
Importance of technical English terms used in industries

Objectives : At the end of this lesson you shall be able to

- **state importance of english for employability skills**
- **state importance of english for soft skills.**

English as a language is important for professional courses It enhances:

- **Employability skills:** Trainees who possess the ability to understand, read, write and speak the language get better opportunity to get a job and retain in to scale heights in their career not only in the corporate, but also in the public sector.
- **Soft skills:** Apart from the hard skills that is the ability to acquire technical skills it has become very much necessary to master the art of soft skills equally in the under graduation level to develop the art of articulation in the world of competitive environment when the world has become very small with the access of

internet and electronic media at our doorsteps. Being articulate it would be easier to build interpersonal relationship for smooth flow of communication to ensure productivity. The openness of the environment would ensure the confidence in decision making capability. Openness of the ambience would lead to smart work which steer one to be multitasking.

- English as a language gained popularity not until 14 th century. Today it is a language of survival and sustenance
- Dominance of the British in every part of the world during the 19th and early 20th century by setting up colonies due to industrial revolution made the language richer and richest.

Different types of documentation as per industrial needs

Objectives : At the end of this lesson you shall be able to

- state the purpose of documentation
- list the different types of documentation
- explain the documents format - batch processing, BOM, cycle time, productivity report, manufacturing inspection report.

Documentation

Documentation and records are used throughout the manufacturing process as well as supporting processes (quality control) must meet the basic requirements. Documentation is a set of documents provided on paper, or online, or on digital or analog media, such as audio tape or CDs. Examples are user guides, white papers, online help, quick reference guides.

The stages of recording the documents is to

- prepare, review, update and approve documents.
- identify changes and current revision status of documents.
- use of applicable documents available at points of use with the control documents of external origin
- identify and distribute relevant versions to be identifiable and remain legible.
- prevent unintended use of obsolete documents and archiving.

The different types of documentation as per industrial needs includes

- Processing charts
- Bill of materials (BOM)
- Production cycle time format
- Productivity reports

- Manufacturing stage inspection report
- Job cards format
- Work activity log
- Batch production record format
- Estimation of work
- Maintenance log format

Process chart

A process chart is a graphical representation of the activities performed during manufacturing or servicing jobs. Graphical representation of the sequence of operations (workflow) constituting a process, from raw materials to finished product.

Process charts are used for examining the process in detail to identify areas of possible improvements.

The different types of process charts are

- Operation process chart
- Flow process chart (man/ material/ equipment type)
- Operator chart (also called two handed process chart)
- Multiple activity chart
- Simo chart

The following symbol set derived from Gilbreth's original work as the standard for process charts.

Symbol	Letter	Description	Examples
O	O	Operation	Saw cut, paint, solder, package
→	M	Transport	Conveyor / Fork lift / OTR truck
□	I	Inspection	Visual/dimension
D	D	Delay	WIP/Hold/ Queue
∇	S	Storage	Warehouse/tracked storage location

The application of symbols on a flow process chart is shown in the figure

Flow process chart(Machines)		Summary				
		Function	Present		Proposed	
			*	Time	*	Time
Industry : _____	Product : _____	Operation				
		Inspection				
		Transport				
		Delays				
		Storage				

Details	O→□ D▽	Qty	Time (in mins)	Analysis	Actions recommended
Raw material from stores	O→□ D▽				
To cutting machine	O→□ D▽				
Cutting of material to size	O→□ D▽				
Filling, Finishing	O→□ D▽				
To inspection for finished size	O→□ D▽				
To stores (Finished job)	O→□ D▽				

Batch record forms

The documents used and prepared by the manufacturing department provide step-by-step instructions for production-related tasks and activities, besides including areas on the batch record itself for documenting such tasks.

Batch production record is prepared for each batch should include information on the production and control of each batch. The batch production record should confirm that it is correct with standard operating procedure.

These records should be numbered with a unique batch or identification number and dated and signed when issued.

The batch number should be immediately recorded in data processing system. The record should include date of allocation, product identity and size of batch.

Documentation of completion of each significant step in the batch production records (batch production and control records) should include :

- Dates and, then appropriate time
- Major equipment used machinery and specific batch numbers of raw materials, reprocessed materials used during manufacturing.

- Critical process parameters records.
- Trial product or sample (if required).
- Signatures of staff for sequence of operation.
- Laboratory test results and line inspection notes.
- Achieved production against target.
- Packaging and label (if any) details.

