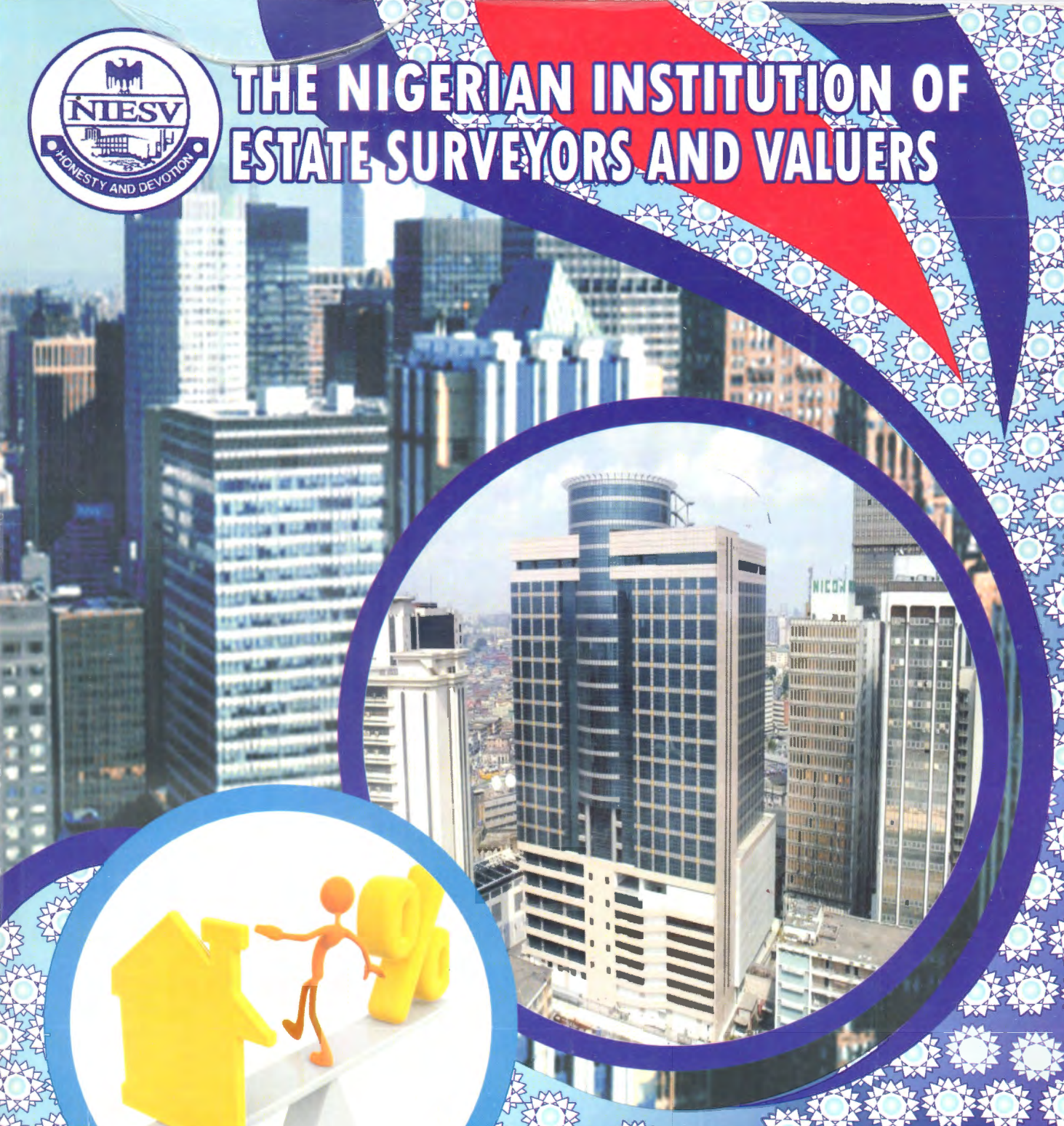
THE NIGERIAN INSTITUTION OF ESTATE SURVEYORS AND VALUERS



PROFESSIONAL QUALIFYING EXAMINATION

LECTURE NOTES 2nd Edition

Adult Route To Membership Of Niesv, 2016

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LECTURE NOTES 2nd Edition

ADULT ROUTE TO MEMBERSHIP OF NIESV, 2016

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Preface to the 1st Edition

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The idea to commence a Adult route to membership of NIESV was considered by the Council in 2013 at Uyo-Akwa-Ibom State Council Meeting. A committee was formed to look into modalities for recruiting mature Estate Surveyors into the profession. The outcome of this Committee is the manifestation of this Lecture Notes. The Membership Committee ensures that candidates with a Degree or HND in Estate Management and Valuation, who have attained the age of at least 50 years and have been in practice for over two decades should be allowed to apply for this special route.

Scholars and practitioners are engaged to prepare lecture notes for the task tailored in line with our Professional Examination syllabuses. I am particularly grateful to this group of researchers who did not only provide educative and teaching materials on relevant areas of our practice, but did it with a dispatch. Thank you for this outstanding task.

The President of NIESV, Olorogun James Omeru has been very supportive in ensuring that success of this lofty project is achieved. He particularly chaired a meeting of a group of Land Administrators in Benin City in 2013 and promised to put an end to non-professionals heading our State and National Ministries of Lands in Nigeria.

The programme is intended to bring mature members of profession into our membership cadre through a well formulated and rigorous training over a specified period.

This particular edition covers Principles of Valuation, Building Construction Professional Practice, Advanced Valuation I and II, and Professional Report Writing.

Dr. B.J. Patunola Ajayi
Chairman, NIESV Membership Committee,
Abuja, FCT-Nigeria

Preface to the 2nd Edition

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The success of the first edition of this book propels the Membership Committee of the NIESV to search for an improvement and an introduction of new topics in this edition Emerging Global challenges in Real Estate Surveying and Valuation Practice call for learning new topics to solve them. this edition includes International Financial Reporting Standards, Land Administration and Management, Property Rating and Taxation and other contemporary topics.

Additional member was invited to contribute chapters to this edition to augument the existing pool of discussions and enriching this edition.

The enthusiasm displayed by these energic and brilliant contributors is not only to be appreciated but the promptness in responding to the submission of topics covered are invaluably commendable. I appreciate the contributions and support of our amiable President Olorogun James Omeru, for his effort in seeing to the successful production of the book and training that subsequently followed.

Thank you Almighty God for making an idea of a young guy from far away Bauchi a reality and sparing our lives to this moment.
Thank you all.

Dr. B.J. Patunola Ajayi
Chairman, NIESV Membership Committee
Abuja, FCT, Nigeria.

Forward

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The World is changing and the global process of doing business is equally changing, that is why it is paramount to adapt to the changes in order for us to be relevant as leaders in real estate business arena. It is pathetic to note that majority of our ministries of land are being directed by personnels who are not well versed in the profession of Estate Surveying and Valuation. To make the needed impact that the contemporary change demands, we must device a way to bring them under our umbrella. That is the reason for Adult Route to Membership.

The idea to train and absorb our mature members into the members' fold of the profession through a special route was first considered in 2013 and a Committee was established to give modalities in order to achieve this purpose.

I congratulate the First Vice President and Chairman, NIESV Membership Committee for working tirelessly in ensuring that this Lecture Notes is prepared and published in a book format.

I also appreciate the efforts of the contributors - ***ESV. Adedayo Adebayo, ESV. Iroham C.O, ESV. Olurotimi Kemiki, ESV. Salau L. Tunde*** *and* ***ESV. Bamidele Ogunleye*** *for forwarding their write-ups for publication without any pecuniary attachment whatsoever. Thank you for this selfless service to humanity.*

It is my firm believe that, this book shall not only be beneficial to the candidate on Adult Route but also, other probationers aspiring to sit for our Professional Qualifying Examination (PQE). I hereby recommend this book to the general community of Professional Estate Surveyors and Valuers, Probationers, Students and General Public who intend to improve their knowledge in Real Estate Profession through a self study.

Thank you all

Oloorogun James Omeru (FNISV)
President, The Nigerian Institution of Estate Surveyors and Valuers
Abuja, F.C.T-Nigeria.

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The Nigerian Institution of Estate Surveyors and Valuers (NIESV) is grateful to the following scholars for contributing to the writing of chapters of this book. Their efforts shall be recognised for providing a selfless service to the Institution. Thankyou.

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Chapter Ten

INTRODUCTION

Machines

Machine is a term derived from a Latin Word 'Machina. As a scientific definition a "machine" is any device that transmits or modifies energy. In common usage, the meaning is that of devices having parts that perform or assist in performing any type of work or a particular type of work. Machines normally require some energy source ("input") and always accomplish some sort of work ("output"). Machines of all types make work easier by changing the size or direction of an applied force. A basic distinction between a machine and a tool is that the latter is a device that has no rigid moving parts. People have used mechanisms to transform one form of motion or energy into another. Modern power tools, automated machine tools, and human-operated power machinery are tools that are also machines.

