill chucks are used to hold drill bits firmly when drilling. Drill chucks are made two types. One type can be opened and closed by hand for the other type a key is used to open or close the jaws.



Picture 2.85: A drill chuck

### 2.5.19. Morse Taper Sleeve

This is an adaptor that enables to mount the drill with the conical shank directly to the spindle without a drill chuck .



Picture 2.86: A morse taper sleeve

### 2.5.20. Sleeve Wedge

This is used to pull out the drill chucks and morse taper sleeves.

### 2.5.21. Open-Ended Spanner

It is used for tightening and loosening of nuts and bolts in standard sizes.



**Picture 2.87: An open-ended spanner**

### **2.5.22. Ring Spanner**

They are close-ended wrenches so they enable to hold bolts and nuts without sliding.



**Picture 2.88: A ring spanner**

### **2.5.23. Hexagonal Spanners**

These spanners are also called allen key. This is a simple hexagonal shaped rod with a right-angle bend designed to engage into the head of a screw which has a hexagonal shaped recess in the head - this is a very common screw found in many modern domestic appliances. Allen keys are available in sets of metric and imperial sizes. .



**Picture 2.89: Allen keys**

### 2.5.24. Socket Tools

Sockets are used to tighten or loosen bolts and nuts with hexagonal head. Socket tools consist of tommy bars, gear latches and socket pulleys.



Picture 2.90: Socket tools

### 2.5.25. Adjustable Wrench

The jaws of this spanner can be adjusted according to the bolt or nut head size.



Picture 2.91: An adjustable wrench

### 2.5.26. Screwdriver

It's used for tightening and loosening screws. Its bit is made of steel and its handle is made of wood or plastic.



Picture 2.92: A screwdriver

### 2.5.27. Cross-Head Screwdriver

It's used for cross-head screws. It has small and large bit types.



**Picture 2.93: A cross-head screwdriver**

### **2.5.28. Pliers**

Pliers are used for grasping, pulling, squeezing, bending and shaping the materials. Handles of the pliers are insulated.



**Picture 2.94: Pliers**

### **2.5.29. Cutting Pliers**

These pliers can cut the thin wires and narrow parts. Their handles are insulated.



**Picture 2.95: Cutting pliers**

### 2.5.30. Long Nose Pliers

The tools whose edges are thin and long unlike ordinary pliers. It's used for grasping and shaping the parts that are too difficult for ordinary pliers to reach.



Picture 2.96: Long nosed pliers

### 2.5.31. Puller

They are used for pulling out the materials that are tightened into somewhere firmly. They are produced with two or three jaws.



Picture 2.97: A puller

### 2.5.32. Wheel Grinder

Wheel grinders are used for cleaning the surfaces of work pieces by putting on abrasive disk. They can also cut metals. They may be electrical or pneumatic..



Picture 2.98: A Wheel Grinder

### 2.5.33. Abrasive Disk

It works on the surface of a metal by abrasive machining. It's also used for honing the tools. Abrasive disk is made of the materials like silicon calcium carbide and aluminum oxide. It's mounted to the grinding machine or pedestal grinder .



Picture 2.99: An abrasive disk

### 2.5.34. Shears Used in Hands

Their blades are sharpened. They are used for cutting sheet metals into pieces up to 1 millimeter thick.



Picture 2.100: Shears used in hands

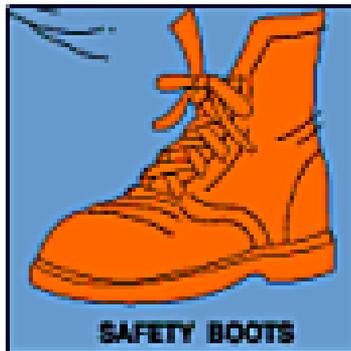
## 2.6. Industrial Accidents and Security Precaution



Picture 2.101: Industrial Accidents

### 2.6.1. Industrial Accidents that may be in the workshop

- Worker's fingers may be wounded or cut.
- Chip and metal dust may get into the eyes.
- If the worker has long hair, it may get wound and tangled around the turning work pieces or turning cutting tools. This is too dangerous.
- Bumping and falling because of carelessness.
- We have to be careful on the slippery ground and wear non-slipping shoes.



Picture 2.102: Safety boots

### 2.6.2. Rules that we have to care to prevent industrial accidents

- Machines should be checked before using.
- We shouldn't leave the working machine.
- First we should stop the machine then we should change the speed gear .
- We mustn't work on the machine that we don't know how to run.
- On the machines that are out of order, we should hang the signboard on which "OUT OF ORDER" is written.
- We should do maintenance of the machines regularly.
- Workers must obey the safety rules in the workshop.
- While filing, we should not use the file without a handle.
- Workers working on the machine mustn't pay attention the other things.
- The chips and metal dust after filing should be cleaned by a wire brush.
- We should wear protection goggles while we are working with abrasive disk.



Picture 2.103: Protection goggles

- We mustn't do the measuring while the machines are working.
- We shouldn't carry the sharp and cutting tools in our pockets.
- First aid kit has to be present and ready in the workshop.



