

AUTO ENGINE REBUILDING NCII

Prepare report of malfunctioning
tools



Preparing report for malfunctions of hand tools in unplanned or unusual events.

Tools are made for use. Its life cycle must be used to its maximum effectiveness. It is designed to give its purpose so that work becomes easy and efficient. A tool that is 100 percent usable brings joy to the one using it but a faulty tool is unsafe to use. It is not recommended for use because of its risk to workplace activities. A faulty tool creates headache and irritation. That is why; faulty tools must be recorded, marked, and reported at once.

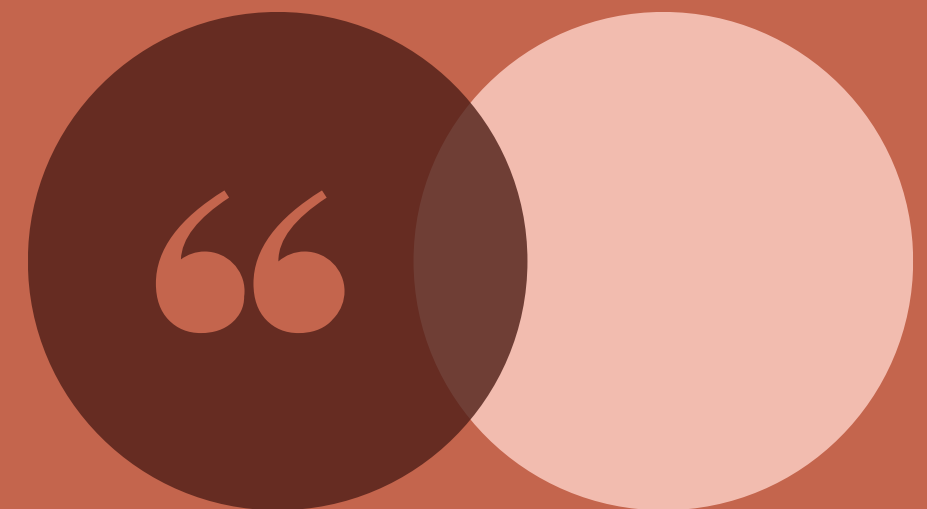


Defective tools can be repaired according to company procedure. This is essential in restoring back their technical specifications. A good example is the drill bit's angular cutting edge. If standard procedure is not followed in sharpening its edge, it will not cut effectively compared to the original specifications. Partially defective tools can be reconditioned for another form of use. Heavily damaged tools not fit for human use are condemned and disposed.

Tools must be set apart according to their serviceability. It is important that defective or faulty tools must be marked. Markings will mean that they are not to be used and are intended for repair or reconditioning.

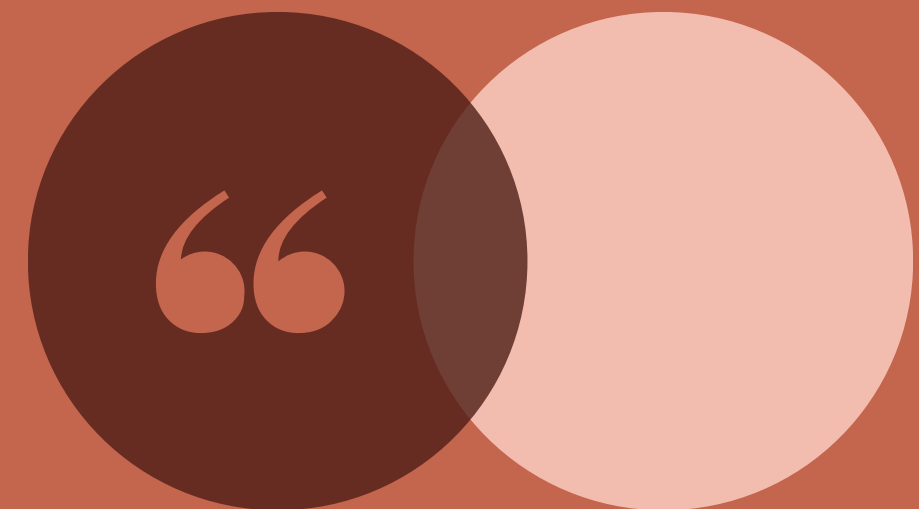
BELOW ARE SOME EFFECTS OF A DEFECTIVE TOOL THAT CAN RESULT IN THE FOLLOWING CONSEQUENCES:

1. Reduces work efficiency. It decreases work effectiveness and additional time allotment is needed to finish the work. Therefore, delay of work is sure.
2. Lessens the concentration of the user. Frequent breakdown or change of tools because of its faulty condition affects the mental focus of the user. It creates anxiety and apprehension thus delaying the work instead of finishing it on time.



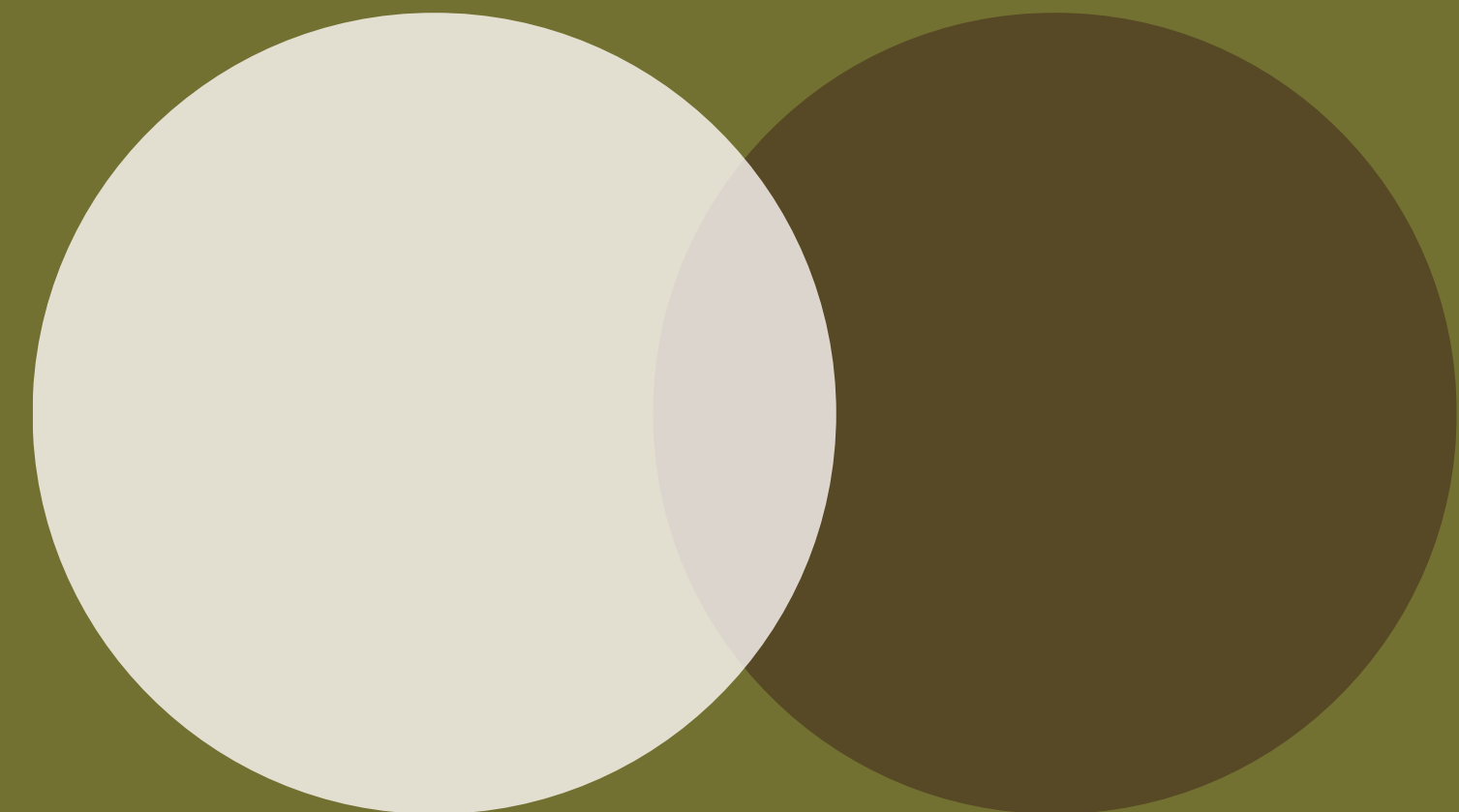
BELOW ARE SOME EFFECTS OF A DEFECTIVE
TOOL THAT CAN RESULT IN THE
FOLLOWING CONSEQUENCES:

3. Decreases credibility. Competitiveness is the language of service. Once the customer perceives that a worker or a serviceman uses faulty tools without giving notice of it, it lessens their trust and confidence



IN ORDER TO AVOID THESE SITUATIONS, PROPER INVENTORY OF TOOLS MUST BE CONDUCTED, RECORDED AND UPDATED. REPORTING THE CONDITION OF GOOD, FAULTY AND DAMAGED TOOLS WILL GIVE AN ACCOUNT OF THEIR PRESENT CONDITION. IT WILL GIVE A BASIS FOR DISPOSAL, IF DAMAGE IS SEVERE OR BEYOND RECOVERY; FOR RECYCLING, IF THE FAULT CAN BE CORRECTED AND REPAIRED AND REUSED TO ANOTHER FORM OF SERVICE. A BROKEN HACKSAW CAN BE RECYCLED TO ANOTHER FORM LIKE CONVERTING IT TO A SHARP BLADE FOR STRIPPING ELECTRICAL WIRE. MAINTENANCE OF TOOLS ENTAILS CLEANING AND DOING SIMPLE REPAIR IN ORDER TO PROLONG THEIR USE.

To give you an idea of what an inventory, requisition and account of tools are, a basic sample of forms are given.



SAMPLE INVENTORY OF TOOLS

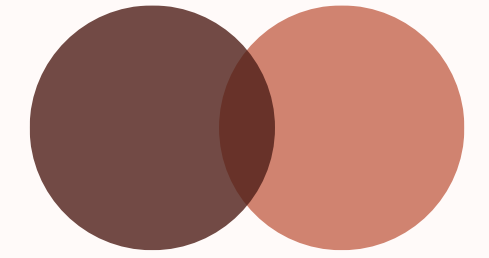
Item No.	Source of Fund	Description	Quantity	Remarks
001	National	Open wrench, mm. drop forged, Sakura, Japan	1 set, 12 pcs	
002	-do-	Box wrench, in. drop forged, Sakura, Japan	1 set, 12 pcs.	
003	-do-	Screwdriver, flat, hardened steel, Stanley, U.S.A.	1 set, 6 pcs.	
004	-do	Screwdriver, Phillips , hardened steel, Stanley, U.S.A.	1 set, 6 pcs.	
005	SEF	Hammer, ball peen 16 oz., high grade steel, Proto, U.S.A.	6 pcs.	

To give you an idea of what an inventory, requisition and account of tools are, a basic sample of forms are given.

SAMPLE ACCOUNT OF TOOL CONDITION

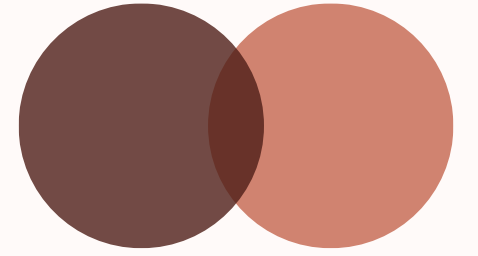
Item No.	Source of Fund	Description	Remarks / Condition		
			Good	Defective	Condemnable
001	National	Open wrench, mm. drop forged, Sakura, Japan			
002	-do-	Box wrench, in. drop forged, Sakura, Japan			
003	-do-	Screwdriver, flat, hardened steel, Stanley, U.S.A.			
004	-do	Screwdriver, Phillips , hardened steel, Stanley, U.S.A.			
005	SEF	Hammer, ball peen 16 oz., high grade steel, Proto U.S.A.			

To give you an idea of what an inventory, requisition and account of tools are, a basic sample of forms are given.



Unit 4: Maintain Hand Tools

- STANDARD OPERATIONAL PROCEDURE, PRINCIPLES AND TECHNIQUES IN MAINTAINING TOOLS.
- TOOL MANAGEMENT IS A MANIFESTATION OF A GOOD SERVICEMAN OR ANY PERSON WORKING WITH TOOLS. THE WAY A PERSON MANAGES HIS TOOLS HAS BEARING ON THE WAY HE MANAGES HIS PERSONAL PROPERTY.
- MUCH TO SAY, A GOOD TOOL MANAGER IS EFFICIENT IN LISTING AND KEEPING RECORDS. UP-TO-DATE RECORDS OF TOOLS BOTH THE OLD AND NEWLY BOUGHT MUST BE ENTERED TO THE ROSTER OF TOOLS. BASICALLY, FUNDAMENTAL PRINCIPLES AND TECHNIQUES IN MAINTAINING TOOLS AT THE MINIMUM LEVEL IS GOOD ENOUGH BUT THE MORE ROUTINE SCHEDULE YOU MAKE , THE BETTER. IT WILL ONLY TAKE A MATTER OF ONE TO TWO HOURS TO MAINTAIN TOOLS. SOMETIMES, IT TAKES MORE THAN WHAT EXPECTED TIME IS CONSUMED DEPENDING ON THE EXTENT OF THE NUMBER AND SIZE.



Unit 4: Maintain Hand Tools

- ONE OF THE MAINTENANCE SCHEMES OF THE PROVISION AND USE OF WORK EQUIPMENT REGULATIONS 1998 (PUWER) UNDER THE LAW ON TOOLS AND MAINTENANCE IS TO ENSURE THE SAFEKEEPING AND SECURING OF THE EQUIPMENT INCLUDING TOOLS.
- THIS LAW HELPS IN IDENTIFYING SAFETY PROCEDURE BEFORE IT GROWS INTO A SEVERE HAZARD.
- IN ORDER TO AVOID THESE PROBLEMS, SOME PRINCIPLES MUST BE FOLLOWED. NEGLIGENCE OF THESE PRINCIPLES OPENS A DOORSTEP TO RISK AND DANGER TO LIFE AND PROPERTY.

OPERATIONAL PROCEDURE IN TOOLS AND EQUIPMENT MAINTENANCE



1. SAFE USE.

ASSURANCE OF SAFE USE IS EXPECTED. THIS CAN BE DONE BY KNOWING THE PURPOSE, APPLICATION, AND REQUIREMENT OF TOOLS AND EQUIPMENT. WITHOUT THIS KNOWHOW, THE USER WILL ONLY BE GUESSING AND WRONG USE IS EXPECTED. RISK OF INJURY IS MORE LIKELY TO HAPPEN. SHOP / INDUSTRY OWNERS ARE EXPECTED TO TRAIN THEIR WORKERS. THIS WILL BUILD MORALE AND REDUCE DANGER

OPERATIONAL PROCEDURE IN TOOLS AND EQUIPMENT MAINTENANCE



2. SAFEKEEPING.

REGULAR MAINTENANCE OF TOOLS AND EQUIPMENT THROUGH SAFEKEEPING MUST BE A PART OF THE HEALTH AND SAFETY OF USERS AND OWNERS. DANGERS TO THEFT AND EXPOSURE TO MOISTURE IS AVOIDED, PROPERTY IS TAKEN CARE OF, AND RISK IS EVADED. PUTTING THE TOOLS, EQUIPMENT AND PAPER DOCUMENTS SUCH AS MANUAL OF SPECIFICATIONS IN A VERY PROTECTED BUT EASY TO RETRIEVE PLACE IS A GOOD HABIT OF SAFEKEEPING. STORAGE ROOM MUST BE PROPERLY LOCKED AND VENTILATED

OPERATIONAL PROCEDURE IN TOOLS AND EQUIPMENT MAINTENANCE

3. SAFETY SIGNS AND SYMBOLS.

BY PUTTING SAFETY SIGNS AND SYMBOLS, USERS ARE INFORMED AND WARNED OF WHAT TO DO AND WHAT NOT TO DO. RISK IS LIMITED AND PUT IN CONTROL. SPECIFIC SAFETY SIGNS FOR MECHANICAL, ELECTRICAL, PNEUMATIC, AND HYDRAULIC MUST BE CLEARLY DEFINED AND PLACED IN A VISIBLE AREA.