Machines normally require some energy source ("input") and always accomplish some sort of work ("output")

It behooves here to reiterate that machine is a device having a unique purpose that augments or replaces human or animal efforts for the accomplishment of physical tasks. All machines have an input and output device. The outputs of some machines constitute the input of others such as generators. The outputs of generators (electrical, hydraulic and pneumatic energy) are used to operate many other machines like material processing, packaging, conveying and washing machines.

TYPES OF MACHINES

There are two major types of machines: The simple and the complex machine. Simple machines are types of machines that do work with one movement or if that do perform their action in one movement. These devices may also be used to support industrial applications, although devices entirely lacking rigid moving parts are not commonly considered machines. Hydraulics are widely used in heavy equipment industries, automobile industries, marine industries, aeronautical industries, construction equipment industries, and earthmoving equipment industries. There are 6 simple machines; the inclined plane, the wedge, the screw, the lever, the pulley, and the wheel and axle. Of the six, the lever, the pulley, and the inclined plane are primary; the wheel and axle, the wedge and the screw are secondary. The wheel and axle combination is a rotary lever, while the screw may be considered an inclined plane wound around a core. The wedge is a double inclined plane. Complex machines are composed of more elementary machines called simple machines, such as the wedge and the pulley. A wheelbarrow can be described as an example of a complex machine that uses a lever and a wheel and axle. Complex machines are designated, as a rule, by the operations they perform; the complicated devices used for sawing, planing, and turning, for example, are known as sawing machines, planing machines, and turning machines respectively and as machine tools collectively.

Machines used to transform other forms of energy (as heat) into mechanical energy are known as engines. i.e. the steam engine or the internal-combustion engine . The electric motor transforms electrical energy into mechanical energy. Its operation is the reverse of that of the electric generator, which transforms the energy of falling water or steam into electrical energy.

It behooves us to briefly discuss the various types of simple machines:

- The inclined plane: The inclined plane is a plane surface set at an angle, other than a right angle, against a horizontal surface. The inclined plane permits one to overcome a large resistance by applying a relatively small force through a longer distance than the load is to be raised.

  The figure below gives an idea of an inclined plane.

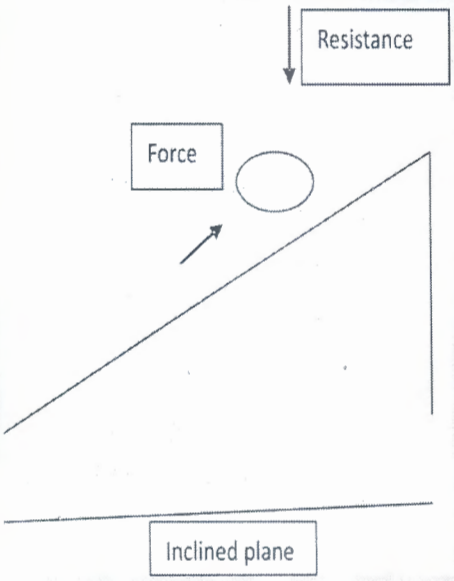
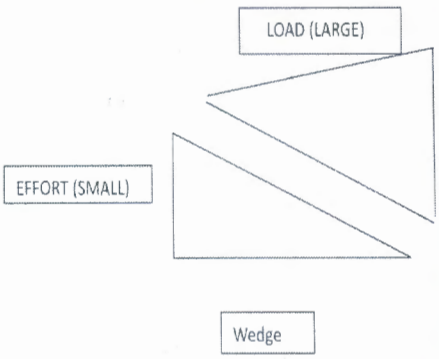


Figure1: An Inclined Plane:

Examples of Inclined plane include: Ramps, Sloping roads, e.t.c.

- Wedges: The wedge is an active twin of the inclined plane. It does useful work by moving. In contrast the inclined plane usually remains stationary. This simple machine consists of a set of inclined planes set together that can sustain relative sliding or rolling motion. By moving one plane relative to the other, a wedge is capable of building relative force in a direction perpendicular to that of the moving wedge. Force multiplication varies inversely with the size of the wedge angle; a sharp wedge (small inclined plane) yields a large force. With adequate friction at the interfaces, the wedge becomes a separating, holding and stopping device with countless mechanical applications. In the broadest sense wedges include all devices for cutting and piercing. Examples include kitchen knife, chisel, hatchet, carpenter planes, air hammer, e.t.c.



Figur2: A Wedge:

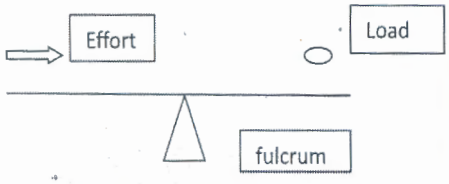
- Screw: A simple screw is a helical (a three-dimensional twisted shape) inclined plane. A screw can convert a rotational force (torque or moment) to a linear force and vice versa. The ratio of threading determines the mechanical advantage of the machine. More threading increases the mechanical advantage. A rough comparison of mechanical advantage can be done by taking the circumference of the shaft of the screw and divide by the distance between the threads.

  A screw is a shaft with a helical groove or thread formed on its surface and provision at one end to turn the screw. Its main uses are as a threaded fastener used to hold objects together, and as a simple machine used to translate torque into linear force. It can also be defined as an inclined plane wrapped around a shaft.

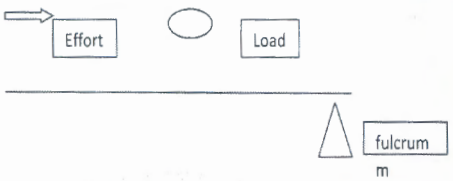
- Lever: A lever is a simple machine that makes work easier for use; it involves moving a load around a pivot using a force. Levers are simple machines used to lift weights. From a layman's point of view it is pertinent to define some terms germane to the study of this simple machine. These are: the load, the effort, and the pivot (fulcrum). A load is the thing you're lifting. A fulcrum is the thing that makes the load lighter. An effort is the person pushing to make the objects move. There are three different types of levers. They are the first class, second class and third class levers.

  First class lever- A first-class lever is a lever in which the fulcrum is located between the input effort and the output load. In operation, a force is applied (by pulling or pushing) to a section of the bar, which causes the lever to swing about the fulcrum, overcoming the resistance force on the opposite side. The fulcrum may be at the center point of the lever as in a seesaw or at any point between the input and output. This supports the effort arm and the load. Apart from the seesaw other types of the first class lever include: bicycle

hand brake, can opener, hammer (when pulling the nail with the hammers claw), pliers (double lever), scissors (double lever), oars, shoehorn e.t.c.



Second class lever- In a second class lever the input effort is located at one end of the bar and the fulcrum is located at the other end of the bar, opposite to the input, with the output load at a point between these two forces. Examples include: dental elevator, door, nutcracker, springboard, wheelbarrow, bottle opener, e.t.c



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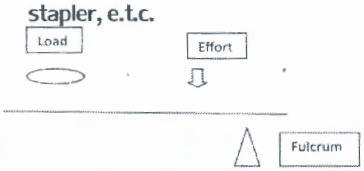
Third class lever- For this class of levers, the input effort is higher than the output load, which is different from second-class levers and some first-class levers. However, the distance moved by the resistance (load) is greater than the distance moved by the effort. Since this motion occurs in the same length of time, the resistance necessarily moves faster than the effort. Thus, a third-class lever still has its uses in making certain tasks easier to do. In third class levers, effort is applied between the output load on one end and the fulcrum on the opposite end. Examples include: baseball bat, boat paddle, broom, fishing rods, hockey sticks, hoe, nail clippers, tweezers, stapler, e.t.c.



- Pulley: A pulley (also called a sheave or block) is a wheel with a groove between two flanges around its circumference. A rope, cable or belt usually runs inside the groove. Pulleys are used to change the direction of an applied force, transmit rotational motion, or realize a mechanical advantage in either a linear or rotational system of motion. Pulley systems are used in the real world to lift large masses onto tall heights. The pulley system consists of one or more pulleys and a rope or a cable. The number of pulleys used may increase or decrease the mechanical advantage of the system. Generally, the higher the mechanical advantage is, the easier it is to lift the object that is being lifted. Overall, no matter how easy it is to use the pulley system, the system itself is not very efficient due to the force of friction. For example, one has to pull two meters of rope of cable through the pulleys in order to lift an object one meter. Examples of pulley include crane and flag pole.

- Wheel and axle

The wheel and axle is a simple machine. The form consists of a wheel that turns an axle and in turn a rope converts the rotational motion to linear motion for the purpose of lifting. By considering the machine as a torque multiplier, i.e. the output is a torque, items such as gears and screwdrivers can fall within this category.

A wheel and axle is a lever that rotates in a circle around a center point or fulcrum. The larger wheel (or outside) rotates around the smaller wheel (axle). Bicycle wheels, ferris wheels and gears are all examples of a wheel and axle. Wheels can also have a solid shaft with the center core as the axle such as a screwdriver or drill bit or the log in a log rolling contest.

A wheel is considered a lever that can turn 360 degrees and can have an effort or resistance applied anywhere on that surface. The effort or resistance force can be applied either to the outer wheel or inner wheel (axle). Steering wheels and door knob are good examples.