What's this? *It's a chisel*

How do you spell it? *Chisel, C-H-I-S-E-L.*



What's this? *It's a vice*

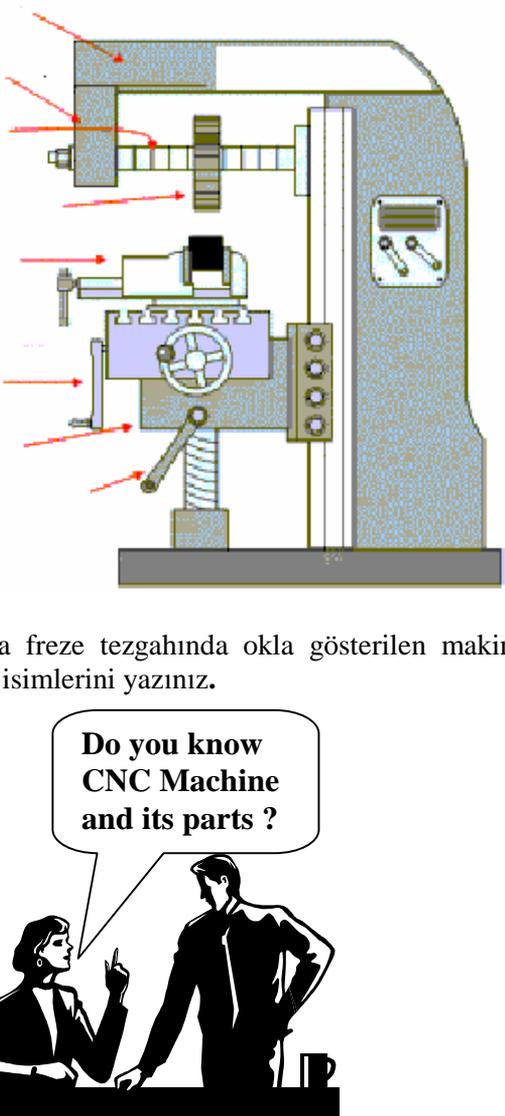
How do you spell it? *Vice, V-I-C-E.*



**What is this ? It's micrometer.**

**How do you spell it ? Micrometer,  
M-I-C-R-O-M-E-T-E-R**

## UYGULAMA FAALİYETİ

İŞLEM BASAMAKLARI	ÖNERİLER
 <p>➤ Yukarıda freze tezgahında okla gösterilen makine kısımlarının isimlerini yazınız.</p> <p>Do you know CNC Machine and its parts ?</p>	<ul style="list-style-type: none"><li>➤ Yeni öğrendiğiniz Teknik İngilizce kelimeleri birkaç kez yazabilirsiniz.</li><li>➤ Öğrendiğiniz kelimeleri unutmamak için sıkça tekrar edebilirsiniz.</li><li>➤ İnternette freze tezgahı ile ilgili İngilizce terimleri takip edebilirsiniz.</li><li>➤ Yeni öğrendiğiniz İngilizce kelimeleri yüksek sesle tekrarlayınız.</li></ul>

## ÖLCME VE DEĞERLENDİRME

A ) What are the names of the machines below?



1)



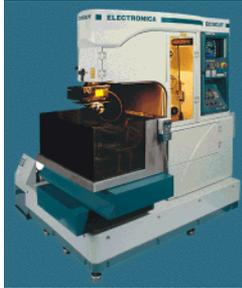
2)



3)



4)



5)



6)

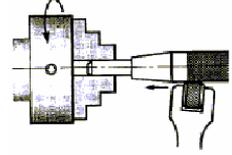
**B ) Match the figures and their names below**

1. **Knurling**



**A**

2. **Protection goggles**



**B**

3. **Tilting table**



**C**

4. **Ball Screw**



**D**

5. **Screws and bolts**



**E**

Cevaplarınızı cevap anahtarı ile karşılaştırınız.

**DEĞERLENDİRME**

Cevaplarınızı cevap anahtarı ile karşılaştırınız. Doğru cevap sayınızı belirleyerek kendinizi değerlendiriniz. Yanlış cevap verdiğiniz ya da cevap verirken tereddüt yaşadığınız sorularla ilgili konuları faaliyete geri dönerek tekrar inceleyiniz.

# MODÜL DEĞERLENDİRME

## PERFORMANS TESTİ (YETERLİK ÖLÇME)

Modül ile kazandığımız yeterliği aşağıdaki kriterlere göre değerlendiriniz.

DEĞERLENDİRME KRİTERLERİ	TRUE	FALSE
<b>1. Lathe is a machine tool where the workpiece rotates and cutting tool moves towards the part.</b> Is it true or false ?		
 <b>2. These are milling cutters.</b> Is it true or false ?		
 <b>3. This is a micrometer.</b> Is it true or false ?		
 <b>4. This is a calliper.</b> Is it true or false ?		
 <b>5. This is a screwdriver.</b> Is it true or false ?		
 <b>6. This is a CNC control unit.</b> It is true or false ?		
 <b>7. These are V blocks.</b> Is it true or false ?		

## DEĞERLENDİRME

Yaptığımız değerlendirme sonucunda eksikleriniz varsa öğrenme faaliyetlerini tekrarlayınız.

# CEVAP ANAHTARLARI

Modülü tamamladınız, tebrik ederiz. Öğretmeniniz size çeşitli ölçme araçları uygulayacaktır. Öğretmeninizle iletişime geçiniz.

## ÖĞRENME FAALİYETİ-1 CEVAP ANAHTARI

1	Yes
2	Yes
3	Yes
4	No
5	Yes
6	No

## ÖĞRENME FAALİYETİ-2 CEVAP ANAHTARI

Sorular A	Cevaplar
1	Milling Machine
2	Vertical Lathe
3	Lathe
4	CNC Turning Center
5	Wire EDM Machine
6	Vertical Lathe

SORULAR B	CEVAPLAR
1	B
2	D
3	A
4	C
5	E
6-	D

## MODÜL DEĞERLENDİRME CEVAP ANAHTARI

1	True
2	True
3	True
4	False
5	True
6	True
7	False

Cevaplarınızı cevap anahtarları ile karşılaştırarak kendinizi değerlendiriniz.