Batch processing record : (Sample format - 1)

The format 1 used in documentation of batch processing record has the description of the job, necessarily mentioned with part number and name of the part.

A predetermined batch quantity with batch number allotted and identified with batch record number for documentation. The product reference is made with purchase order number.

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The production process is descriptively written about the sequence of operation to be carried out on the product. The batch processing record is signed with date mentioning name of person responsible and their designation.

The manufacturer organization name, period of

manufacture preferably the year with starting date of manufacture and end date of manufacturer and number of pages of document according to batch quantity processed, and total number of pages of document,

inclusive of inserted pages and manufacturing facilities is provided with.

The remarks if any on the process should be also mentioned then and there.

BATCH PROCESSING RECORD - FORMAT - 1

Batch Processing Record		
Description of job	Batch no. :	
Part no. :	Batch quantity :	
Name of part :	Batch record no. :	
	Purchase order no. :	
Description of process :		
Manufacturing Organisation :		
Period of manufacture (Year - Qtr):	Start date of manufacture:	End date of manufacture:
Number of pages according to batch:	Inserted pages:	Manufacturing facilities:
Total number of pages		
1. Operator / Technician	Date	Name and signature
2. Production in-charge:	Date	Name and signature
3. Section manager	Date	Name and signature
4. Plant in-charge:	Date	Name and signature
5. Production in-charge:	Date	Name and signature
Remarks (if any)		

Bill of materials (BOM) format - 2

The list of parts involved in manufacturing of an assembly hierarchially is given in this format.

The format shown is as per bureau of Indian Standards IS:11666-1985 as example for Engineering Component drawings.

The BOM in the form of tabular columns has the component marked with item number, and its name is

given under description and number of is mentioned under quantity, with reference drawing ie., sub assembly/ part drawing number.

The material designation as per code of practice or standards is mentioned, and any other specific notes are given under remarks column.

The BOM is placed on the manufacturing drawing containing with assembly and parts in standard sheet sizes of engineering drawing.

BILL OF MATERIAL (BOM) - FORMAT - 2 as per IS: 11666-1985

S.No	Item No.	Description	Quantity	Reference dwg no.	Material as per standard	Remark

Cycle time

Cycle time is the total time from the beginning to the end of the process. Cycle time includes process time, during which a raw material worked with to bring it closer required form output, and delay time, during which the to workpiece waiting for next operation.

The time taken to perform one operation repeatedly measured from "Start to Start" the starting point of one product's processing in a specified machine or operation

until the start of another similar product's processing in the same machine or process. Cycle time is commonly categorized into same machine/process.

Machine cycle time

The processing time of the machine working on a part.

Auto cycle time

The time a machine runs un-aided (automatically) without manual intervention.

Overall cycle time

The complete time it takes to produce a single unit. This term is generally used when speaking of a single machine or process.

Total cycle time

This includes all machines, processes, and classes of cycle time through which a product must pass to become a finished product. This is not lead time, but it does help in determining it.

Production cycle time (Format - 3)

This format 3 should contain mentioning the organization name department / section name. The process which is being observed for analysing the cycle time is mentioned with line in charge name and the date/time of the operations, with operator name is indicated.

The time observation on each operation, sequence noted in the column, and lowest repeatable is also mentioned for each operation. The times observation for machine cycle time is also noted, with any notes be recorded in respective operations in sequence.

PRODUCTION CYCLE TIME - FORMAT - 3

Organisation Name: Department / Section :		Process:		Line Incharge:		Date/Time:		
Operator :						Machine Cycle Time		Notes
Operator Sequence		Observed Times			Lowest Repeatable			

Productivity report

Productivity report to measure and review the efficiency of a person, machine, factory, system, etc., in converting inputs into useful outputs. Productivity report is computed by dividing average output per period by the total costs incurred or resources (capital, energy, material, personnel) consumed in that period.

The base document daily production report which reveals the actual output against the target plan and on investment cost incurred as mentioned above decides the cost efficiency.

Daily production report (Format 4)

The output of production is shown in the format, referring the job order no quantity, material and size, every process involved, to produce a component, quality control, packing should contain the details of planned quantity and produced quantity is recorded in the document. This is the base details for arriving the productivity report. The incurred cost is worked out considering infrastructure, raw materials and facilities.