OPERATIONAL PROCEDURE IN TOOLS AND EQUIPMENT MAINTENANCE



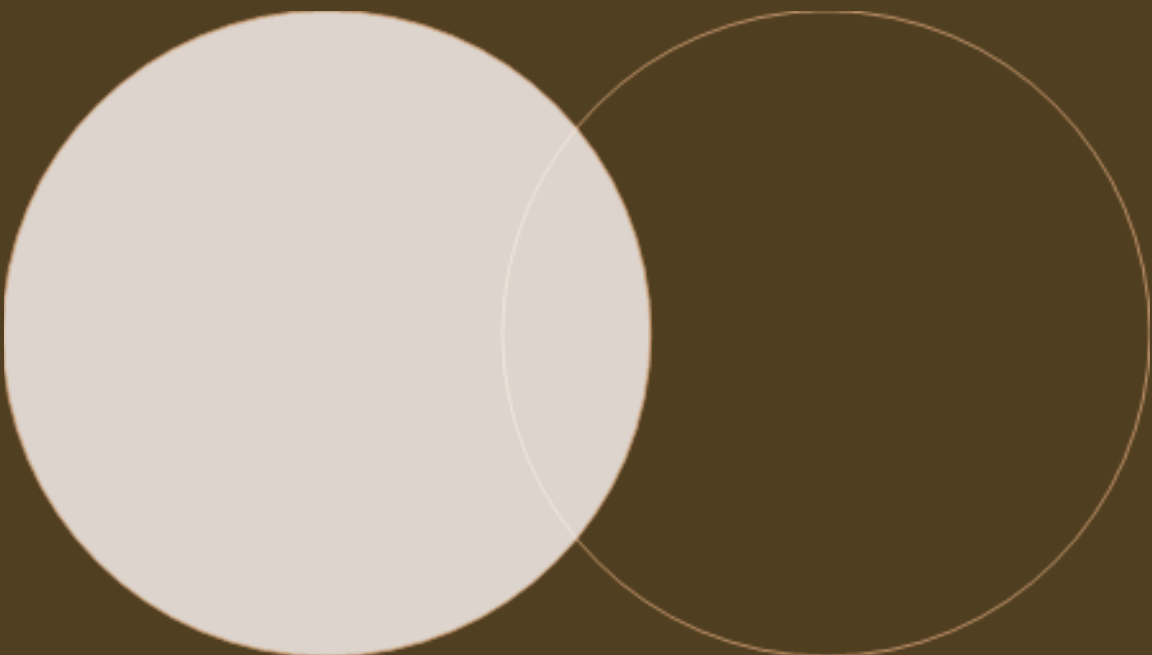
4. SAFETY PROTECTION.

THE USE OF PERSONAL PROTECTIVE EQUIPMENT (PPE) IS NECESSARY. SAFETY GEARS MUST BE WORN PROPERLY. SUITABILITY OF PPE TO THE WORKPLACE MUST CONFORM WITH THE WORK BEING DONE. IT MUST BE COMFORTABLE SO THAT USER WILL NOT BE IRRITATED. THE PPE CAN CONTROL HEALTH RISK AND DECREASE POSSIBILITY OF THREAT OR INJURY. FOR FACE PROTECTION, EYE WEAR, GOGGLES, AND SAFETY SHIELD USED IN WELDING ARE USED. THE BODY PROTECTION SUCH AS APRONS OR COVERALL GARMENT SERVES AS PROTECTION FOR THE FRONTAL BODY. HIGH GRADE, HEAT AND CHEMICAL RESISTANT HAND GLOVES PROTECT THE HANDS AND A SIMPLE DUST MASK OR RESPIRATOR CAN WARD OFF CHEMICAL FUMES AND DUST FOR THE RESPIRATORY SYSTEM. APPROPRIATE SHOES CAN ALSO PROTECT FROM ACCIDENTAL FALL OF METALLIC PARTS. NOT ONLY THAT, SAFETY IN THE WORKPLACE IS ALSO INCLUDED. FIRE EXTINGUISHERS PLAY A VITAL ROLE IN REDUCING AND TOTALLY PUTTING OUT THE FIRE. SAW DUST IS A GOOD CLEANER FOR SPILLED OIL ON THE FLOOR.

AUTO ENGINE REBUILDING

NCII

Select measuring instrument and
carry out measurement and
calculations



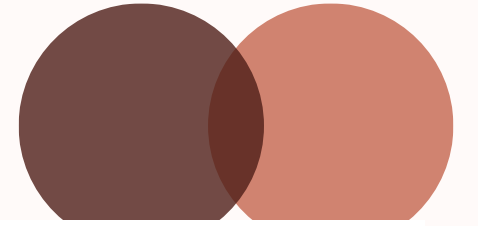


Modern measuring instruments evolved in a very fast and changing time. Year after year, from human to non-human use, new and sophisticated measuring instruments are innovated. In automotive application, vehicles are innovated and modified year after year. Measuring instruments used from engine output testing like dynamometer to engine tune-up like engine analyzer are used even in small auto shop industry.



With the emerging trends of measuring instruments, the need for accurate data is very much important. In automotive servicing, the language of competition cannot be denied. Car owners go to car repair shop with updated gadgets. They thought that repair is not guessed but really gives a fast movement of digital or analogue reading of the gadget. Just one flick of a finger is needed to get the job done. Precision measuring instruments cannot be squarely compared to the one used for mechanical jobs. Tools for mechanical jobs are heavy and need strong force to operate whereas precision instruments are light, sensitive and calibrated to get accurate result. A slight difference of reading invites occurrence of error. Essentially, having a simple or sophisticated precision measuring tool is not a fad anymore but a necessity that must be seriously considered. Measuring instruments and its application

Perform Mensuration and Calculations

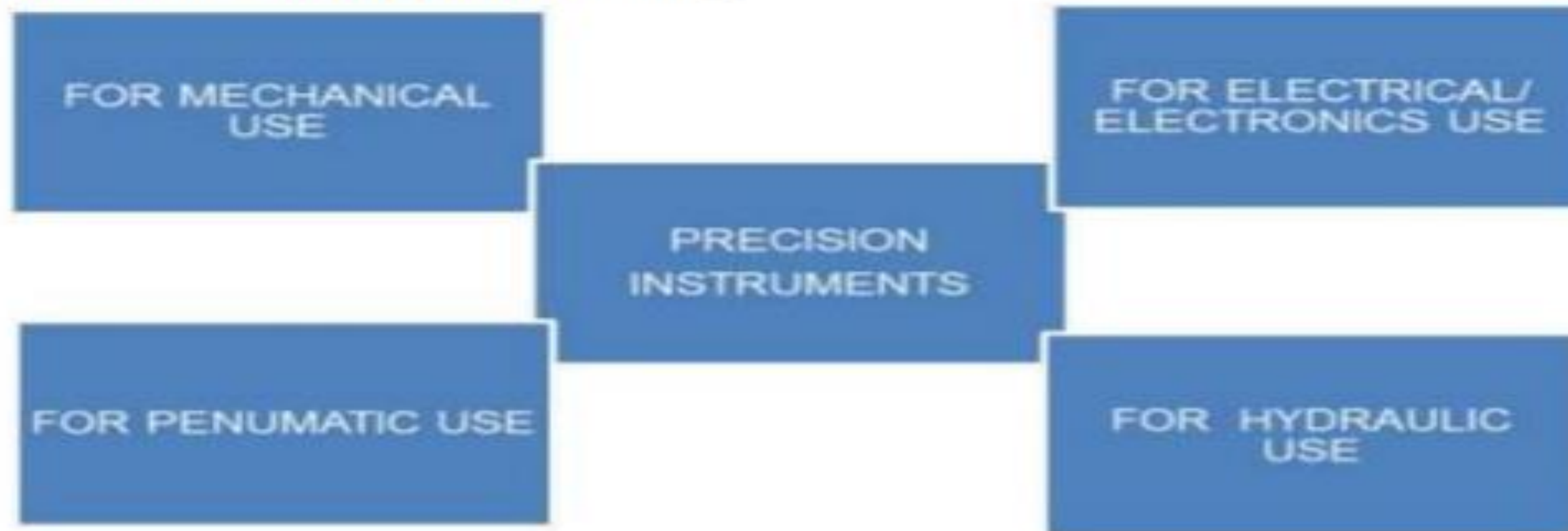


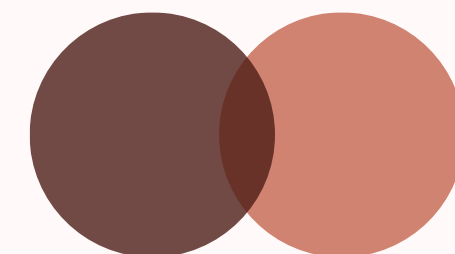
Measuring instruments and its application

Very importantly, your knowledge of the different types and applications of measuring instruments play a vital role in the development of your competency.