# TECHNICAL DICTIONARY

abrasive disk	zımpara taşı
abrasive machining	aşındırma ile talaş kaldırma
acceptance sampling	kabul için örnek alma
accessory	aksesuar, yardımcı teçhizat
accuracy	hassasiyet, doğruluk
acetylene gas	asetilen gazı
acorn nut	tırtıllı somun, taçlı somun
actuator	uyarıcı
adapter	adaptör (ara rakor; birbirinden ayrı cins iki dişli ucu birleştiren ara parça)
addendum	diş ucu (dişlide)
adhesion	tutma, adezyon
adhesive joining	yapıştırma yolu ile birleştirme
adjustment	ayarlama
age hardening	yaşlandırarak sertleştirme
air furnace	hava fırını
allen screw	alyen vida; altı köşeli gömme başlı vida
allen wrench	alyen anahtar, gömme anahtar, altı-köşe "L" şeklinde anahtar
allotropic changes	allotropik değişme, eşözdek değişimi
allowance	pay, tolerans
alloy	alaşım
anchor bolt	tesbit civatası, ankraj bulonu
angle	köşebent demiri, köşebent, korniye; aç
angle milling cutter	açı frezesi, konik freze bıçağı
annealing	normalleştirme tavı, menevişleme
annular gear	içten dişli
anodizing	anotlama, anotsal işlem, anotlama usulü ile oksitleme
anvil	örs
apparatus	cihaz, aygıt, alet
apron	araba önlüğü
arbor	malafa
arch press	kemerli pres
arc spot welding	arklı nokta kaynağı
artificial aging	sunî yaşlanma
assemble	monte etmek
assembly	takım; birkaç parçadan meydana gelen parça grubu; komple, montaj
attachment	yardımcı teçhizat, ataşman

austempering  
austenite  
automatic screw machine  
axial

## **B**

bainite  
bakalite  
band sawing machine  
barrel finishing  
base  
base circle  
batch production  
batch size  
batch furnace  
beam  
    I-beam  
    U-beam  
bearing  
    ball-bearing  
    needle bearing  
    roller bearing  
    tapered roller bearing  
    bearing cone  
    bearing cup  
bellows  
belt  
belt polishing  
bench lathe  
bench molding  
bending  
bentonite  
bessemer converter  
bevel gear  
bevel protractor  
bilateral  
billet  
bit  
blast furnace

ösmenevişleme  
östenit  
index tezgahı  
eksenel

bainit, alçak derecede sulanmış çelik  
bakalit  
şerit testere  
dolaplama  
taban, kaide, temel  
diş dibi dairesi (dişlide)  
küme üretimi  
küme büyüklüğü  
yığılm fırını  
kiriş  
I profilli demir, I-kirişi  
U profilli demir, U-kirişi  
yatak, rulman  
bilyalı rulman  
iğneli rulman  
makaralı yatak  
konik makaralı yatak  
yatak göbeği, iç yatak  
rulmanların dış çemberi, yatak kabı  
körüük, körüük biçiminde  
kayış  
kayışlı parlatma  
masa tornası, saatçi tornası  
tezgah kalıplaması  
bükme, eğme  
yumuşak balçık  
bessemer potası  
konik dişli  
dereceli gönyeye  
çift yönlü  
bilet, ham demir çubuk  
uç, matkap ucu, kalem ucu  
yüksek fırın

blind riser	kör oluk
blister copper	saf bakır
bloom	demir kütüğü
blow molding	hava basınçlı kalıplama
bluing	menevişleme
board hammer	tahtalı şahmerdan
bolt	civata
bonding	yapıştırma, bağlama
boring machine	oyma tezgahı, delik işleme tezgahı
boring mill	delik tezgahı
bottom board	faraş tahtası
brace	el matkabı
bracket	konsol, çıkma, destekli raf, dirsek
brass	pirinç
brazing	sert lehim, pirinç kaynağı
break corner	kırma ağız
brittle	gevrek, kırılğan
broaching	broşlama, tığ çekme, boşaltma
broaching machine	boşaltma tezgahı
broaching tools	boşaltma kalemleri, boşaltma tığları
bronze	bronz, tunç
buffing	perdahlama
built-up edge	yığıma ağız
burnishing	çapak temizleme
burr	çizik, kazıntı, torna taleminin bıraktığı iz, çapak
bushing	burç
butterfly nut	kelebek somun
button	kontrol düğmesi, düğme
butt welding	düz ek kaynağı, alın kaynağı
<b>C</b>	
calibration	kalibrasyon, ayar
calliper	kumpas
calorizing	sementasyon ile alüminyum kaplama
cam	kam, eksantrik, armutçuk, mil dirseği, boynuz
cap screw	civata başlı vida; altı köşe başlı somunsuz vida,
	kapak vidası, başlık vidası
carbide	karbür
carbide tools	sert maden takımlar