The wheel and axle is similar in appearance to a pulley, with one major difference: the wheel is fixed to the axle, as is the steering wheel of a car. A user applies effort to the large outer wheel of the steering wheel to move the load at the axle. The Mechanical Advantage of a wheel and axle is equal to the radius of the wheel divided by the radius of the axle. The radius of the wheel, and therefore its circumference, is usually much larger than the radius of the axle. Therefore, the distance over which the effort is applied is

much greater than the distance the load, which is placed at the axle, moves. The difference in the sizes of the wheel and axle can result in a large mechanical advantage. Some common examples of a wheel and axle are a doorknob and a round water faucet handle.

MECHANICAL ADVANTAGE AND EFFICIENCY OF MACHINES

Mechanical advantage (MA) of a simple machine is the ratio between the force it exerts on the load and the input force applied. In a layman's view MA can be described as the amount of effort saved when using machines. This does not entirely describe the machine's performance, as force is required to overcome friction as well. The mechanical efficiency of a machine is the ratio of the actual mechanical advantage (AMA) to the ideal mechanical advantage (IMA). Functioning physical machines are always less than 100% efficient.

Machinery

Machinery on the other hand can be defined as an assemblage of machines or mechanical apparatus. The word machinery is believed to be clouded with varied explication. Notwithstanding, these diverse definitions, that proposed by the Companies Act which defines the term "Plant and Machinery" as the fixed assets of a company other than land and buildings tend to suffice on global detection. Motor vehicles, mobile plants, ships, locomotives, airplanes and similar assets (which patently are not physically fixed) will normally be considered to be plant and machinery.

Plant

The term "Plant" refers to all total of machines used in a company for production process. A straight jacketed definition of plant could sway professional judgment even though that forms the basis for the recognition of any plant. However, due to the susceptibility of diverse meanings attributed to "plant" depending upon its settings and context of assessment, it could be impossible to define it exhaustively. After the recognition of a fixed asset being the combination of series of machine for anything to be considered as "plant" it must have the following attributes: it must have some degree of durability. So anything which is quickly consumed or worn out in the course of a few operations or within a short time cannot be called "plant". It must fulfill the function of a plant in the activity to which it is employed. i.e. it must be a tool of business– a means of carrying on a business. It would not cover the stock in trade i.e. goods ought or made for sale by a businessman. It would not include an article which is merely a part of the premises in which the business is carried on. Hence, a plant may include any article or object fixed or moveable, live or dead used by a businessman for carrying on his business. It is pertinent to state here that most times plant and machinery can be thought of as asset of a company other than land and buildings. However, motor vehicles, mobile plant, ships, locomotives and similar assets not physically fixed are not necessarily considered as plant and machinery except when they are utilized or form part of the production cycle.

Any difference amongst Plant, machinery and other related appellations

The term plant has been described as the combination of these machines geared towards achieving the same purpose. Hence machinery and plant have been attributed to mean the same thing. This calls for why agitation is being made to change the appellation of this course from "plant and machinery valuation" to "machines and plant valuation". As the latter term will cover all small devices geared towards making work easy and faster to accomplish. More so the plant and machinery valuation faculty of the Royal Institution of Chartered Surveyors has changed its name to machinery and business assets faculty. The American Society of Appraisers prefers to call its faculty machinery and technical specialties. In a nut shell plant and machinery, machines and plant, plant and equiptment, machinery and business assets or whatever name is chosen refers to the installations and support facilities especially designed and installed to perform predetermined function in the course of manufacturing or production process whether singly or in the combination of other items. Therefore plant and machinery or whatever appellation is adopted

include: industrial building housing the plant and production process; building service installations normally included in the valuation of land and buildings; process plant; plant or equiptment which might have been installed wholly in connection with the operator's industrial or commercial process together with furniture, furnishings, fixtures and fittings, vehicle, tools, etc.

This first lecture is aimed at giving students a base on getting acquainted with certain basic terms and recognition of these terms as the study goes along. For instance terms like simple machines, complex machines synonymous with machinery and plants should no longer be strange as these form part of assets of companies. Students of Estate Management should note that asset valuation is part of their exclusive reserves as valuers after graduation. However, plant and machinery valuation is only confined to valuation of machinery and plants. In the case of asset valuation other equipments and apparatus such as furniture, fittings and fixtures become inclusive for valuation except where these devices can be categorically classified as machines. The simple machines are however very pertinent in the study of plant and machinery as they form the basis of operation of any form of device designed to make the work and activities of man easier and accomplishable at record time.

CONSTITUENT OF MACHINES AND PLANT

Generally, any equipment which provides part of the services to the property and which would normally be sold with the property on the open market will be considered as part of the building. On the other hand, all equipments primary concerned with the process of production should be thought of as plant and machinery.

Plant and machinery forms an integral part of the capital assets of companies and establishments, especially in production and manufacturing concerns where their activities involves intensive use of plant and machinery. There could be confusion even among valuers as to what constitute plants and machinery particularly in a non-production concern; hence caution needs to be taken in identification.

A company in existence is made up of various assets. These assets are broadly classified into fixed assets and current assets. Current assets are those items which are expected to be consumed or sold in the course of trading connected with the business or production cycle. Thus, theses cannot be regarded as plant and machinery. The fixed assets of a company on the other hand could be defined as those assets which are intended for use on a continuing basis for the purpose of the company's activities in the production or supply of goods and services. Fixed asset are sub-divided into the following three categories:

- Tangible assets: these include
  Land and buildings
  Plant and machinery
  Motor vehicles
  Other fixtures and fittings, tools and equipment; and,
  Payments on account of tangible assets in course of construction
- Intangible assets:
  Cost of research and development
  Patents, licenses, trademarks if required for valuable consideration or created as an asset
  Goodwill to the extent that it may be acquired for valuable consideration; and
  Payments on account of intangible assets
- Financial assets:
  Own shares
  Investments
  Loans to third parties; and
  Shares in affiliates

Taking a look at the various forms of assets of a company, it is obvious that plant and machinery come under the fixed asset. A general classification of items that constitute plant and machinery is as follows:

- Plant and Machinery used for:
  The generation, storage, primary transformation or main transformation of power i.e. generators, transformers, switchgears etc
  The heating, cooling, ventilating, lighting, drainage or supply of water i.e. boilers, compressors, water pumps, water reservoirs, water and effluent treatment plant etc
- Lifts and elevators used for passengers:
- Railway and train way lines, tracks, coaches:
- Pipelines, gas and electricity pipes:
- Petrol station equipment i.e. pumps, fuel reservoirs, oil

tankers etc

- Firefighting equipment
- Motor vehicles, including trailers, trucks, buses etc
- Cranes and mechanical equipment e.g. tippers, pay loaders, forklift, drilling equipment
- Ship and barges
- Aeronautical equipment, including planes, helicopters, space ships etc
- Communication equipment such as telephones and telecommunication installations, computers, etc
- Farm implements such as tractors, harrows, incubators, hatchers etc
- Plant and Machinery in the nature of a building or structure including blast furnaces, coke ovens, tar distilling plants cupolas or water towers with tanks

As a reminder it should be noted that in some companies motor vehicles could also be classified as plant and machinery depending on its mode of operation. From the aforementioned students should begin to have a clear picture of what constitutes plant and machinery in an organization. This identification of plant and machinery in any organization is the bane to most valuers. A successful recognition/completion of what constitutes plant and machinery in every organization has perhaps solved more than half of what is required in the valuation exercise.

PURPOSES OF MACHINE AND PLANT VALUATION

Having described and indentified the types and nature of plant and machinery, there is the need to discover why plant and machinery needs to be valued. We all know that the business world is highly industrialized. Many jobs previously accomplished manually is being done by machines. Hence, due to the large sums of money spent on acquisition and installation of plants and equipments in factories, industries, offices, and other organizations all over the world, there is need to keep abreast of developments in the plant and machinery business climate. Also there have been situations that had caused people uncomfortable and many businesses ruined for no cause of their own through fire outbreak, flood and earthquakes etc. for these unforeseen circumstances, the issue of insuring these machines and equipments become mandatory to mitigate loss. Also, for updating the accounts of a company or for the determination of the premium payable to the insurance company, in an attempt at guiding against under-insurance, plant and machinery valuers are also called upon to determine the worth of these equipments periodically. There are instances whereby the equipments in question will have to change hands. Thus, it can be observed that plant and machinery valuation is required for varied reasons which can be summarized into three broad categories:

- Financial valuation:

This involves the establishment of the economic worth of the plant and machinery for an ongoing concern. That is, the plant and machinery remain in the same position, the same hands and contributing to the profitability of the organization. This exercise may be carried out for the following reasons:

Merger and takeover
Insolvency
Settlements of disputes
Balance sheet
Internal performance analysis
Published financial statements
Investigation
Nationalization
Funding
Takeover defence
Floatation
Taxation
Privatization

- Open market valuation:

Open Market Valuation is required when a company actually intends to enter into a transaction or it wishes to borrow money using its plant and machinery as security for the loan. Hence it is required by:
Sellers wanting to know how much they might expect to achieve
Accountants

Investigating companies with financial problems

Buyers wishing to know how much to offer

Bankers and lenders for loan security purpose

Accountants handling the affairs of failed companies

These categories of people seek to establish the worth of the plant and machinery assets if sold outside the business of the company, provided that the plant and machinery would be sold by private treaty assuming:

- An able and willing buyer
- A willing seller
- A reasonable period within which to negotiate the sale taking into consideration the nature of the plant and machinery and the state of the market
- The parties in the transaction are knowledgeable, prudent and without compulsion
- Values would remain stable throughout the reasonable period of negotiation at prevailing market condition
- The plant and machinery would be freely exposed to the market
- No account would be taken of an additional bid by a special purchaser
- No account would be taken of expenses of realization which may arise in the event of disposal

Insurance valuation:

Insurance valuation determines the value of plant and machinery which represents the actual amount to indemnify the insured in the event of occurrence of loss or risks against which insurance has been taken. The two basis of insurance valuation are as follows:

- Reinstatement basis of valuation: This simply implies giving the insured a new one to replace the old one in case of total loss if there is no under insurance clause.