Like any other tasks, components to be measured must first be identified before using any tools. Identification of components will determine the right tools to be used. It will make your work easier and faster without going back and forth because of wrong choice of tools. To understand it more, a precision instrument like vernier caliper is not a good in getting the diameter of oil filter. But getting the diameter of bearing or thickness of shim using this kind of precision tool is much better.

In order to be clearer, the following precision instruments/tools basically used in automotive application are the following:



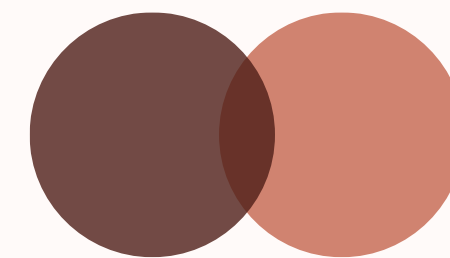


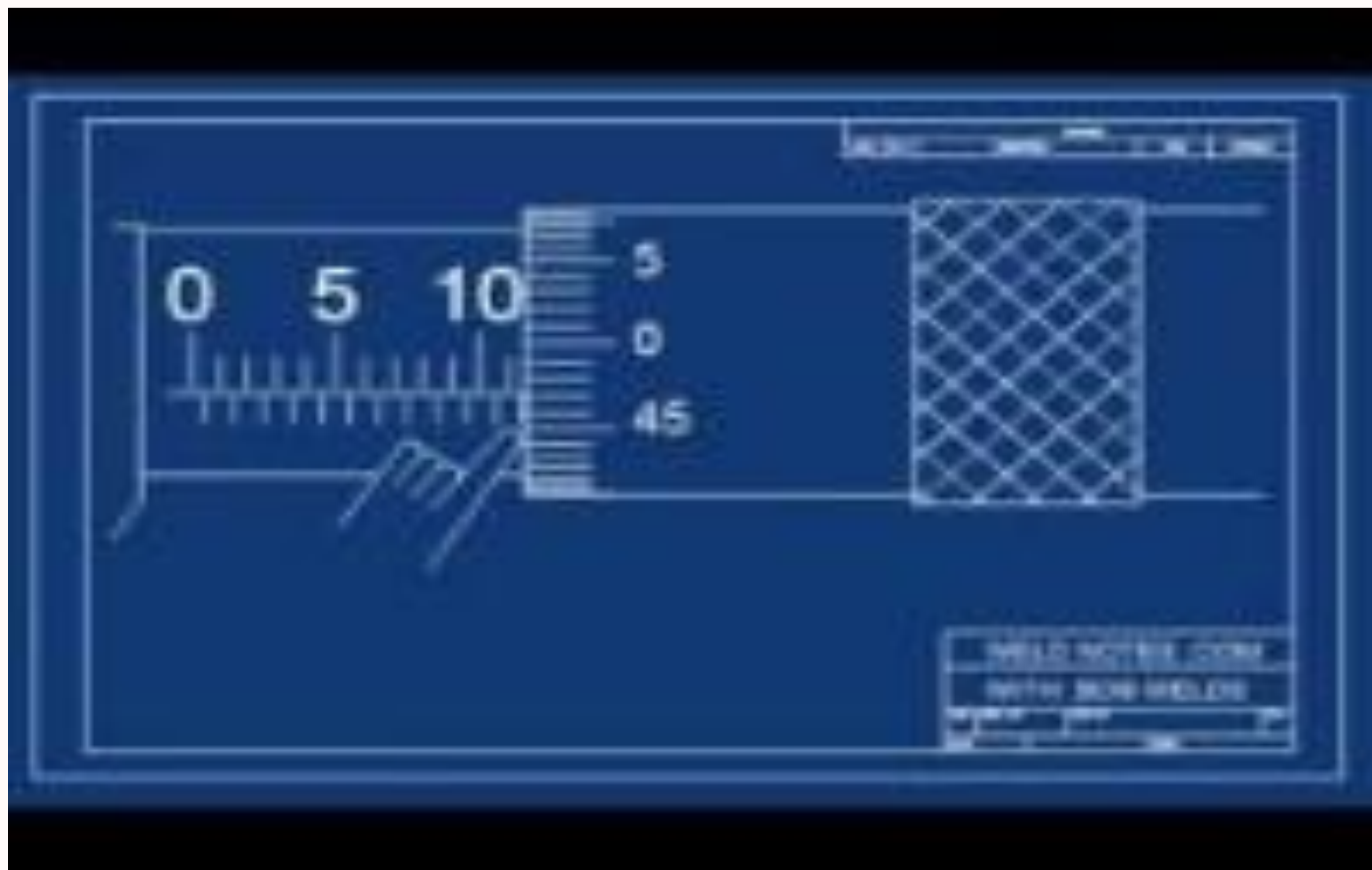
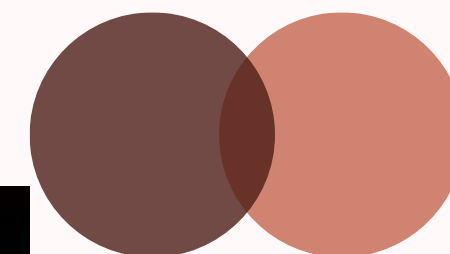
A. For Mechanical Use

1. The Vernier and Micrometer calipers are both precision instrument that can measure even the smallest and tiniest thickness and diameter of an object. Vernier or micrometer calipers are usually used in measuring the diameter of engine crankshaft and camshaft journals pistons and valve adjusting shims. These engine parts need to be measured in a precise way. Verniers and Micrometers can be bought equipped with digital or analogue reading. This will lessen the time consumed in analyzing the reading of data because of the direct data available as you measure the part