course	kaba, kalın
coating	örtme, kaplama
coining press	darb presi
cold heading	soğuk baş yapma
cold sawing	soğuk kesme
cold welding	soğuk kaynak
cold working	soğuk işlem
collar	bir parçanın etrafını saran blok bilezik, yaka, halka
collet	bilezik, esnek kovan, freze çakısı tutacağı (pens)
collet holder	esnek kovan (pens) tutacağı
column	sütun
combination die	keser basar kalıp
combination chuck	üniversal ayna
combined cut	birleşik kesim, kombine kesim
compass	pergel, pusula
compensation	denkleştirme
compound rest	takım kızağı
compression molding	basınçlı döküm
compressive strength	sıkıştırma dayanımı
computer	bilgisayar
Computer Numerical Control (CNC)	bilgisayarlı sayısal denetim
concentric	eş merkezli
continuous casting	sürekli döküm
continuous chip	akma talaş
contour	çevre yolu
converter	konverter, değiştirici
coolant	soğutucu
cope	örtme, üst döküm derecesi
copper (or cupper)	bakır
core	maça (dökümcülükte)
core diameter (drills)	öz çapı
core print	maça yatağı, maça yuvası
corrosion	yenim, paslanma
cost	maliyet
cotter pin	maşalı pim, kopilya
cotton waste	üstüğü
counter boring	düz havşa açma
counter sinking	konik havşa açma
coupling	kavrama, kaplin

crest  
cross-slide  
cross-wise  
crown gear  
crusible  
cupola  
curling  
cutting edge  
cutting fluid  
cutting force  
cutting speed  
cyaniding

## D

dedendum  
deep drawing  
deep-hole drilling machine  
deformation processes  
depreciation  
depth gage  
depth of cut  
dial  
dial indicator  
diametral pitch  
diamond tools  
die  
die casting  
diffusion  
direct arc furnace  
disc  
discontinuous chip  
disposable pattern  
distortion allowance  
dividing head  
dog  
double housing planer  
double margin drill  
down milling  
draft allowance

vida dişinin tepesi  
çapraz kızak  
enlemesine  
akış dişlisi  
pota  
kupola, döküm ocağı  
saç kıvrırma, kenar kıvrırma  
kesme yüzü, kesme ağızı  
kesme sıvısı  
kesme kuvveti  
kesme hızı  
siyanürle sertleştirme

diş dibi (dişlide)  
derin çekme  
derin delik delme tezgahı  
bozundurma süreçleri  
amortisman, aşınma, kıymetten düşme  
derinlik mastarı  
kesme derinliği  
kadran, kontrol saatlerinin yüzü  
komparatör  
kudur diş arası  
elmas takımlar  
kalıp; pafta kalıbı (erkek diş açma aleti)  
pres döküm  
yayınım, difüzyon  
ark fırını  
disk, yuvarlak plaka, kurs  
kesme talaş  
harcanır model  
çarpılma payı, bozulma payı  
bölüm aynası, divizör  
firdöndü, kanca, tornalamada kullanılan ara mesnet  
çift sütunlu planya  
çift zırlı matkap  
eş yönlü frezeleme  
çekme payı

drag	alt döküm derecesi
draw bar	çekme çubuğu, çekirme
draw-cut shaper	çekerek keser vargel
drawing	çekme
drawing die	çekme kalıbı
drill chuck	matkap aynası, mandren
drill performance	matkap verimi
drill point	matkap ucu
drilling machine	delme tezgahı, matkap tezgahı
drive	tahrik
drop forging	şahmerdanda dövme
drop hammer	serbest düşümlü tokmak, şahmerdan
drug	alt derece
drum	tambur
drum lathe	kampana tornası
ductility	yumuşaklık, süreklilik
duplicating machine	kopye makinası
dye	boya, boyamak
dynamometer	dinamometre

## **E**

eccentric	eksantrik, dış merkezli; kam
elastic	esnek, elastik
elastic limit	esneklik sınırı
elasticity	esneklik
electric discharge machining	kıvılcımla malzeme işleme
electrode	elektrot, elektrik kaynak çubuğu, elektrik kutup çubuğu
electromechanical grinding	elektro mekanik taşlama
electroforming	elektrikle şekillendirme
electrohydraulic forming	elektrohidrolik şekillendirme
electroplating	elektroliz yoluyla kaplama (galvanoplasti)
electroslag welding	cürufaltı kaynağı
electrotinning	elektrikle kalaylama
element	öğe, eleman
elongation	uzama
embedding	gömülme
embossing	kabartma
emery	zımpara
emery paper	zımpara kağıdı

emulsion	sütsü, sübye, emülsiyon
enamel	emaye
end clearance angle	uç boşluk açısı
end cutting edge angle	yan ağız açısı
end-mill cutter	parmak freze
endurance	dayanım, sürme
engine lathe	torna tezgahı
equipment	aygıt, aparat, ekipman
etching	asitle aşındırma, dağlama
expansion	genişleme
expansion reamer	genişletme raybası
explosive forming	patlama yoluyla şekillendirme, patlama kalıplaması
extract	özüt
extraction	özütleme
extrusion	ekstrüzyon, kalıptan basma, darçıkım