There is need to distinguish between Insurable Replacement Cost (IRC) and Gross Replacement Cost (GRC) approach.

Gross replacement cost valuation makes allowance for finance costs and charges, which when considered for a capital intensive plant may be enormous. In Insurable replacement cost, finance costs and charges are not considered rather each department in the factory is grouped according to its possibility of catching fire. Thus, each department is rated into the level of risk.

- Indemnity insurance basis of valuation: In this case items insured are placed exactly the position or condition it was immediately before the occurrence of the loss. The claim settlement is either by repair, replacement with equivalent one where obtainable or by payment of cash equivalent.Note that:

1. The cost of reinstating the plant and machinery damaged if it is not a total loss or if destroyed, the plant and machinery will be replaced as in the condition it was immediately before the incidence plus
2. Provision for loss of rent during the reconstruction/repair period plus
3. Cost of alternative accommodation during the repairs or reconstruction period
4. The inflation rate will be assumed constant during the construction period

BASES OF MACHINES AND PLANT VALUATION

Just as you have been thought in your conventional valuation practices that involve the valuation of land and buildings, it is also applicable in the valuation of plant and machinery that purpose defines the basis while the basis determines the method of valuation to adopt. Bases can be described as the ground on which the valuation should take place. The purpose of valuation could answer the question why should valuation be carried out in the first place. Bases should explain what the valuation exercise intends to achieve while the method of valuation expounds on how the valuation exercise should be carried out. The method of valuation used and the final value estimates are largely determined by the Basis of valuation employed which has to reflect the requirements of the instruction, the use to which the property is, or will be put and the type of property. The requirements of the instruction are varied and depend upon the particular need of the client. Property types, on the other hand, include 'specialized' and 'non-specialized' held either as owner-occupied, investment or surplus to the requirement of the business.

For the sake of convenience, the bases for plant and machinery valuation are classified under two broad groups.

Thus: 'the going concern basis' and 'the gone concern basis'

In carrying out the valuation of plant and machinery, it is important to identify which of the two concepts is relevant to the intended purpose.

Going-concern basis: the concept as the name suggests assumes that the assets being valued will continue in the processes for which they are purchased and installed. Going-concern basis means the same as 'existing use' or 'value-in-use basis. Other names ascribed to the going concern basis of valuation include 'accounting purposes valuation', and the 'in-house accounting valuation'. The going-concern basis of valuation is described in the RICS guidance note and the International Valuation Standards Committee (IVSC) notes on the valuation of plant and machinery as 'Value to the Business'. The IVSC guidance notes define 'Value to the Business' as the value, assuming that plant and machinery will continue in its present existing use in the business of the company. Both the RICS and the IVSC guidance notes recommend this approach for both private and public companies alike, as long as their intention is to continue using the assets in their business for a reasonable period in the future. Going-concern basis reflects the potential use limitations of the business with all its strengths and weaknesses. It does not account of the alternative uses to which the assets can be put. From the forgoing, it could easily be seen that for balance sheet purposes, for instance, the going-concern basis is to be adopted, otherwise it would run counter to the accounting principle of value in the business making use of the assets being subjected to valuation. Other purposes for which the basis could be used include mortgage, stock financing, taxation, insurance, acquisition and mergers, company accounts, annual financial report, business performance analysis e.t.c.

Content of the valuation for going-concern:

The instruction to determine 'going concern value' is will in normal cases refer to the entire plant and machinery asset of a company. Hardly will a company require the 'value in use' of a single item or one single production line.

Plant and machinery in this context will be part of the fixed assets of the company and will not include items that are to be consumed by the company in the normal course of its business. It is the fixed assets of a company other than its land and building.

Motor vehicles, mobile plant, ships, locomotives, aeroplanes and similar assets, which are not physically fixed, are part of plant and machinery unless they form part of the stock in trade of the company.

If motor vehicles and other similar items not physically fixed are to be included in the valuation, the basic information required will be found in their registration books. Physical inspection of these items must be made noting mileage and general condition. Where it is not possible to inspect physically all the items of motor vehicles and the like, a note should be made in the report to this effect. In the case of company, which deals in plant and machinery, its items of plant held for trading purposes will not qualify to be classed as part of fixed assets (plant and machinery).

All plant and equipment, which provides a service to the building in which a company carries on its business and which will normally be sold with the buildings, will be classified as part of the buildings. All other plant and equipment connected with the business of the company will be valued as plant and machinery unless otherwise requested in the instructions. Any such instructions should be clearly stated in the final report.

Items on hire purchase should be included in the valuation without any accounting taken of the outstanding amount on the hire purchase agreement, unless the company specifically requests that items on hire purchase agreement be included only at a figure, which represents their equity in the asset at the date of the valuation.

Items on operating leases in which the ownership remains with the lessor are to be excluded from the value in use of the lessee's assets. Such items will not appear on the lessee' balance sheet in any case and should be ignored in the valuation.

Items on finance leases in which the risk and benefit of ownership is with the lessee will be included in the valuation, because the lessee merely funds ownership of the items by a sort of borrowing.

Product-dedicated items are items used in connection with the manufacture of an individual product. They have no general use besides the manufacture of an individual product and are not considered as party of the production plant. They include items such as injection moulds, drilling and inspection jigs, etc. they can only be used in conjunction with the production plant to produce just the item for which they were designed and made. The economic value is dependent on the demand for the product for which they are used, and as soon as there is no further

demand for that product, the economic life of these items end, and they become more or less of no value to the company. In most cases these should be excluded from the valuation, or at best reflected in the value of the plant to which they are attached should the client demand to see them in the valuation. The description of the item to which they are attached should state what items of this type are used with it.

Redundant products are items that either due to any form of obsolescence, climatic pressures or as a result of efflux of time has become outmoded thereby resulting to disuse. These products should not be included in the valuation. One guiding principle for valuers of plant and machinery on the bases of going concern should always be products relevant to operation/production of such companies.

- Gone concern basis:

'Gone-concern value' and 'alternative use value' mean the same thing. Gone – concern valuation assumes that the business will be discontinued or altered. The values obtained using this basis will reflect the potentials for alternative uses, if any, which can be realized by the company if the assets were used for other purposes other than that for which they were installed (Aluko and Ajayi, 1992). For instance, a sweet making factory wanting to incorporate the manufacture of biscuits and macaroni will be valued on a gone concern basis. Other purposes for which gone concern valuations can be applied include sale and purchase of assets, privatization, division under the terms of a will, investment decisions, etc.

Items that should form part of the valuation for this basis should be at the discretion of the valuer, which is a function of the type of valuation and the specification of duty.

From observation it can be deduced that the financial purpose of valuation is synonymous with the Going concern basis while the open market purpose is synonymous with the Gone concern basis (see previous lecture (2) for reference). The insurance purpose is not necessary confined to any of the above mentioned basis; more so insurance can be carried out on all company's' assets of which plant and machinery forms part. Details of insurance valuation will be focus of discourse later.

FACTORS AFFECTING THE VALUE OF MACHINES AND PLANT

Before delving into the determination of assets values it is pertinent that students identify the various factors that affect values of plant and machinery. These factors include:

- Physical factors: plant and machinery value is affected by depreciation due to age, wear and tear, physical and functional obsolescence. Intensity of use and number of shifts operated affect wear and tear of plant and machinery, which invariably affect the value. The nature of materials handled may also affect the life span in much the same way as adverse climatic conditions. Apart from these, the availability of spare parts is an indispensable tool in good repairs and preventive maintenance etc, and determines to a large extent the quality of services available.
- Statutory regulations: Government legislation on import, such as the banning of the importation of certain items of plant have the effect of pushing up local demand for the relevant manufacturing plant or, in the case of plant and machinery, of enhancing greatly the second hand values of some of the items of plant and machinery. Again, the level of import duties payable on plant and machinery is also an important factor. For the higher the import duty, the higher the value of the existing plant. In Nigeria, the custom duty is surcharged on imported plant and machinery and this is an additional cost to the plant.
- Level of expertise: various plants and machineries require specialize approach in their installation and operation. In countries were such machines are not being manufactured, cost of operation and installations of such machines could be substantial notwithstanding a comparison paltry cost of purchase.
- Economic factors: the general economic climate and the specific situation of the particular industry must be taken into account. While temporary fluctuations in the levels of business can usually be ignored, the underlying trends cannot. Anything that is said to have value has a monetary worth attached to it, Plant and machinery inclusive. Monetary worth are likewise affected by monetary and fiscal policies of government. Such effects are usually pronounced in situations where such assets will have to change hands. Factors like changes in consumer demand or government legislation can make some plant obsolete before their physical life is over, and where they cannot be used for other purposes, their market value will be adversely affected. Each

proposed sale/purchase of plant and machinery will be unique in terms of its contents, location and timing, and it will be normal for identical items offered in different sales to attract different market values, due to the following reasons:

Type of sale

If the sale is by unction, it is well known that the higher the attendance, the greater the chances of realizing high price.