Micrometer

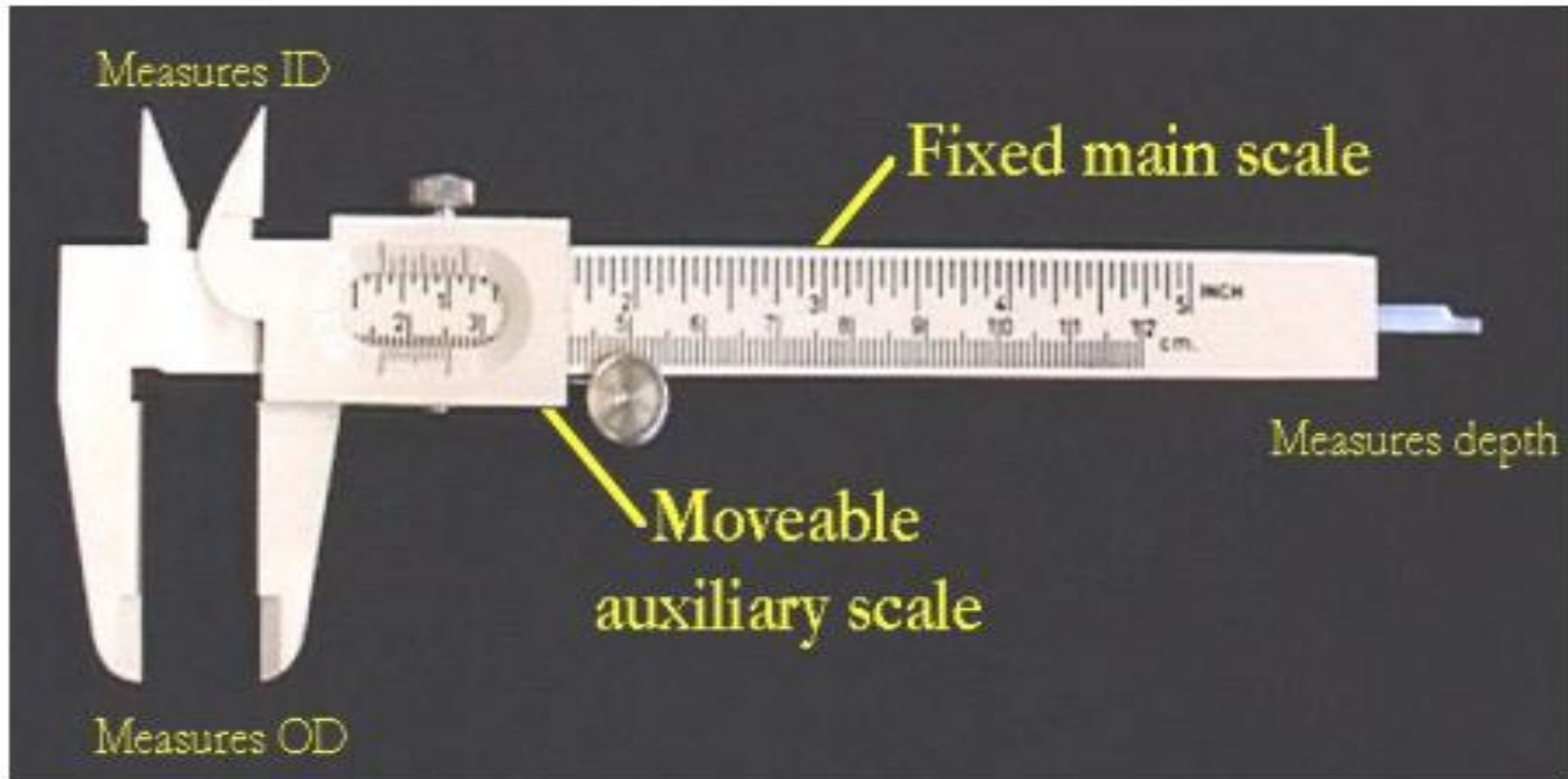
- a hand-held precision measuring instrument.
- in English metric system, it measures thicknesses in thousandths or ten-thousandths of an inch, while in Metric measurements are in hundreds or millimeter.
- there are two kinds, the inside and outside micrometer.
outside micrometer is used most in the automotive shops.





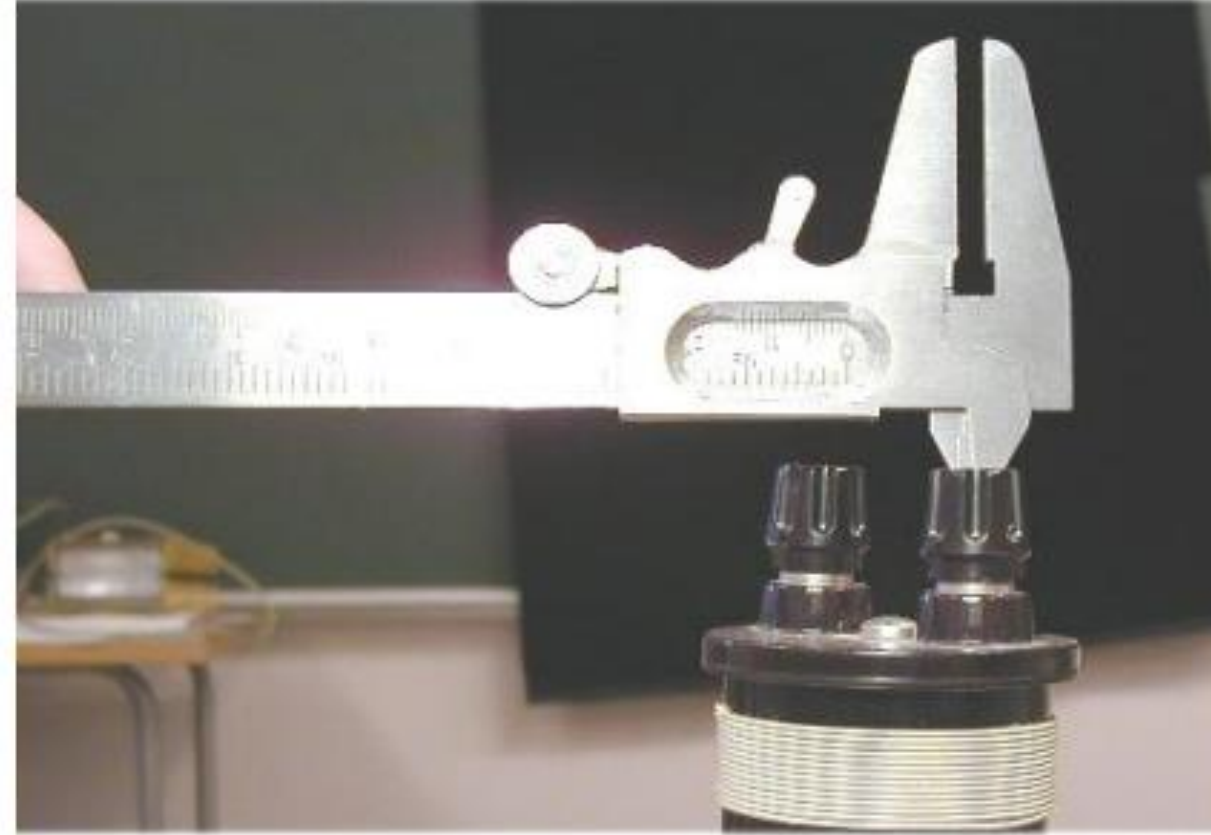
Vernier Caliper

-can take both inside and outside measurements. These may be in either thousandths of an inch or hundredths of a millimeter.





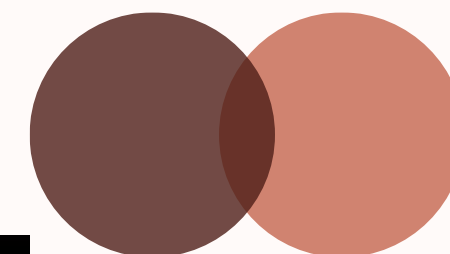
Measuring the outside diameter

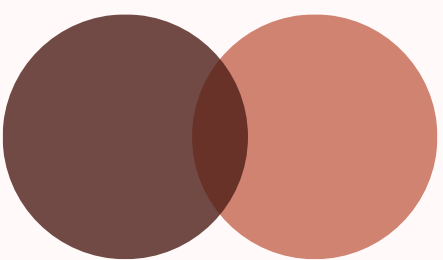


Measuring the inside diameter



Measuring the depth diameter



-
- 
2. Dial gauge is an instrument that measures „thrust” or „backlash”. A backlash is the result of force that comes from an abnormal clearance or gap between two parts as in the differential gears. When two parts wear-out, slack is developed and backlash is the result of it. Dial gauge is also used in getting the clearance of engine valves. It is more accurate than feeler gauge. The movement of pointer in the dial gauge determines the amount of backlash being measured