## **F**

face	alın, yüz
face milling	alın frezeleme
face milling cutter	alın frezesi, alın işleme çıkısı
face plate	firdöndü aynası
facing	alın tornalama işlemi
fastening	sıkıştırma, bağlama
fatigue	yorulma, hareket halindeki aksamın yorulması
feed	ilerleme, besleme
feedback	geriye besleme
feedrate	talaş kaldırma hızı, ilerleme hızı
feed rod	talaş mili
feeler gage	hassas mastar
ferrous metal	demirli, demirden oluşan metal
file	eğge, törpü
coarse file	kaba eğge
bastard file	orta kalın dişli eğge
needle file	saatçi eğgesi
slitting file	oluk eğgesi
square file	dörtköşe eğge
superfine file	ince perdah eğgesi
triangular file	üçköşe eğge
round file	yuvarlak eğge

taper file	konik eęe, fare kuyruęu eęe
parallel file	düz eęe
flat file	yassı eęe
drill file	delik tesviye eęesi
filing	törpüleme, eęeleme
fillet	pervaz
fillet weld	pervaz kaynaęı
fillister head screw	yıldız bařlı vida
fillister head screw driver	yıldız uçlu tornavida
fine	ince
finish allowance	iřleme payı
finishing	son iřleme
finishing cut	ince iřleme
finishing teeth	kalibre aęızları
fit	alıřtırma, geęme
transition fit	ara geęme
interference fit	sıkı geęme, temaslı alıřtırma
clearance fit	bol geęme
medium fit	orta sıkı alıřtırma, tatlı alıřtırma, tatlı geęme
running fit	döner alıřtırma, oynar alıřtırma
sliding fit	kayar alıřtırma, kayar geęme
shrink fit	sıkı geęme, sıkma alıřtırma
fixture	baęlama aygıtı, baęlama düzeni
flame cutting	oksijenle kesme
flama hardening	alevle sertleřtirme
flange	flanř; baęlantı, birleřme yüzü
flank (gear)	diř yanı
flank wear	serbest yüzey aşınması
flash welding	yakma alın kaynaęı
flexibility	esneklik
floor molding	yer dökümü
flute	yiv, oluk (matkapta)
fly-cutter	yaprak çakı
fly nut	kelebek somun
follower rest	gezer yatak
forging	dövme
form milling cutter	modül freze bıçaęı, profil frezesi
forming	řekillendirme
foundary process	dökümcülük

foundation	temel
fracture	kırılma, kopma
fracture point	kopma dayanımı
frame	iskelet, çerçeve, şasi, gövde
friction disc	sürtünme aynası
friction drive	sürtünmeli tahrik, sürtünme mekanizması
front pilot (broaches)	ön kılavuz
furnace	tav fırını, ocak
fuse	sigorta; madenin sıcaklık dolayısıyla sıvı haline gelmesi; kaynayıp birleşme

## G

gage (or gauge)	mastar, ölçü, birim, gösterge, ölçü aleti
gage block	johnson mastarı
galvanizing	galvanizleme
gang drilling machine	çok milli delme tezgahı
gasket	conta
gasket ring	conta bileziği, salmastra bileziği
gate	aralık, kapı
gear	dişli
gear-cutting machine	çarklara diş açma makinası
gear train	dişli düzeni; birbirine geçmiş müteaddit dişli tertibatı
girder	kiriş, payanda, putrel, kuşak
goggles	kaynakçı gözlüğü
grain	tane
grain size	tane büyüklüğü
graphite	grafit; saf ve yumuşak karbon
gravity sintering	ağıdirmalı külçeleme
gray cast iron	kır dökme demir
grease	gres yağı
grease gun	gres pompası
grinding	taşlama
grinding machine	taşlama tezgahı
grinding wheel	zımpara taşı, taşlama taşı
grinding wheel dresser	zımpara taşı düzelticisi
grindstone	bileyi taşı
grit	maden talaşı, maden kırıntısı; iri taneli kum
grub screw	yarık başlı makina vidası, saplama vidası
gun drill	namlu matkabı

## *H*

hacksaw blade  
hacksaw machine  
hammer  
hand milling machine  
hardenability  
hardness  
headstock  
  
heat treatment  
helical gear  
helical spring  
helix angle  
herringbone gear  
high speed steel  
hobbing  
honing  
horn press  
hot spinning  
hot working  
hose  
hub  
hydraulic press  
hydraulic shaper  
hypoid gear

el testere bıçağı  
kollu testere makinası  
çekiç  
el freze tezgahı  
sertleşebilme  
sertlik  
tornada başlık tarafı, torna aynası,  
torna feneri, tahrik tertibatı  
ısıtma işlemi  
helis dişli  
helezonli yay  
helis açısı  
çavuş dişli  
hava çeliği, yüksek hız çeliği  
azdırma  
honlama, ince taşlama, parlatma, bileme  
mahmuzlu pres  
sıcak sıvama  
sıcak işleme  
hortum  
göbek (kasnak, dişli vb. göbeği)  
hidrolik pres  
hidrolik vargel  
hipoid dişli

## *I*

idler gear  
impact  
impurity  
inclined press  
indentation  
independent chuck  
index head  
indicator  
induction hardening  
ingot  
injection molding

avara dişli  
çarpma, darbe, şok  
pislik, kir, yabancı madde  
eğik pres  
çukuriz  
çeneleri ayrı sıkılır ayna, mengene ayna  
bölümlü başlık  
gösterge, sayaç  
endüksiyonla sertleştirme  
ingot, külçe  
enjeksiyonlu kalıplama

lead  
lead screw  
leather  
lever  
linkage  
lip angle  
lock nut  
longitudinal  
lubricant  
lubricating gun  
lubrication  
lubricator