The attendance level at an auction is a function of the quality and quantity of the items on offer for sale. It is therefore important when assessing the value of an item to take into consideration the volume and quality of the total package of items to be sold.

Location

Buyers are usually less prepared to look for items to purchase in remote and hidden locations because of the extra transportation and handling costs in getting the items to their premises. Such costs should be considered in assessing value in the cases of most items except where the sale is to local purchasers, who may even be willing to pay a premium.

Time of sale

In some cases, such as insolvency, the vendor may not be in a position to choose an optimum time for selling his items. On the other hand, demand for some items vary with the time of the year. It is well known for instance, that the market value of certain items goes up when festive seasons are near.

Removal costs

It is not impossible to come across plant and equipment, which can only be removed from its present location after removing some part of the building structure such as the roof or walls. The value of such an item will naturally be affected by the amount of demolition and remedial work necessary to enable the buyer take home his purchase.

Special dismantling costs

This will include such costs as will be incurred in the purging of a chemical plant. This type of cost in most cases can be so enormous as to result in a negative value.

Category of purchaser

The value attainable can vary significantly depending on whether the buyer is a dealer, agent or an end user. The surveyor should keep in mind wholesale and retail value factor in his assessment. The definition of market value states that the surveyor must disregard in his valuation, the prospects of abnormally high offers by a special purchaser.

The special purchaser will include any buyer with an urgent and specific requirement for the particular item on offer and who is prepared to pay over and above the normal market value in order to secure the purchase.

Selling costs

These will include agents' commission, costs of advertising and all other costs incurred in putting up items for sale. They must all be deducted from all market valuations to arrive at a reasonable estimated Net Realizable Value. It is however also pertinent to report gross figures and add a note that the selling costs have not been taken into account rather than provide net figures, which may not be accurate due to uncertain costs.

Assignment:

Apart from physical factors, statutory regulations, level of expertise and economic factors, students are advised to go and learn more factors that affect values of plant and machinery

METHODS OF MACHINES AND PLANT VALUATION

As we are all conversant with conventional methods of valuation such as the cost method, income approach, residual method, profit method, comparative method, it is worthwhile mentioning here that these methods are suitable usually when valuing land and buildings. However, for plant and machinery valuation, the methods usually adopted are: the market data approach; the profits method; and the cost or summation method. For the particular requirements of the plant and machineries to be valued, however, the profit, the market data or the summation methods could be employed, depending on the nature of the market and the availability of reliable data. Although, in practice the method usually adopted is the cost or summation method. The following is, therefore, a cursory look at the suitability of each of the above methods adopted in plant and machinery valuations.

· The market data approach: this approach is appropriately based on the assumption that an informed purchaser, without undue influence, will pay no more for a property than the cost of acquiring an existing one with the same utility and located in the same or similar neighborhood. This method

is, therefore, mainly predicated on the comparison or recent sales prices of properties having similar attributes with the subject being appraised. Some of the attributes include location, physical state, tenure/title, time within which the transaction was concluded, construction, layout, equipment and size. The effective comparison of these attributes and the making of proper adjustments where necessary are the bane of the method. To achieve reasonable results, experience and a fair good knowledge of that segment of the property market are essential ingredients. It is however true that the number of subjective considerations associated with the use of the method is reducible to a manageable level with the availability of sufficient and reliable data and evidence of comparable transactions making the method a more dependable means of estimating value.

- **The profits method: this method converts anticipated future benefits (profits) of property ownership into an estimate of present value. The steps involved require adequate market data and reliable books of account, which were not always sufficiently available. It is now being canvassed that under circumstances of dearth of supportable data, the placement of value on plant and machinery is almost impossible under this method. This is true because it is often difficult to determine from the records of most establishments, the percentage contribution of each asset of the company. In the light of the above considerations, therefore, the profit method was, at best useful only as a check for the overall value of the assets as determined using the cost approach.**

- **The cost or summation method: the cost or summation approach is based on the premise that an informed purchaser, under normal circumstances, would pay no more for a property than the cost of producing or acquiring a substitute property of similar utility within the same or like neighborhood. The method essential involves the estimation of the total cost of construction of such plant and machine depreciated to reflect physical, functional and economic obsolescence. The major problem in the use of this method of valuation is the determination of obsolescence due to aging (physical deterioration), unfavourable national and/or international economic factors and functional problems. It is, therefore, suggested that its application is more acceptable if the plant is in its highest and best use (new state, say not more than three years) or made as good as that through regular and sufficient maintenance and refurbishment. These are necessary because, estimating even minor forms of obsolescence involves, in most cases, unsupportable judgemental considerations that weaken the method's credibility. However, with experience and sufficient knowledge of that segment of the market, acceptable value estimate could be obtained from its use.**

The method is also considered the most alternative in the placement of value, under the circumstances of plant and machinery that rarely change hands (rarely sold in the open market). As highlighted earlier, this method is mostly used in valuation of plant and machinery because, apart from the reasons given for not using the other approaches dealt with above, it is most suitable for the type of specialized nature of plant for which companies are noted for; specialized in terms of design, layout, construction, quality, type of materials and equipment. From the aforementioned it has been revealed that the cost or summation method is the widely used method in the valuation of plant and machinery. However, for an appropriate grasp of this method, valuers should be conversant with the concept of depreciation and its application.

DEPRECIATION OF MACHINES AND PLANT

Depreciation is the term used to describe the reduction in the value of an asset over a period of time. Depreciation may be observed in forms of physical deterioration, locational and economic obsolescence and functional obsolescence. It is the measure of the

wearing out, consumption or other loss of value of assets whether from use, effluxion of time or obsolescence through technological and market changes. There are so many factors likely to accelerate depreciation in values of plant and machinery. Some of these include rate of use or general carelessness as regards use. Good management on the opposite side of reduces the rate of depreciation on an asset. Experience has shown that two similar properties could lie in the same location, have similar characteristics but upon valuation by depreciated replacement cost method, the value of one is found to be less than that of the other. It is therefore wrong for a valuer to neglect this very important factor which greatly affect the values of the properties and which could lead to a false presentation of value when neglected. It may sometimes takes more than one professional to decide what rate of depreciation should be used in depreciating a plant or machinery. Having ascertained the gross value of a plant and machinery by the appropriate method of valuation, the valuer can direct his attention to depreciating this figure in order to arrive at the existing-use-value of the plants and machinery. Depreciation is indeed an issue in valuation of plant and machinery. Fundamentally, the existing use value of plant and machinery calculated by the depreciated replacement cost method is that part of the gross value that is attributed to the unexpired portion of the total economic working life. The factors that affect depreciation or determine the assessment and allocation of depreciation are:

- General condition
- Standard of maintenance
- Workload to which plant and machinery is subjected Replacement of component parts since new
- Other relevant factors

Depreciation and what it means

Before we delve into the various methods of depreciation it is crucial at this moment for us to take a look at the four technical meanings ascribed to depreciation. They include:

- Loss of value: when the value of an asset is computed at two different dates, and the value at the later date is subtracted from the value at the earlier date, the difference is a measure of the amount of depreciation that the asset has experienced. This is the meaning generally applied to the word depreciation when used in everyday speech. Of course, when talking about value, one must make the distinction between market value and value to the owner. Depreciation may apply to either of these two definitions of value whether they are determined by actual market price, by an appraisal, or by any other method.
- Cost amortization: from an accounting point of view, the cost of an asset is an operating expense which has been prepaid and which must be apportioned according to some systematic procedure among the years of the asset's life. In standard accounting terminology it is cost and not value that is apportioned. A report of the committee on terminology of the American Institute of Certified Public Accountants define depreciation as follows: "Depreciation accounting is a system of accounting which aims to distribute the cost or other basic value of tangible capital assets, less salvage value (if any), over the estimated useful life of the unit (which may be a group of assets) in a systematic rational manner. It is a process of allocation, not of valuation. Depreciation for the year is the portion of the total charge under such a system that is allocated to the year. Although the allocation may properly take into account occurrences during the year, it is not intended to be a measurement of the effect of all such occurrences". The term book value is used to describe the difference between the depreciable cost of an asset and the total amount of depreciation charges that have been made to date against the asset.
- The difference in value between

an old asset and the reproduction of the identical but new asset, which is used as a standard to compare values: the appraisal concept of depreciation is based upon this premise. One way to appraise old assets is based upon replacement cost, which is defined as the difference between the cost of reproduction of the asset and the depreciation that it has experienced through time to date of appraisal.