DAILY PRODUCTION REPORT - FORMAT- 4

		Daily Production Report								Organisation Name:			
		Date:				Department: Section:							
Job Order No. Quantity Material & Size	Planned	Process - I		Process-II		Process-III		Process-IV		Quality Control		Packing	
		Completed	Completed	Planned	Completed	Planned	Completed	Planned	Completed	Planned	Completed	Planned	Completed

Signature of section Incharge

Manufacturing stage inspection report (Format 5)

The format 5 is to monitor the production in various stages for which manufacturing stage inspection conducted for documentation to review the productivity. The format gives the details of product being inspected showing the details of customer reference by purchase

order (PO) number and date, job order number and date, process involved in manufacture of product, the quality submitted for inspection. The accepted and rejected quality recorded with inspection record review date and the inspection person signature who conducted the stage inspection is recorded date wise for mentioned /specified period with start and end dates.

MANUFACTURING STAGE INSPECTION REPORT - FORMAT - 5

Status: From Date To Date/.....	Inspection conducted by								
	Inspection Record No.								
Organisation Name :	Rejected								
	Accepted								
	Qty								
	Process								
	J.O Date								
	Job Order No.								
	P.O No. & Date								
	Customer								
	Product ID/ Code								
	Date								

Documentations - 2

Objectives : At the end of this lesson you shall be able to

- state the purpose of job card and its format details
- explain work activity log format details
- state the details of batch production format.

Job card

A job card is a document showing the details of a job to be performed in a production shop. It is used to authorize and instruct the work team to take up the production work.

Job card format - 1

Job card has the details of commencing the job, customer name, work order no, document number, reference number and date.

The details which have to be recorded about the product line description showing the operations each into recording of start time and total time of operation. The location time recorded is to track if any delay/ reasons and necessary actions if taken with remarks.

If the product has to be completed with any of the further operations in sequence, this card will travel along with job for next workstations for further operations if any to complete the requirement of job, and recorded till finishing of the job.

JOB CARD - FORMAT-1

Job Card						Doc No.	
						Rev No.	
						Date	
Order Starting Date							
Customer							
Work Order No.							
Details							
S.No.	Date	Production Line Description	Time (Minutes)			Location Time	Remarks
			Start Time	End Time	Total Time		

Work activity log format - 2

This document is to record the activity/operations performed by the operator from time to time (format) shows time duration as one hour (For whole day shift). The

operator has to record every hour, activity description, equipment/machinery/instrument used to perform the job.

Any remarks may noted by the operator to complete this record.

WORK ACTIVITY LOG - FORMAT-2

Organisation Name:			
Department:			
Section:			
Employee Name:			
Supervisor Name:			
Date:			
Start / Stop	Operations performed	Equipment / Machinery/ Instruments used	Remarks
8.00 to 9.00 a.m.			
9.00 to 10.00 a.m.			
10.00 to 11.00 a.m.			
11.00 to 12.00 noon			
12.00 to 1.00 p.m.			
1.00 to 2.00 p.m.			
2.00 to 3.00 p.m.			
3.00 to 4.00 p.m.			
4.00 to 5.00 p.m.			
5.00 to 6.00 p.m.			

Batch production record format - 3

This document is for recording the details of production covering the processing steps with documented page number with deviation against each in short description.

This document is to be prepared under heading description of job part number, batch number, name of

the part. The processing steps number serially for each process with sequential operations in logical order with documented page number. The description of deviation are noted against each operations in sequence gives the detail of batch production record for every part.

BATCH PRODUCTION RECORD - FORMAT-3

<u>Batch Production Record in accordance with batch processing record</u>			
Manufacturing Organisation Name: _____			
Description of job: _____			
Name of part: _____			
Batch No.: _____			
The following deviations have appeared (continued)			
No. process step	Name of processing step	Documented page no.	Short description of deviation
1	<u>Raw material preparation:</u> Operation 1: Descaling Operation 2: Degreasing Operation 3: Wire brushing		1. _____ 2. _____ 3. _____ 4. _____
2	<u>Sizing of material:</u> Operation 1: Shearing Operation 2: Deburring		1. _____ 2. _____ 3. _____

Estimation and maintenance records

Objectives : At the end of this lesson you shall be able to

- state the purpose of estimation
- explain the details of formats for estimation sheet
- explain the details of formats for maintenance log, history sheet of machinery and equipment and checklist for preventive maintenance.