## *M*

machinability  
machine bed  
machine frame  
machine molding  
machine screw  
machine shop  
machine tool  
machining time  
magnet  
magnetic chuck  
maintenance  
malleable  
malleable iron  
mandrel  
manual  
manufacturing processes  
margin (drills)  
martensite  
mash seam weld  
masking  
mass production  
material  
measurement  
measuring instruments  
mechanism

kurşun  
vida açma mili (tornada)  
deri  
levye, kol, manivela, kumanda kolu  
bağlantı, mekanizma, düzen  
kenar açısı  
kontra somunu  
boyuna, uzunlamasına  
yağlama maddesi  
yağ tabancası  
yağlama  
yağdanlık, gresörlük

işlenebilirlik  
tezgah gövdesi  
tezgah gövdesi  
makinalı kalıplama  
makina vidası, civata başlı vida, somunlu vida  
atelye, işlik  
takım tezgahı  
işleme zamanı  
mıknatıs  
mıknatıslı ayna  
bakım  
dövülgen  
dövülgen demir  
mandrel, malafa, torna punta veya matkap başlığı  
elle işleyen, elle çalıştırılan; el kitabı  
imalat yöntemleri  
faz, zırh  
martensit  
ezme dikiş kaynağı  
maskeleme  
seri imalat  
gereç, malzeme  
ölçme, ölçü  
ölçme aletleri, ölçme cihazları  
mekanizma, tertibat

mesh	tel örgü, örgü süzgeç; birbirine geçme, dişlilerin temas halinde olması
metal	metal
metal removing	talaş kaldırma
metal spinning	sıvama
metal spraying	metal püskürtme
metrology	ölçme bilimi
mica	mika
micrometer	mikrometre
mild steel	yumuşak çelik
milling cutter	freze çakısı
milling machine	freze tezgahı
monel metal	monel pirinçi
morse taper	mors konikliği
mould (or mold)	döküm kalıbı, kalıp dökme
multiple cut	çoklu kesme
multipoint	çok ağızlı takım

## N

nail	çivi
nail puller	kerpeten
natural	doğal, tabii
neck (drills)	boyun
needle	iğne, ibre
nipple	nipel, boru rakoru, meme, meme ucu
nitriding	nitritleme
nodular iron	yumrulu demir
nominal size	nominal ölçü
nonferrous metal	demir içermeyen metal
normalizing	normalleştirme tavı
notching	kertikleme
numerical control	sayısal denetim
nut	somun

## O

offset	kaçıklık, sapma, yerinden kaçma
oil	yağ
oil bath	yağ banyosu
oil screw gun	vidalı yağ pompası

oil tempered  
open-end wrench  
open-hearth furnace  
operation  
ore  
oxidation  
oxy-acetylene welding

yağda tavllanmış  
açık ağız anahtar  
siemens-martin fırını  
işlem  
cevher  
oksitlenme, paslanma  
oksijen kaynağı

## **P**

panel  
  
parkerizing  
pattern  
pattern allowance  
pellet  
penetration  
percussion press  
perforating  
permeability  
piercing  
pig iron  
pin  
pincers  
pinion  
pipe  
pipe wrench  
pit molding  
pitch  
  
pitch circle  
plain milling cutter  
plain milling machine  
planer  
planetary gear  
planetary milling machine  
plant  
plastic  
plate  
plating

pano, tablo, şalter veya kontrol  
saatleri panosu; plaka  
parkerleme  
model (dökümcülükte)  
kalıp payı  
topak  
girimim, penetrasyon  
vurgu presli  
delikleme  
geçirgenlik  
delme (Mannesman metodu)  
pik demir  
pim, perno, muylu, şiş, iğne  
kerpeten, kısıkaç, pense  
küçük dişli  
boru  
boru anahtarı  
kuyu dökümü  
hatve, vidanın her dişte ilerleme miktarı,  
iki diş arasındaki uzaklık, adım  
diş açıklığı dairesi, bölme dairesi (dişlide)  
silindirik freze bıçağı  
düz freze tezgahı  
planya  
gezegen dişli, gezer dişli, planet dişli  
gezegen başlı freze tezgahı  
fabrika, tesis, atölye  
plastik  
levha, plaka  
kaplama

pliers	pense
ploughing force	sürtme kuvveti, kazma kuvveti
plug	tapa, tıkaç, elektrik fişi
plug gage	delik mastarı
plumber	tesisatçı
pneumatic gage	havalı master
pneumatic hammer	havalı tokmak
pneumatic rammer	havalı (pnömatik) şahmerdan; basınçlı hava tokmağı
point angle (drills)	uç açısı
pointer	gösterge, ibre
polishing	parlatma, polisaj
porosity	gözeneklilik
powder metallurgy	toz metal bilimi
precipitation hardening	çökelterek sertleştirme
precision	hassasiyet
press	pres, cendere, presle basma
pressing	presle şekillendirme, presle basma işlemi
process	süreç
product	ürün
production	üretim
profiling machine	kopye tezgahı
protractor	açı ölçer
puller	çektirme
pulley	kasnak, makara
punch	zimba
punching	zimba ile delme, presle delme

## Q

quality control	kalite kontrolü
quantity	miktar, nicelik
quench hardening	su verme sertleştirmesi
quenching	su verme
quick return mechanism	vargel mekanizması