Wear and tear, which result in decreased serviceableness: as structures and equipment become older, the wear and tear often results in impaired functional efficiency. This is an engineering concept of depreciation. It is not a value concept. The fact that an asset may be perfect and as good as new, does not insure than its value is the same as when it was new, for the asset may have undergone a certain amount of technological obsolescence. That is, more recently produces assets may perform the service more efficiently or may have a broader range of capabilities.

It is extremely important to recognize at the outset that depreciation is a book of account entry (a paper loss). Hence, depreciation could not just be the only factor that affects before tax cash inflow as other factors ranging from managerial inefficiency, marketing procedures and other adverse financial climate could affect such. However, depreciation is usually considered for issues like tax matters; an escrow account for replacements is not set up and consequently, monies from the cash flow stream are not diverted for this purpose.

COMPOSITE METHODS OF DEPRECIATION

Having studied the four technical meanings ascribed to depreciation, students by now should have a great grasp of the concept of depreciation. However, it is one thing to know about depreciation, it is another to be able to apply it. Every professional exposed to the utilization of the concept, depreciation, encounter problems, as there are divergent opinions on its application. Professionals are faced with myriad of options in determining depreciation. However, regardless of the depreciation method to be used, it is important that two elements be considered before depreciation charge is calculated. The first is the depreciation base, which is the aggregate of all costs incurred in acquiring the asset, installing it and making it ready for use LESS or minus any residual value expected at the time of retirement, plus the anticipated costs of removing the asset when retired. The second element is the useful life of the asset, which is a function of the physical wear and tear to which the asset is subjected and of technological change and innovation. Having said this, it behooves us to take a look at the various methods of determining the depreciation of plant and machinery. They are:

Straight-line method: the plant and machinery is seen as providing an equal amount of service in each year with maintenance cost either constant or insignificant. The benefits derived from using the asset are also assumed to spread evenly over the useful life of the asset. The annual depreciation charge is obtained by dividing the depreciation base by the estimated number of years for which the asset is useful and the charge is the same every year. The rate of depreciation may be obtained by converting the reciprocal of the useful life into a percentage. The rate when applied by the depreciation base gives the depreciation charge. Annual depreciation under this method is computed by dividing the depreciable book value of the asset over its full service life in years. Students should note that the depreciable book value is the same as the depreciation base, which is defined mathematically as (acquisition cost indexed to present value, less items that can be written off immediately such as fees related to taxation if any, less salvage value).

Illustration:

Assuming a machine that has a depreciable book value of N1, 050, 000 and with a

full service life of 25 years. You are required to compute its annual depreciation.

Solution:

Depreciable book value/base = N1, 050, 000

Useful life = 25 years

Annual depreciation = N1, 050, 000

z 25

= N42, 000

Thus, the annual depreciation is 1 or 4% of its depreciable book value.

25

- Sum-of-the-years'-digits method: this method is a way of achieving decreasing charges by applying diminishing rates to the depreciation base. The rates are obtained by setting the sum of the digits fro one through the useful life of the asset in years as the denominator, while the numerators are the individual year numbers taken in descending order per year. Under the method of declining charge for depreciation of a fixed asset is made as the asset ages, and usually there are heavy early-year charges to depreciation counterbalanced by lower charges in the later years. Under this method, the digits that correspond to the number of years of service life of an asset are added. Mathematically this can be computed as n (n+1) where n = number of years in the life.

2

Illustration:

Assuming a machine that has a depreciable book value of N1, 050, 000 and with a full service life of 25 years. You are required to compute its annual depreciation.

Solution:

Depreciable book value/base = N1, 050, 000

Useful life = 25 years

Thus, for n = 25, n (n+1) = 25(25+1) = 25(26) = 325

2 2 2

Thus, the depreciation for the first year of life is then computed as

25 * 1050000 = N80, 769. 23

325

The second year, the depreciation is 24 * 1050000 = N77, 538. 46

325

The third year, the depreciation is 23 * 1050000 = N74, 307. 69

325

And so on until the end of the 25th year. Students who are vigilant will discover that the charges decrease by N3, 230. 77 yearly.

- Declining balance depreciation: there are two facets of this type of depreciation method they are the 100% declining balance and the double declining balance. In any declining balance depreciation a given rate is applied each year to the remaining book value of the asset. The remaining book value is that portion of the depreciable book of an asset or assets that has not been written off in the previous years. This method assumes that as the fixed assets gets older, the benefits derived from them decreases, while maintenance and repair costs incurred on them increase. The method entails the application of a constant depreciation rate to the declining basic value of an asset at the beginning of successive years. The result is that a declining depreciation charge is obtained as the asset ages. Any prospective salvage value for the asset is disregarded in computing the permissible declining balance rate because the declining balance method automatically generates a salvage value at the end of the asset's life.

The depreciation rate under the 100% declining balance approach is computed as:

100%

Estimated life of asset in years

While the depreciation rate under the double declining balance approach is computed as:

200%

Estimated life of asset in years

Mathematically, let P represent the initial depreciable book of an asset and r represent the declining balance rate expressed as a decimal. It can be shown that the book value of the asset at the end of n years is given by:

$S.V. = P(1-r)^n$.

Illustration:

Assuming a machine that has a depreciable book value of N1, 050, 000 and with a full service life of 25 years. You are required to compute its annual depreciation.

Solution: (100% or single declining balance approach)

Depreciable book value/base = N1, 050, 000

Useful life = 25 years

$\frac{100\%}{25 \text{years}} = 4\%$

Because the initial depreciable book value is N1, 050, 000, the depreciation charge during the first year of life would be 0.04(N1, 050, 000) = N42, 000. The remaining book value would be N1,050,000 – N42, 000 = N1, 008, 000

Thus, the depreciation during the second year is 0.04(N1, 008,000) =N40, 320. The remaining book value would be N1,008,000 – N40, 320 = N967, 680

Thus, the depreciation during the third year is 0.04(N967, 680) =N38, 707.2 and so on.

The salvage value at the end of the 25 years is thus:

$S.V. = P(1-r)^n = S.V. = N1, 050, 000 (1-0.04)^{25} = N378, 416.55$

Illustration:

Assuming a machine that has a depreciable book value of N1, 050, 000 and with a full service life of 25 years. You are required to compute its annual depreciation.

Solution: (200% or double declining balance approach)

Depreciable book value/base = N1, 050, 000

Useful life = 25 years

$\frac{200\%}{25 \text{years}} = 8\%$

Because the initial depreciable book value is N1, 050, 000, the depreciation charge during the first year of life would be 0.08(N1, 050, 000) = N84, 000. The remaining book value would be N1,050,000 – N84, 000 = N966, 000

Thus, the depreciation during the second year is 0.08(N966, 000) =N77, 280. The remaining book value would be N966,000 – N77, 280 = N888, 720

Thus, the depreciation during the third year is 0.08(N888, 720) =N71, 097.6 and so on.

The salvage value at the end of the 25 years is thus:

$S.V. = P(1-r)^n = S.V. = N1, 050, 000 (1-0.08)^{25} = N130, 583$

Lets take a quick look at the comparison of depreciation methods. The table below gives annual depreciation charges and end-of-year book values for straight line depreciation, double declining balance, 100% declining balance and sum of the years digits for our hypothetical machine previously considered. In each case the depreciable book value is N1, 050, 000 and the service life, is 25 years.

Years	Straight line	Double declining balance	100% declining balance	Years digit
0				
1	42, 000	84, 000	42, 000	80, 769
2	42, 000	77, 280	40, 320	77, 538
3	42, 000	71, 098	38, 707	74, 308
4	42, 000	65, 410	37, 159	71, 077
5	42, 000	60, 177	35, 673	67, 846
6	42, 000	55, 363	34, 246	64, 615
7	42, 000	50, 934	32, 879	61, 385
8	42, 000	46, 859	31, 561	58, 154
9	42, 000	43, 110	30, 298	54, 923
10	42, 000	39, 662	29, 086	51, 692
11	42, 000	36, 489	27, 923	48, 462
12	42, 000	33, 570	26, 806	45, 231
13	42, 000	30, 884	25, 734	42, 000
14	42, 000	28, 413	24, 704	38, 769
15	42, 000	26, 140	23, 716	35, 538
16	42, 000	24, 049	22, 768	32, 308
17	42, 000	22, 125	21, 857	29, 077
18	42, 000	20, 355	20, 983	25, 846
19	42, 000	18, 727	20, 143	22, 615
20	42, 000	17, 229	19, 338	19, 385
21	42, 000	15, 850	18, 564	16, 154
22	42, 000	14, 582	17, 82	12, 923
23	42, 000	13, 416	17, 109	9, 692
24	42, 000	12, 342	16, 424	6, 462
25	42, 000	11, 355	15, 767	3, 231

Lets also take a look at the salvage value of our hypothetical machine at the end of various useful lives.