Estimation is the method of calculating the various quantities and the expenditure to be incurred on a particular job or process.

In case the funds available are less than the estimated cost the work is done in part or by reducing it or specifications are altered,

The following essential details are required for preparing an estimate.

Drawings like plan, elevation and sections of important parts.

Detailed specifications about workmanship & properties of materials, etc.

Standard schedule of rates of the current year.

Estimating is the process of preparing an approximation of quantities which is a value used as input data and it is derived from the best information available.

An estimate that turns out to be incorrect will be an overestimate if the estimate exceeded the actual result, and an underestimate if the estimate fell short of the actual result.

A cost estimate contains approximate cost of a product process or operation. The cost estimate has a single total value and it is inclusive of identifiable component values.

ESTIMATION SHEET - FORMAT-4

Part Name: Base plate Assembly: Shearing machine Assembly No.: MA2WAOA1		Part No.: 1 Material: Fe310.0 Stock size: 305 x 227 x 20		Insert Part Drawing	
Operation No.	Operation description	Machine	Estimated time	Rate / piece per hr.	Tools
01	Setting and aligning job on table	Milling	10 min		
02	Mount arbor and cutter	Milling	10 min		
03	Set speed and feed	Milling	2 min		
04	Align cutter in position	Milling	2 min		
05	Mill four sides	Milling	50 min		
06	Mark 45° angle corner	-	8 min		vernier bevel protractor vernier height gauge
07	Set and clamp the job	-	10 min		
08	Mill 45° on opposite sides	-	10 min		
09	Set clamp on other sides	-	20 min		
10	Mill 45° on other sides	-	20 min		
11	Deburr and mark drill position	-	10 min		
12	Set and align for drilling	Drilling	10 min		
13	Mount drill chuck and drill	Drilling	03 min		
14	Set drill rpm	Drilling	02 min		
15	Drill pilot and holes	Drilling	30 min		
16	Counter bore holes	Drilling	15 min		
17	Place job on magnetic chuck on surface grinder	Surface grinder	03 min		
18	Grind the surface as per drawing	Surface grinder	10 min		
19	Deburr sharp edges	-	02 min		Abrasive stick

Maintenance log - Format 5

This format is made with details of maintenance activities performed machinewise,

MAINTENANCE LOG - FORMAT - 5

Organisation Name :				
Department:				
Section:				
Name of the machine:				
S.No	Date	Nature of fault	Details of rectification done	Signature of in-charge

History sheet of machinery equipment - Format 6

The document recorded with historical data about the machinery and equipment, contains all details about supplier address, order no., date of receipt, installed and placed, Date of commissioning and machine

dimensions, weight, cost, particulars of drive motor, spare parts details, belt specification, lubrication details, major repair/ overhauls done with dates recorded then and there for analysing the functional and frequency of breakdown etc.,

MACHINERY AND EQUIPMENT RECORD FORMAT - 6

Organisation Name :	
Department:	
Section:	
History sheet of machinery & Equipement	
Description of equipment	
Manufacturer's address	
Supplier's address	
Order No. and date	
Date on which received	
Date on which installed and place	
Size : Length x Width x Height	
Weight	
Cost	
Motor particular	Watts/ H.P./ r.p.m: phase: Volts:
Bearings/ spares/ record	
Belt specification	
Lubrication details	
Major repairs and overhauls carried out with dates	

Checklist for preventive maintenance inspection - Format 7

The very essential document required to observe, the functional aspects of each parts, defects and the remedial measures taken is recorded.

This format enables to program the frequency of maintenance schedules so as to minimise frequent breakdown of machinery/equipments.