## R

rack	kremayer dişli
ram	şahmerdan tokmağı, pres kütüğü
rammer	şahmerdan

raw	ham, işlenmemiş, tabii
reamer	rayba
reaming	raybalama
recess	oluk, oyuk, girinti
red hardness	kızıl sertlik
refractory	tuğlamsı
reinforce	takviye etme, kuvvetlendirme, sağlamlaştırma
relief angle	freze bıçağının arka yüzü ile kesilen parça arasındaki açı
remote control	uzaktan kontrol
removable pattern	sökülebilir model
residual stress	artık gerilme
resin	reçine, akındırık
resistance welding	direnç kaynağı
retaining ring	tesbit segmanı, tesbit bileziği
revolver head	döner kafa, döner başlık
rigid	esnemez
ring	bilezik, halka, piston segmanı
ring gage	yüzük master
riser	oluk
riveting	perçinleme
rod	çubuk, kol
roller	merdane, rulo, silindir
roll forging	dövmeli hadde
roll forming	haddeleme
rolling	haddeleme
rolling mill	hadde makinası
rotation	dönme, bir eksen etrafında dönme, rotasyon
roughing cut	kaba işleme
roughing teeth (for broach)	kaba kesme ağızları
roughness	pürüzlülük
rubber	lastik, kauçuk
run-out	salgı
rupture strength	kopma dayanımı
rust	pas, paslanma

## S

saddle	oturak, eyer, boyun
safety pin	emniyet pimi
sampling	örnek alma

sand	kum
saw milling cutter	testere ağızlı freze çakısı
saw type cutter	testere tipi çakı
sawing machine	testere tezgahı
scale	ölçek
scissors	makas
scrap	hurda
screw cutting	vida açma
screw driver	tornavida
screw machine	civata makinası
seal	keçe, yağ keçesi
seaming	ekleme, dikiş
seam welding	dikiş kaynağı
sensitivity	duyarlık, hassasiyet
set screw	tesbit vidası, kontra vida
set-up time	hazırlık zamanı
shaft	döner mil, şaft
shake allowance	tıklama payı
shank	kesici kalem sapı, şaft
shank cutter	parmak freze
shaper	vargel
shaving	traşlama
shear angle	yarma açısı
shearing	(preste, makasta) kesme
shear strength	kesme dayanımı, kayma dayanımı
sheathing	kaplama
sheave	oluklu kasnak, makara
sheet	levha
sheet metal screw	saç vidası
sheet metal shears	teneke makası
shell reamer	takma rayba, kovan rayba
shearadizing	toz çinko ile galvanizleme, çinko emdirme
shift	vardiya; yerinden oynatma, yer değiştirme, vites geçirme
shim	şim; dişliler veya hareketli yüzeyle arasındaki açıklığı ayarlamak için kullanılan madeni levhalar
shock resistance	sarsım direnci
shot peening	bilyalı yüzey dövme
shrinkage allowance	çekilme payı
side milling cutter	silindirik alın freze bıçağı

side rake angle	yan talaş açısı
sieve	elek
silicon	silisyum
silver	gümüş
sine bar	sinüs çubuğu
sintering	külçeleme, sinterleme
skilled	kalifiye
slab	slab, yassı kütük
slab milling	vals frezeleme
slag	cüruf, dışık
sleeve	gömlek, kovan, mil üzerine bilezik gibi geçen parça; manşon (boruda)
slide	kızak
slideway	kızak
slip plane	kayma düzlemi
slitting	dilme, yarma
slotter	yarma frezesi
snap gage	çeneli mastar
snap ring	tesbit segmanı, yaylı tutturma bileziği
soaking pit	çelik demlendirme fırını
socket	yuva, soket, priz
socket adapter	cırcır anahtarı
socket wrench	lokma anahtarı
soldering	lehimleme
spanner	civata anahtarı
spare	yedek, fazla
specific	özellik
specification	specifikasyon; makina veya cihazın özellikleri, kendine has ölçüleri
specimen	numune, örnek
spindle	fener mili
spindle support	mil desteği
spinning	sıvama
spirit level	düzeç, kabarcıklı düzeç, su terazisi, tesviye ruhu
spline	freze oluklu kayar geçme yapma; iç ve dış dişlileri birbirine geçirmek suretiyle birleştirme
spot face	pul yatağı
spot welding	punta kaynağı
spraying	püskürtme

spring  
spring lock washer  
spring washer  
spring winding  
sprocket  
sprue  
spur gear  
square nut  
stainless steel  
stability  
standard  
standard deviation  
stem  
step drill  
stiff  
storage  
strain  
strain hardening  
strength  
stress  
stretch forming  
strip  
stripping machine  
stroke  
structure  
stud  
submerged arc welding  
super finishing  
surface finishing  
surface hardening  
swaging  
sweep pattern  
synchronization

## **T**

T-slot cutter  
tailstock  
tang (drill)

yay  
yaylı rondela  
yaylı rondela  
yay sarma  
zincir dişlisi, cer dişlisi  
döküm deliği  
düz dişli  
dörtköşe somun  
paslanmaz çelik  
denglilik  
standart, tek biçim, ölçünlü  
standart sapma, tek biçim sapması  
sap, gövde  
kademeli matkap  
bükülmez  
depolama  
gerinim  
uzama sertleşmesi, gerinim sertleşmesi  
direnc, mukavemet, dayanım  
gerilim  
uzatarak, gererek şekillendirme  
şerit, lime, kuşak, band  
sıyırma makinası, soyma makinası  
kurs  
yapı  
saplama, başlıksız civata  
toz atı kaynağı  
hassas perdelama  
yüzey perdelama  
yüzey sertleştirme, sementte etmek  
tokaçlama  
silmeli model  
senkronize etme; aynı anda ve beraber  
çalışır duruma getirme, eşleme, eş zamanlı

yarık freze bıçağı, T-kanalı açma bıçağı  
torna punta başlığı  
sökme ucu (konik şaftlı)