Table showing hypothetical machine's annual depreciation charge (N)

Years	Straight line	Double declining balance	100% declining balance	Years digit
0	1, 050, 000	1, 050, 000	1, 050, 000	1, 050, 000
1	1, 008, 000	966, 000	1, 008, 000	969, 231
2	966, 000	666, 720	967, 680	891, 693
3	924, 000	817, 62	928, 973	817, 385
4	882, 000	752, 213	891, 814	746, 308
5	840, 000	692, 036	856, 141	678, 462
6	798, 000	636, 673	832, 896	613, 847
7	756, 000	585, 739	789, 020	552, 462
8	714, 000	538, 880	757, 459	494, 308
9	672, 000	495, 769	727, 161	439, 385
10	630, 000	456, 108	698, 074	387, 693
11	588, 000	419, 619	670, 151	339, 231
12	546, 000	386, 050	643, 345	294, 000
13	504, 000	355, 166	617, 611	252, 00
14	462, 000	326, 752	592, 907	213, 231
15	420, 000	300, 612	569, 191	177, 693
16	378, 000	276, 563	546, 423	145, 385
17	336, 000	254, 438	524, 566	116, 308
18	294, 000	234, 083	503, 584	90, 462
19	252, 000	215, 357	483, 440	67, 847
20	210, 000	198, 128	464, 102	48, 462
21	168, 000	182, 278	445, 538	32, 308
22	126, 000	167, 696	427, 717	19, 385
23	84, 000	154, 280	410, 608	9, 693
24	42, 000	141, 938	394, 184	3, 231
25	0	130, 583	378, 417	0

- Revaluation method: this method involves the valuation of the assets according to their class, at the beginning of the year and also at the end of the year. By making adjustments in respect of additional assets purchased within the year, a measure of the value of the asset used up during the year is arrived at. This value is then charged to the income statement as depreciation in respect of such assets. The method can be applied to loose tools, or where the useful life of the asset may turn out to be short due to loss, theft, breakage, damage etc. or where it may be cumbersome and unnecessary to keep individual records for each of the items because of the fact that their individual values are immaterial in the context of the whole organization.

Illustration:

The following were obtained from the books of Goalmex Engineering Corporation. In the first year, Processing machines were bought valued at N400, 000. The following values were given by the expert that valued the assets as follows:

Year ended year 1 = N250, 000

Year ended year 2 = N100, 000

Year ended year 3 = N70, 000

Year ended year 4 = N52, 000

Year ended year 5 = N35, 000

Year ended year 6 = N10, 000

Determine the depreciation charged for the six years.

Solution:

Year 1 = N400, 00 – N250, 000 = N150, 000

Year 2 = N250, 00 – N100, 000 = N150, 000

Year 3 = N100, 00 – N70, 000 = N30, 000

Year 4 = N70, 00 – N52, 000 = N18, 000

Year 5 = N52, 00 – N35, 000 = N17, 000

Year 6 = N35, 00 – N10, 000 = N25, 000

The method can be applied to loose tools, or where the useful life of the asset may turn out to be short due to loss, theft, breakage, damage

The Table below gives a lucid picture of how the asset stands at the end of the six years period.

Table showing comprehensive details of machine (N)

Year	Book value at the beginning of the year	Depreciation charge in the year	Accumulated depreciation at the end of the year	Book value at the end of the year
1	400, 00	150, 000	150, 000	250, 000
2	250, 000	150, 000	300, 000	100, 00
3	100, 00	30, 000	330, 000	70, 000
4	70, 000	18, 000	348, 000	52, 000
5	52, 000	17, 00	365, 000	35, 000
6	35, 000	25, 00	390, 000	10, 000

- Productivity or usage method: this method takes the productivity capacity of the asset into consideration and, therefore, bases the depreciation charges on the machine hours used or production units. The useful life of the asset is hereby disregarded and the total machine hours or production units are estimated and used to calculate the annual depreciation charge which will then vary with the level of production or the number of machine hours achieved. This often results in fluctuating charges. The method can be used for assets, which wear out in proportion to their usage, and in the estimation of computation of cost of production.

Illustration:

A machine cost N200, 00 with a budgeted capacity of 600, 000 units. The following units were thereafter produced:

Year 1 = 150, 000 units
Years 2 = 80, 000 units
Year 3 = 100, 000 units
Years 4 = 70, 000 units
Year 5 = 65, 000 units
Years 6 = 50, 000 units

Calculate the depreciation charge.

Solution:

Cost of acquisition = N200, 000 = 0.33/units
Maximum capacity 600, 000

Year 1 = 0.33 * 150, 000 units = N49, 500
Year 2 = 0.33* 80, 000 units = N26, 400
Year 3 = 0.33 * 100, 000 units = N33, 000
Year 4 = 0.33* 70, 000 units = N23, 100
Year 5 = 0.33 * 65, 000 units = N21 450,
Year 6 = 0.33 * 50, 000 units = N16, 500

The Table below gives a lucid picture of how the asset stands at the end of the six years period:

Table showing comprehensive details of machine (N)

Year	Book value at the beginning of the year	Depreciation charge in the year	Accumulated depreciation at the end of the year	Book value at the end of the year
1	200, 00	49, 500	49, 500	150, 500
2	150, 500	26, 400	75, 900	124, 100
3	124, 100	33, 000	108, 900	91, 100
4	91, 100	23, 100	132, 000	68, 000
5	68, 000	21,450	153, 450	46, 550
6	46, 550	16, 500	169, 950	30, 050

ASSIGNMENT: HAVING STUDIED THE VARIOUS DEPRECIATION METHODS, YOU ARE REQUIRED TO WRITE AN ESSAY AND CRITICALLY SUGGEST THE BEST METHOD OF DEPRECIATION THAT SHOULD BE ADOPTED IN THE VALUATION OF MACHINES AND PLANTS

PROCESSES OF PLANT AND MACHINERY VALUATION

Just like in all activities that is worth the while plant and machinery valuation has to be carried out in a systematic way. Any valuer that is conscious of the approach preceding the actual process of actual valuation of plant and machinery will circumvent any glitch likely to be envisioned during the process. In the valuation exercise, the major steps involved after securing the brief include the establishment of the scope and basis of the valuation; identification; classification and compilation of inventory of items of plant and machinery; and finally value the asset on the appropriate basis.

- Securing the brief:

In any form of valuation there must be a commitment by the client for the need for such job. This commits the client and obliges the valuer in carrying out the professional task. The instruction could be written but the intention of contract is what seems paramount here.

- Defining the scope of the valuation:

Invariably when the scope is defined, it automatically means that the purpose of the valuation has earlier been ascertained. The purpose of the valuation will not result without a brief for the exercise in the first place. Students should recall the third lecture on basis of plant and machinery valuation for further details. When the scope of valuation is successfully defined, the valuer is said to have established a route of operation.

- Identification of plant and machinery:

As it has severally been highlighted earlier on, the major bane of this aspect of valuation is the identification of what actually constitutes a plant/machinery in any organization. This is the first step in the valuation process after the identification of the scope of valuation and has been a Herculean task to even the most experienced valuers. The scope of valuation determines what items are to be regarded as plant and machinery. Also the requirements of the clients' will also be a guiding factor. However, one prominent guide in identifying plant and machineries is to determine the use to which the item is put. If a boiler for instance is used to heat the building mainly, then it should be valued with the building, but if it is purposely used to provide steam energy for the manufacturing process then it should be classified and valued as an item of plant and machinery. Students should also note that as per valuation norms, all moveable assets, which concern any organizational concern will fall under one of the following group: plant and machinery, service system, loose tolls and equipments, fixtures and fittings, office and other furniture, office equipment (computer hardware, software, typewriters, printing, Xerox and others), vehicles, raw materials and finished stocks. As has been stated earlier, in conventional plant and machinery valuation, vehicles used as official cars also form part of items as plant and machinery.

- Classification of plant and machinery:

In the classification of plant and machinery, the principal factor here is the nature of organizational outfit. Is it mining, manufacturing or processing concern? For instance plants can be classified as follows:

Automobile plants: these include trucks, buses, trolleybuses, road tractors, trallers, cranes etc.

Chemical plants: chemical plants are industrial process plant that manufactures chemicals, usually on a large scale. Machinery required for chemical plants include: chemical dryer, chemical mixer, chemical process pumps, compressed air dryer, distillation columns, fertilizer plants, industrial mixer, laboratory centrifuge, rotary vacuum dryers, etc.

Gas plants: plants that come under this classification include Oxygen plant, Hydrogen plant, Nitrogen plant, Ammonia plant, Acetylene plant, Carbon-dioxide (CO_2) generator, Dry ice plant, methane plant, Biogas plant, LNG plant, CNG plant, Natural gas plant, Liquid oxygen pumps, Propane generator, Nitrous Oxide plant, Liquid Nitrogen Pump, Oxygen generator, Cryogenic liquid plants, etc.

Pharmaceutical plant: plants that are classified under this category include: drum blender, dry heat sterilizer, dust collector, empty capsule filling machine, feeze drying machine, fermentation house equipment, fertilizer process fertilizer process equipment, friability tester, furnace ducts, herbal extraction plant, homogenizer, ointment mixer, oscillating granulator, roll compactor, etc.