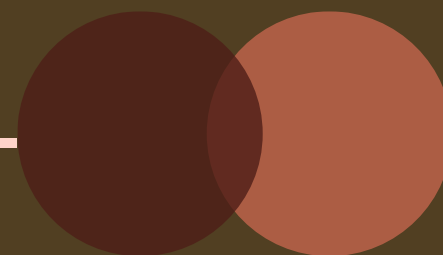
1. Linier Dial Indicator

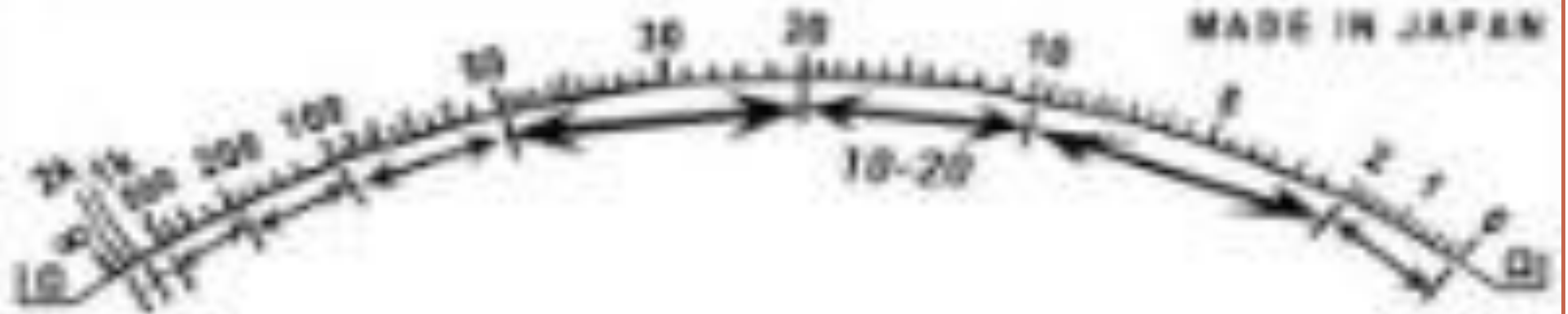


B. For Electrical Use

1. **V.O.M. tester** is a multi tester. It is an electrical instrument that measures or tests the voltage, resistance and current in a circuit. V.O.M. can be digital or analogue. Digital reading have digitized screen and a direct number of data can be read at once. Analogue reading have pointer that determines the reading on the screen. When testing for resistance, external power from the source must be disconnected because V.O.M. tester is equipped with built-in battery as source of power. If external power source is not disconnected, the tester itself will be damaged.

When testing for voltage, tester is connected across the lines of the circuit. But, when the current is tested, the tester prod is connected in series of the circuit. A Clamp ammeter is also available in the market. This kind of tester is clamped in the wire itself. It measures current in amperes.





- 10-20** - ang agwat mula 10 to 20 ay 10
- hinati sa 10 pantay-pantay na linya
 - $10 \div 10 = 1$
 - 1 ang katumbas ng 1

2. Megger Tester is a test instrument in finding out grounds and shorts in a motor. A good example to test is the starter motor. When the starter motor is subjected to a megger test, a flat, thin piece of metal (like a hacksaw blade) is placed above the starter motor. When the megger tester is turned „on“ and starter motor is rotated, a spot where a hacksaw blade is attracted means that the starter motor is faulty and need to be repaired or replaced



3. Engine Analyzer is a compact instrument that tests and measures the following:

3.1 Contact point resistance

3.2 Ignition coil resistance

3.3 Battery voltage

3.4 Ignition current flow

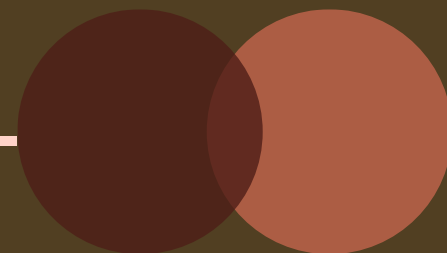
3.5 Engine revolution per minute (RPM)

3.6 Dwell /Cam angle

3.7 Alternator diode

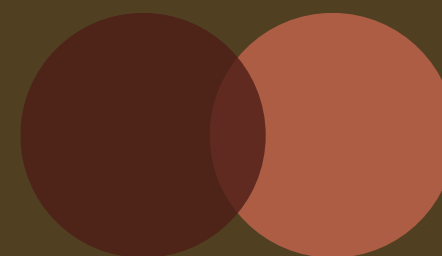


4. Timing/Strobe light is a device that produces stroboscopic effect from ignition pulses. Ignition timing is achieved by aligning the timing marks on the crankshaft pulley and timing cover of the engine



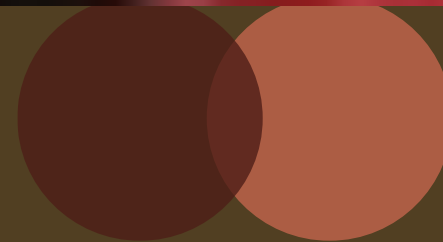
C. For Pneumatic Use

1. Vacuum gauge is an instrument that measures the atmospheric pressure drawn by the engine. It is also used to find out the air fuel ratio of the engine



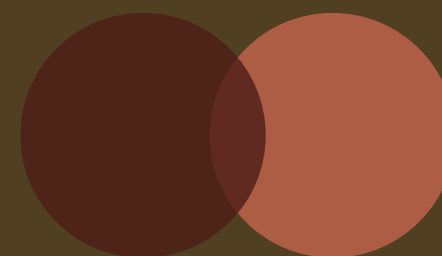
How to use a vacuum gauge

Restricted Exhaust
-Slowly declining reading,
especially while at higher RPM's



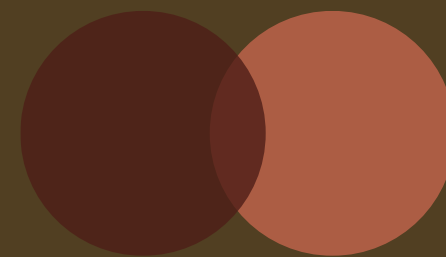
C. For Pneumatic Use

2. Compression gauge is an instrument that measures the compression pressure of the engine cylinder

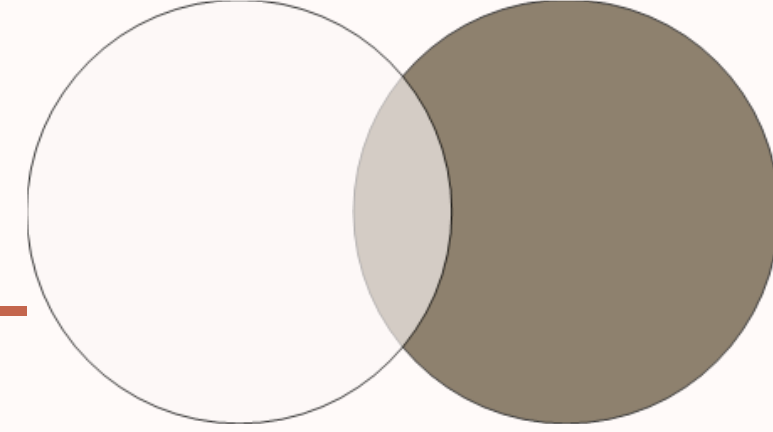


C. For Pneumatic Use

3. Radiator pressure tester is used to test the cooling system for internal and external leaks and to make sure that it has the ability to hold pressure.

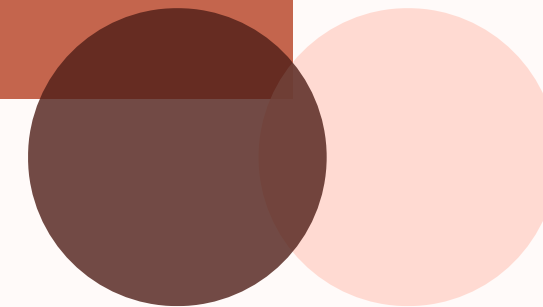


D. For Hydraulic Use



1. Fuel pump pressure tester is an instrument that has the capability to check the pump pressure.
2. Oil pressure gauge is an excellent indicator instrument that determines the pressure of oil flowing.
3. Temperature gauge is an instrument that determines if the engine temperature is normal or overheating.

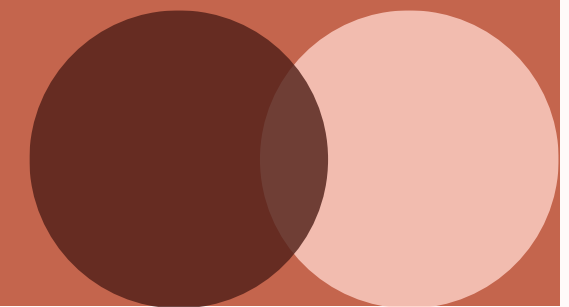
Techniques in measuring and determining Tolerance of parts



There are many ways in measuring a part or component but there is difficulty when using precision instruments specially those that require minute data. The process in which parts are measured needs to have a corresponding data of specifications so that a clear and objective result is attained. Using specific measuring instrument for a specific part or system to be measured is highly recommended. Specific measuring instrument is designed for specific part or system. Using different instruments other than what is required will give you vague or incorrect result. For these reasons, determining to find out the tolerance will give you difficulty.