tap	klavuz
taper	konik
taper turning	konik tornalama
tap hole	klavuz deliđi
taper attachment	konik tornalama aygıtı
taper gage	koniklik mastarı
taper reamer	konik rayba
tapping	kılavuz çekme, kılavuzla diş açma
tapping machine	dişi vida dişi çekmek için kılavuz tezgahı
tempering	tavlama
template	şablon
tensile strength	çekme dayanımı
tension	gerginlik
thread	diş
thread cutting	diş açma, vida açma
thumb nut	dış yüzü tırtıllı dairesel (silindirik) somun
thumb screw	elle gevşetilir sıkıştırılan vida, silindirik başlı ayar
civatası	
tin	kalay, teneke
tip	uç (kalemde)
titanium	titan
tolerance	pay, tolerans
tommy bar	lokma anahtar kolu
tool	alet, takım, torna bıçađı
tool cutter	kalem
tool cutter edge angle	ayar açısı
tool cutting edge inclination	mevil açısı, eğim açısı
tool holder	kalem tutucu, kalemlik, kater
tool included angle	uç açısı
tool life	takım dayanma zamanı
tool minor cutting edge angle	yan bileme açısı
tool normal clearance angle	serbest açı
tool normal rake angle	talaş açısı
tool normal wedge angle	kama açısı
tool post	kalem tutacađı, kater
toolroom	takımhane
tool slide	takım kızađı
torch	üfleç, hamlaş, asetilen alevi, şaloma
torch cutting	üfleçle kesme, kaynakla kesme

torque	burulma momenti, tork
torque wrench	civata sıkma torkunu ölçen anahtar
torsion	burulma, torsiyon
torsional strength	burulma dayanımı
toughness	tokluk
tracing	konye etme
transparent	saydam, şeffaf
transverse	enlemesine
trimming machine	kordon makinası
T-slot	T-kanalı, T-oluğu
tumbling mill	döner değirmen
tungsten	volfram
turning machine	torna tezgahı
turret lathe	revolver torna, yarı-otomatik torna
twist drill	helisel matkap

## U

ultimate strength	maksimum mukavemet
ultrasonic machining	ses üstü dalgalarıyla talaş alma
uniform	düzgün, tek biçimli
unilateral	tek yönlü
upcut milling	aksi yönlü frezeleme
upright drill	sütunlu matkap
upset forging	şişirme

## V

valve	valf, vana, süpap, ventil
V-block (Vee-block)	V-yatağı
vernier caliper	sürgülü kumpas
vise	mengene
void	boşluk
volatile	uçucu

## W

washer	pul, rondela
waviness	dalgalılık
wear	aşınma
welded steel	kaynaklı çelik
welding	kaynak

electric arc welding	elektrik ark kaynađı
fusion welding	erime kaynađı
oxy-acetylene welding	oksijen kaynađı, asetilen kaynađı
spot welding	nokta kaynađı
thermit welding	termit kaynađı
welding rod	kaynak ubuđu, kaynak elektrodu
welding powder	kaynak tozu
welding machine	kaynak makinası
welding helmet	kaynak bařlıđı
white cast iron	beyaz pik
wind nut	kelebekli somun
wire drawing	tel ekme
wiring	elektrik řebekesi tel dizeni
wood screw	ađa vidası
work hardening	iřleme sertleřmesi
work piece	iř parası
work table	iř tablası
worm gear	sonsuz diřli, salyangoz diřli
wrench	anahtar
wrought iron	dvme demir, drk demir

## Y

yield point	akma dayanımı
yoke	atal, mafsal atalı

## Z

zinc	inko
zone	blge

## ÖNERİLEN KAYNAKLAR

- İnternette Makinacılık İle İlgili İngilizce Siteler
- ME 202 Manufacturing Technologies İngilizce-Türkçe Teknik Sözlük
- Muhtelif Teknik İngilizce ve İngilizce Sözlükler
- Lifetime English,İngilizce-Türkçe,Türkçe-İngilizce Sözlük,ALFA
- <http://websters-online-dictionary.org/definition>
- <http://www.metu.com/me2021>
- [www.emco.co.uk](http://www.emco.co.uk)
- [www.maneklulexports.com](http://www.maneklulexports.com)
- [www.technologystudent.com](http://www.technologystudent.com)
- [www.turkcadcam.net](http://www.turkcadcam.net)
- [www.yangzhousupermachine.com](http://www.yangzhousupermachine.com)

## KAYNAKÇA

- AKBABAOĞLU Ahmet, **Yayınlanmamış ders notları**,Tarsus,2006.
- ASLAN Hamit, **CNC Teknik**, Ankara, 2001.
- BAĞCI Özel, **CNC Teknik**, İstanbul, 2000.
- KARAMAN Şükrü, **Yayınlanmamış ders notları**,Tarsus,2006.
- ME 202 Manufacturing Technologies İngilizce-Türkçe Teknik Sözlük
- Milli Eğitim Bakanlığı, Mesleki ve Teknik Eğitim Alanları, Ankara, 2005.
- Muhtelif internet adreslerinin bölüm ve sayfeleri
- Lifetime English,İngilizce-Türkçe,Türkçe-İngilizce Sözlük,ALFA
- ÖZCAN Şefik, Halit BULUT, **Atölye ve teknoloji**, Ankara, 1974.
- ÖZKARA Hamdi, **Tesviyecilik Teknoloji**, Ankara, 1985.
- SARI Mustafa, **Yayınlanmamış ders notları**, Tarsus,2006.