PREVENTIVE MAINTENANCE RECORD - FORMAT 7

Organisation Name :				
Department :				
Section :				
Name of the Machine :				
Machine Number :				
Model No & Make :				
Check list for machine inspection				
Inspect the following items and tick in the appropriate column and list the remedial measures for the defective items.				
Items to be checked	Good working	Satisfactory	Defective	Remedial measures
Level of the machine				
Belt/chain and its tension				
Bearing condition (Look, feel, Listen noise)				
Driving clutch and brake				
Exposed gears				
Working in all the speeds				
Working in all feeds				
Lubrication and its system				
Carriage & its travel				
Cross-slide & its movement				
Compound slide & its travel				
Tailstock's parallel movement				
Electrical controls				
Safety guards				
Inspected by :				
Signature :				
Name :				
Date :				
				Signature of in-charge

Application of Pneumatics

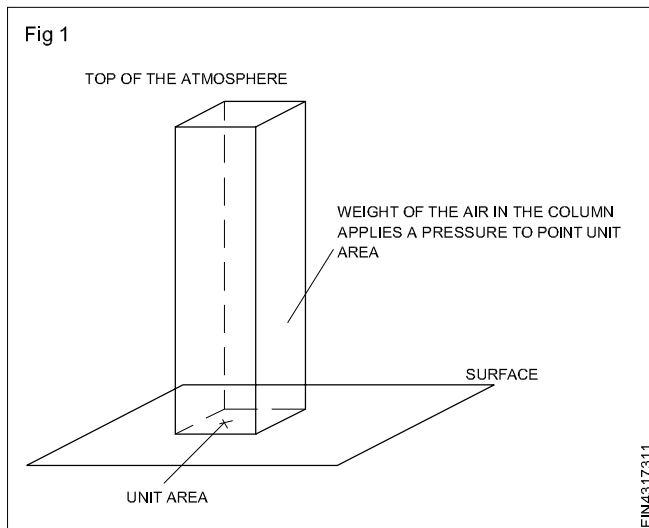
Objectives : At the end of this lesson you shall be able to

- define pneumatics
- state the application of Pneumatics
- list the advantages and limitation of pneumatics

Overview of Pneumatic

original word PNEUMA is taken from Greek language which means breathing.

Pneumatic system gets compressed air as an energy input then converts it into a suitable work and after that exhaust back to the atmosphere. This process of intake and exhaust is compared with breathing.



Definition: It is the science under which you study properties and application of air.

Common terms used in pneumatics

Pressure

Pressure is defined as the load acting upon unit area. (Fig 1)

$$\text{Pressure} = \text{Force}/\text{Area}$$

In pneumatic system three terms related to pressure are commonly used.

Atmospheric Pressure

It is pressure caused by weight of column of atmospheric air acting on the surface

Gauge Pressure

It is pressure value read through an instrument called Pressure Gauge. It indicates pressure value above the atmospheric pressure.

Absolute Pressure

It is the pressure value measured with respect to perfect vacuum.

Absolute pressure = Atmospheric pressure+gauge pressure

$$\text{Abs Pr} = \text{Atm Pr} + \text{Gg Pr}$$

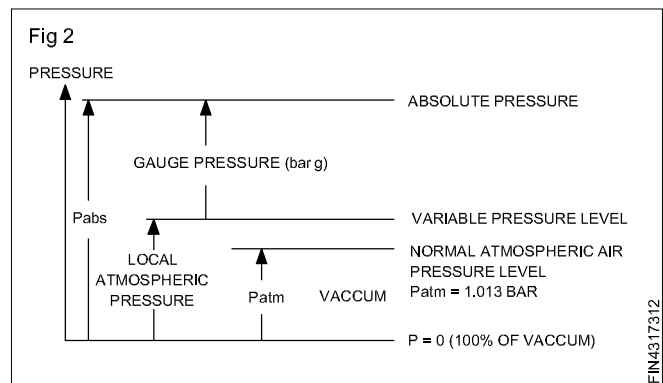


Fig 2 shows the relation between Absolute pressure, Gauge pressure and Atmospheric pressure.

Units of Pressure: Pressure is measured in Pascal (Pa) in SI unit. 1 pascal = 1 newton per meter square. one pascal is the pressure exerted by a force of magnitude one newton perpendicularly upon an area of one square metre...

Example: Pressure = Bar = 1 Kg/Cm² (aprox.)

Bar is a metric unit of pressure equal to 100,000 pa (pascal) standard atmospheric pressure at sea level is 1013.25 milli bar or 101.35 kilo pascal

$$1 \text{ Bar} = 1 \text{ Kg} / \text{Cm}^2$$

Force

Force is the product of pressure and cross section area upon which force is acting.

$$\text{Force} = \text{Pressure} \times \text{Area} \quad (F = P \times A)$$

Unit of Force: Force is measured in Newton in SI unit

$$1 \text{ newton} = 1 \text{ kg m} / \text{s}^2$$