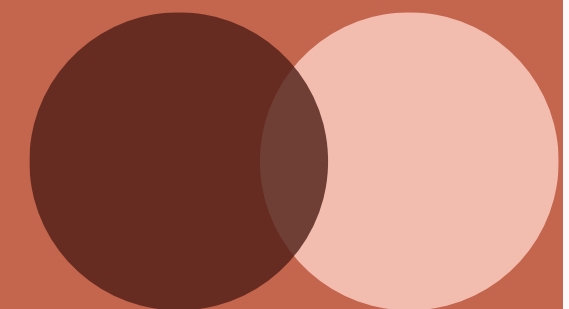
In order to apply techniques and determine tolerance, some considerations are recommended for consideration:

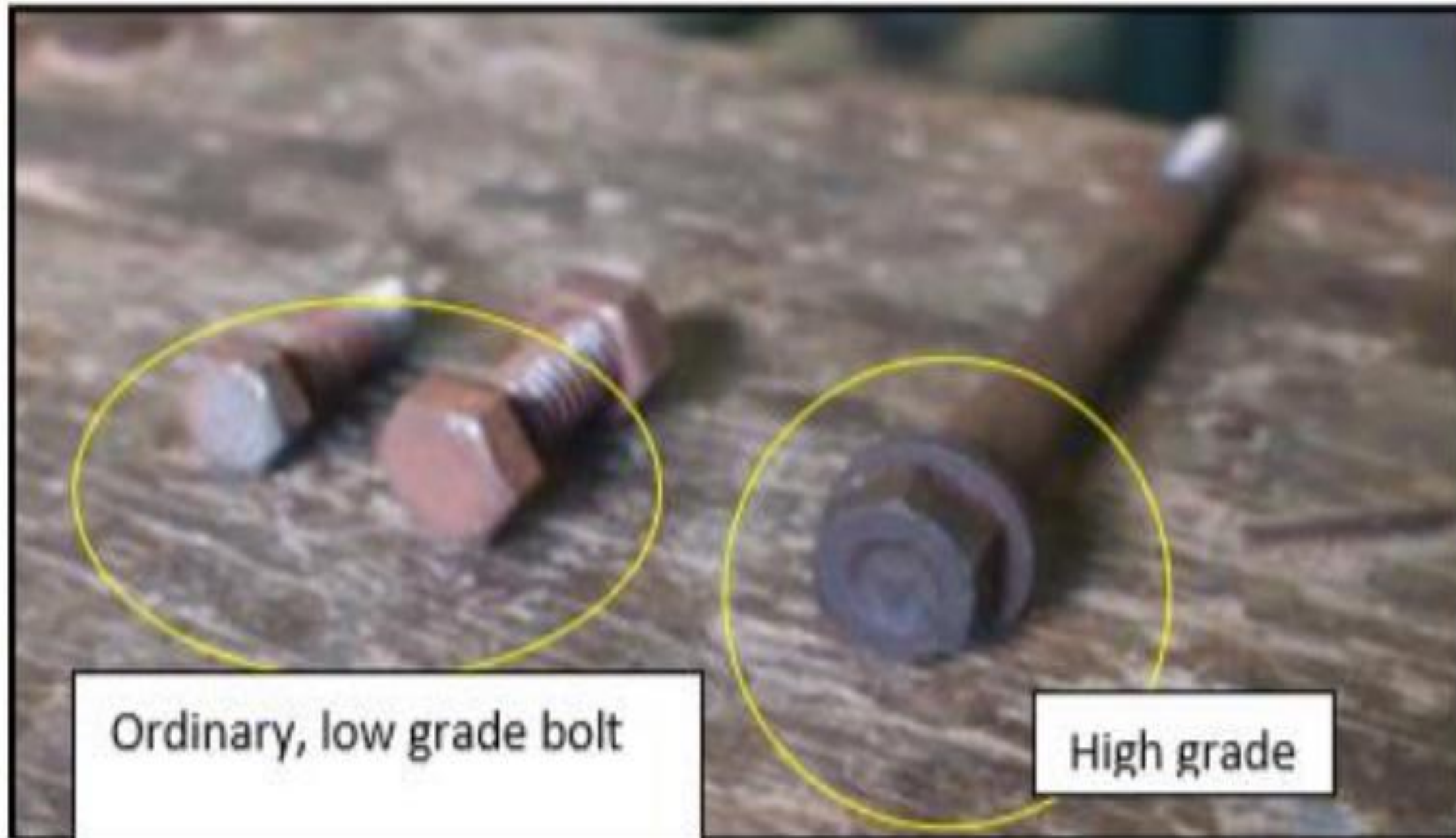
- Use the Manual of Specifications
- Use the Principles of General Rule
- Use of Professional Experience



1. Use the Manual of Specifications. The availability of specifications manual will speak for the tolerance of certain part or system. User's manual will tell you the procedures on how it check and the negative effect if it exceeds the standard limit value of part or system. Without this manual, the user will only be guessing on the corresponding value of measurements. If neglected or allowed in this manner, the parts or system will easily give up.

A good example is the kind of bolts being used. A bolt made of high grade carbon steel has a big difference compared with a bolt made of low carbon steel even if it has the same size. When a low carbon steel bolt is tightened using the torque data used for high grade carbon steel will easily give up and break. This is due to the fact that it cannot withstand the tolerance used in high grade steel carbon steel bolt. The bolt's mechanical strength or stretching point easily gives up and consequently breaks.





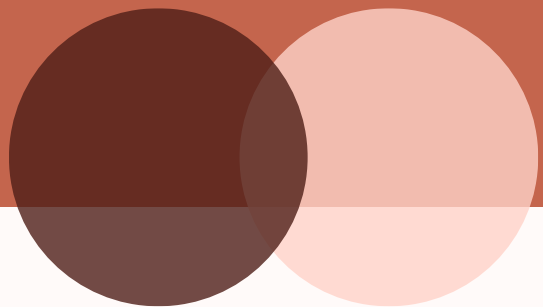
Ordinary and
high grade bolt

Ordinary, low grade bolt

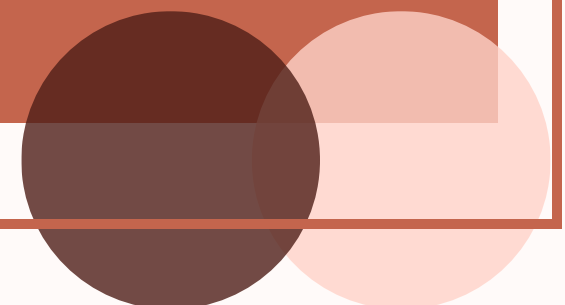
High grade

Vehicle electrical component like ignition coil primary and secondary windings have specified resistance data but tolerance is also given. It means that when the resistance reading is above or below the standard reading but within the limit of its tolerance, it is said that the resistance is acceptable or tolerable.

The use of precision instruments and tools has tolerance also. Mechanical measuring tool like torque wrench have tolerable life cycle. If it exceeds its cycle or length of used, a metal fatigue will be developed. Its effectiveness to accurately measure the tightness of bolts or nuts is affected. That is why it must be calibrated before and after use. Delicate precision tool like Vernier and Micrometers must be used with caution. It is made with a very light material that a sudden impact or force will damage its scale and calibration.

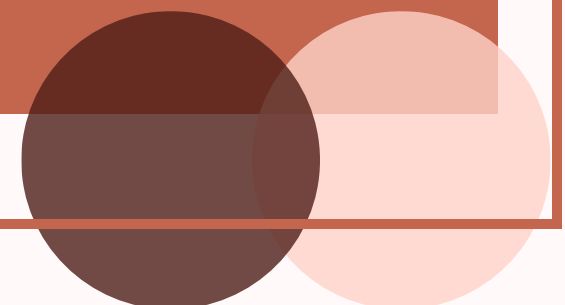


Unlike electrical/electronics precision instruments sometimes, a wrong selection of range is unintentional. In V.O.M, a selected 110 voltage range when tested in a 220 volts line will instantly create damage to the instrument. That is why careful steps must be observed when using delicate precision instrument.

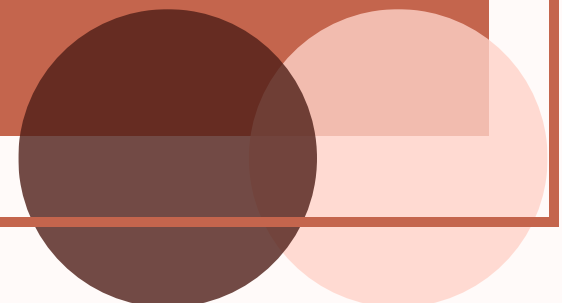


2. Use the Principles of General Rule. Sometimes, a manufacturer allows a general rule when considering tolerance of parts or systems. They include plus (+) or minus (-) rule. Even with the availability of specifications manual, manufacturers accept it but do not tolerate using it even though it does not cross the maximum limit of tolerance. Not all parts or systems can be applied with this kind of principles. The extent of tolerable limit must be determined so that the outcome of the process can be achieved without affecting other factors.

The application of piston ring end clearance is a good example. Even without the aid of specifications manual, the principle of general rule is applied by multiplying the piston diameter by three thousandths of an inch (.003 in”) and you will get the acceptable piston ring end clearance.



3. Use of Professional Experience. This can be done if a person or user has vast, wide and long experience working on the specific task. A novice worker must not involve himself in duplicating this kind of ability. An experienced one because of his long immersion in specific tasks have become expert and remember the applicable specifications of a certain part or system including the correct tolerance



Methods of calculation/conversion of units of measurement using mathematical formula

Measurement is the process of finding out the physical quantity in terms of time, distance, quantity and economy. The word measurement comes from the Latin word *mēnsūra* and the science of measurement is called Metrology.

Early history had no standard of measurement. It was only over time where people agreed and accepted to use it for uniformity and necessity. Later on, a means of standardizing measurement was established to avoid dishonesty and deceit.

The era of measurement continued to develop into a more suitable and scientific way. Later on, methods of calculations were scientifically done as a way of solving number problems and were generally accepted in education, government offices, business and personal used.

Methods of calculation/conversion of units of measurement using mathematical formula

There are two widely accepted and recognized used systems of measurement. The International System (SI) and the English systems. The SI is expressed in metric system of measurement which is expressed in meter for length or distance and kilogram for mass/weight. Whereas the English system is expressed in inches or mile for length/distance and ounce or pounds for mass/weight.

In automobile its systems are also measured. Whether it functions or not, its kinetic and static energy can be measured. When the vehicle runs, it is measured by the distance travelled in terms of miles(mi) or kilometers (km). When it comes to speed it is measured by miles or kilometers per hour. When it comes to engine speed it is expressed in revolution per minutes (rpm).

Below is a sample Systems of Measurement chart of both English and Metric with corresponding conversion

MEASUREMENT SYSTEMS

L E N G T H

12 inches	1 foot	1 kilometer	1000 meters
36 inches	1 yard	1 hectometer	100 meters
3 feet	1 yard	1 decameter	10 meters
5,280 feet	1 mile	1 meter	1 meter
16.5 feet	1 rod	1 decimeter	0.1 meter
320 rods	1 mile	1 centimeter	0.01 meter
6 feet	1 fathom	1 millimeter	0.001 meter

WEIGHT

27.34 grains	1 dram	1 tonne	1,000,000 grams
438 grains	1 ounce	1 kilogram	1,000 grams
16 drams	1 ounce	1 hectogram	100 grams
16 ounces	1 pound	1 dekagram	10 grams
2000 pounds	1 short ton	1 gram	1 gram
2240 pounds	1 long ton	1 decigram	0.1 gram
25 pounds	1 quarter	1 centigram	0.01 gram
4 quarters	1 cwt	1 milligram	0.001 gram

VOLUME

8 ounce	1 cup	1 hectoliter	100 liter
16 ounces	1 pint	1 decaliter	10 liters
32 ounces	1 quart	1 liter	1 liter
2 cups	1 pint	1 deciliter	0.1 liter
2 pints	1 quart	1 centiliter	0.01 liter
4 quarts	1 gallon	1 milliliter	0.001 liter
8 pints	1 gallon	1000 milliliter	1 liter

A R E A

144 sq. inches	1 sq. ft.	100 SQ. millimeters	1 sq. centimeter
9 SQ. feet	1 sq. yard	100 SQ. centimeters	1 sq. decimeter
43, 560 sq. ft.	160 sq. rods	100 SQ. decimeters	1 sq. meter
160 sq. rods	1 acre	10,000 sq. meters	1 hectare
640 acres	1 sq. mile		

T E M P E R A T U R E

FAHRENHEIT		CELSIUS
32 Degrees F	WATER FREEZES	0 Degrees C
68 Degrees F	REASONABLE ROOM TEMPERATURE	20 Degrees C
98.6 Degrees F	NORMAL BODY TEMPERATURE	37 Degrees C
173 Degrees F	ALCOHOL BOILS	78.34 Degrees C
212 Degrees F	WATER BOILS	100 Degrees C

TEMPERATURE CONVERSION TABLE

TO CONVERT	EQUATION	EXAMPLE
Celsius to Fahrenheit $^{\circ}\text{C}$ to $^{\circ}\text{F}$	$^{\circ}\text{F} = \left[\frac{9 \times ^{\circ}\text{C}}{5} \right] + 32$	Convert 50°C to $^{\circ}\text{F}$ $^{\circ}\text{F} = \left[\frac{9 \times 50}{5} \right] ^{\circ}\text{C} + 32 = 122^{\circ}\text{F}$
Fahrenheit to Celsius $^{\circ}\text{F}$ to $^{\circ}\text{C}$	$^{\circ}\text{C} = \frac{5}{9} \times \left[^{\circ}\text{F} - 32 \right]$	Convert 122°F to $^{\circ}\text{C}$ $^{\circ}\text{C} = \frac{5}{9} \times \left[122^{\circ}\text{F} - 32 \right] = 50^{\circ}\text{C}$
Celsius to Kelvin $^{\circ}\text{C}$ to K	$\text{K} = ^{\circ}\text{C} + 273$	Convert 50°C to K $\text{K} = 50^{\circ}\text{C} + 273 = 323 \text{ K}$
Kelvin to Celsius K to $^{\circ}\text{C}$	$^{\circ}\text{C} = \text{K} - 273$	Convert 323 K to $^{\circ}\text{C}$ $^{\circ}\text{C} = 323 \text{ K} - 273 = 50^{\circ}\text{C}$

Unit 2:

Maintain measuring instruments

Safe handling procedures and care of measuring instruments

Every property must be taken care with concern. Like a good manager looking for the welfare of his duty can be compared to a person who is responsible in keeping his personal belongings. The same is true in handling your tools. Tools, like measuring instruments must be handled with great caution. Aside from their expensive cost and delicate use, they are also sensitive. Even a slight accidental bump can affect the calibration and internal parts especially those that are made of electronic.

To protect your measuring instruments from mishandling, safety procedures must be followed at all times to ensure freedom from risk of danger and threat of thieves.

The following are basic rules to consider in managing your measuring instruments.

1. Always keep your receipt of purchase. This is one way of ensuring your measuring tools of their warranty if something happens to your tools. This will give you a good exchange of a new one if manufacturer's defect is the cause of the defect.

2. Always follow safety instructions. The safety instructions in owner's manual will be your guiding information on what and what not to do with your instruments. This will assure you of the proper use and step-by-step procedures if calibration is needed.

The following are basic rules to consider in managing your measuring instruments.

3. Always match the type of job with your instruments. Matching of job with your instrument is important. Do not use your instrument if it is not intended for tough job.

4. Always handle your measuring instruments safely. Never use your tools to point at somebody or use for joke or play. Remember, measuring tools are expensive. If they accidentally fall, they may easily be damaged. Always use the tool holder. Like a careful lineman, a tool holster is always fastened in his waist to protect the instrument from falling.