Diary plants: plants that come under this category include concentration separation equipment, conveyors, cream separators, filling machines, flow meters, heat exchangers, homogenizers, insects control system, pasteurizes, pipes, pneumatic blowers and boosters, pressure vessels, process pumps, programmable controllers, solenoid pneumatic valves, temperature controllers, thermic fluid heaters, centrifugal pumps, buil milk coolers, butter churners, milk pasteurization plant, etc.

Power plant: certain plants in this category include steam power plant, geothermal power plant, gas power plant, nuclear power plant, wind power plant, hydroelectric dams, coal plants, fossil fuel power plants, etc.

The list is endless. The prevalent situation determines the classification to adopt.

Some valuers usually omit this stage especially in very small industrial out fits that focus on a particular line of operation. However, there should be a point of caution here. When machines are classified under subset as regards what they are focused on in various era of operation it enables the valuer to capture every machine in the various era of operation and as such the omission of certain machines will to a great extent be reduced if not eliminated.

- Compilation of inventory of plant and machinery:

Having identified and classified the various plants and machinery valuation, the next stage is to compile the inventory of existing plants and machinery. Compilation of plant and machinery follows a definite pattern. The amount of details necessary for the asset schedule to form the basis of the valuation should be enough information to enable the client to identify the assets being valued at the same time, to give the valuer enough information to calculate the worth of the machinery. In describing the machine, it must be in such a way as to leave no doubt in mind of the manufacturer or supplier asking for the price. The general format is:

Maker's name
Model or type designation
Capacity
Description
Serial number
Note on age and condition
Other relevant comment

However, it should be noted that when preparing the schedule of company's assets within its premises that certain plant and machineries might be with the subcontractors; away on repair; working on an off-site project, or at the house of one of the managers or employee or anywhere, such as the helicopters or mobile plants. As a result of this, the valuer must liaise with the client and the building surveyor in order to make sure that that the borderline assets are not totally omitted nor included in both the plant and property valuation. Hence, it is necessary to ask about equipment not on site.

- The actual valuation:

A scrupulous adherence to the aforementioned steps will curb unnecessary errors. At this stage the valuer determines the method of valuation to adopt, although in the Nigerian practice the cost or summation approach is usually adopted. From the information gathered at the inventory stage, the appropriate type and adoption of depreciation is considered. Economic factors prevalent and those that have been experienced since the manufacture/purchase of such assets are also important factors to consider.

Placing values on the said assets becomes the prerogative of the valuer at this stage.

- Reporting

At the end of any valuation exercise, valuers are required to report their professional task. This is function of the basis of the valuation job being handled. However, certain features are always germane. This includes: The value arrived at, the date, purpose of the valuation and the beneficiary of such job.

VALUATION OF OBSOLETE MACHINES

If change is the law of life, there is no reason to suppose that the rate of change will be such as to leave nothing obsolete. With the rapid pace of technological change today, it is common for valuation surveyors to set levels of value for items no longer in current production. In the fields of machine tools, textile plants, computer equipment and process control, the pace of change has been particularly rapid. The assessment of value of obsolete machinery for presentation in company's accounts is becoming increasingly important as the speed of technological change advances even more rapidly.

It has earlier been established that the proper basis of value of machinery for a going concern is the "Existing use value", which is usually determined by:

"Depreciating the gross current replacement cost in order to reflect the value attributable to the remaining useful economic working life of the machine, taking due account of wear, tear, age, obsolescence, scarcity value and other relevant factors including residual value at the end of the asset's useful economic working life"

However, it should also be recalled that two other methods of valuation of plant and machinery do exist, thus, the profit method and that of market data. The profit method is seldom used due to the intricacies involved and certain parameters that might appear arcane when considered. In the case of market data approach, "where suitable market evidence exists this value should be compared with the cost of acquiring a similar asset in the open market which has the same remaining working life as the existing asset"

From the aforementioned, it becomes evident that it is not necessary to establish a gross value, that is a new cost, and then depreciate it in every case when valuing certain plants and machinery. However, the snag with the market data approach is to get a proper market that showcases the machine in question having the same features and peculiarities. This market is colloquially called the second hand market (Tokunbo) and appellation common in this part of the world. Certain types of machine tools, textile machines or some of the simpler machines in pharmaceutical plants are perhaps good examples of machinery which is commonly bought and sold in the second hand market. The question then is what about the most sophisticated plants and machinery?

It should be noted that the key world in the fairly used market as often referred to in relation to

valuation of plant and machinery is "suitable market evidence". The word suitable is obviously open to various interpretations, but in this context implies that a ready and active market must exist in a certain type of plant and contain a sufficient number of transactions for Data to be analysed and trends monitored. These transactions must be free and fair and conducted in industries where purchase of the plant at the market rate can be expected to offer a prudent purchaser an economic return on his invested capital assuming the machines he has purchased are employed for the use they were intended, rather than for onward sale. The market value we are seeking to obtain is the best price likely to be paid by a machine user for an asset in the same condition as the item been valued rather than a dealer. This is because as defined much earlier machines are principally used for ongoing business that anticipates future streams of profit, not the breakup of the plant for sale.

Before a valuer begins to carry out valuation of obsolete machines, the first condition to be established is what type of obsolescence is being considered, even though this term might seem vague in explanation. Thereafter just as was learnt in the valuation of other modern machines, the scope of the valuation is of preeminence.

For a machine whose useful life has ended the value of such machine is its "salvage value". However, when such machine is still in operation, the task of determining its value becomes herculean. Notwithstanding the challenge facing the valuer, certain points need to be made. Firstly, a machine that has exceeded its useful life no matter the good state it commands and its level of productivity perhaps due to effective maintenance policy has little more time to pack up. A manufacturer is the best personnel to describe a machine. Based on the specifications, peculiarities and other recondite features of any machine, useful life are placed of which a machine is deemed to function, thus, any more extra years of operation will be short-lived, hence such machines will not be much better than their salvage value while their value of operation will not exceed that of the final specified year. Although, the discretion of the valuer is paramount in placing a final figure, having taking note of specific features prevalent. Obsolete machines under this category could be described as scrap.

To some economic school of thought, a machine is regarded as being obsolete when a new technological advancement makes it uneconomical to utilize such equipment even when such equipment is still physically capable of contributing to production. There are machines which do to pace in technology have become obsolete but do have some useful life running, the approach will be to depreciate for new as used during the cost/summation method studied earlier but better still make recourse to market data evidence as discussed above, particularly when the manufacturers of such machines cannot be contacted or approached and invoice of purchase cannot be reached either. In some industries however, particularly process industries, chemical and food plants are good examples here, plants are rarely sold second hand. The same may be said of highly specialist machine tools such as special purpose drilling machines used in the automotive industry. When existing use values of these obsolete plants are to be calculated, fairly ground rule has been laid according to the RICS guidelines on the basis of their modern equivalent asset. Referring to building valuations the relevant guidance notes state:

"When valuing for gross current replacement cost, where a modern building of the same gross internal floor area might cost substantially less than an identical replacement of the one on site, then the lower figure for the modern building should be used as a basis for estimating net current replacement cost"

The above statement is equally relevant to the valuation of plant and machinery. In practical fact, what represents a modern equivalent asset may be a matter of debate, but the principle is plain.

What is a modern equivalent asset? How do we determine what is considered an adequate replacement? To decide this it is perhaps useful to consider what the owner of the machinery would do in the event of its replacement. He has two choices. He may replace his plant with equivalent plant from another source, or with modern computer controlled plant of the latest technology.

Let's take the first case that is replacing his plant with equivalent plant from another source. In many cases the particular obsolete machines being considered may not be available from the original supplier, but may still be available as a new machine from countries where the state of technological development is not as high. For example in the United Kingdom today there are large number of machine tools, plastics machinery and amounts of general factory equipment being imported from Eastern Europe and South East Asia to do work previously done by British, German or American machines. It has been argued that these machines are not of the same quality as those produced by the manufacturers they are replacing. However, the standard of quality of manufacture and sophistication of machines has

increased progressively over time. The demand for more reliable products has led to the need to manufacture to closer tolerances and to produce goods of better quality than was the case in the past, and necessary improvements in machinery have been to make this possible. A second rank of machine of today's manufacture may easily produce work of equal quality to that of an obsolete machine when it was new some twenty or thirty years ago.

It's simply like comparing a modern Eastern European car with a Morris Oxford, or an Old Mercedes. If a factory owner would consider replacing his machinery in this way then this can be considered as an appropriate estimation of gross that is new value. To produce a net value appropriate for presentation in accounts, it is then only necessary to depreciate this figure to reflect the wear, tear and remaining life of his current machinery.

On the other hand gross or new value may be decided by comparing existing assets to modern computer controlled machinery. Consultation with the client's engineering staff can usually provide a likely scheme for replacement. It is not necessary to consider each individual machine in this situation, but the client's intention towards groups of machines. He may replace three older spinning machines with one modern item for example, or a bank of five capstan lathes with a machining centre. In this situation each of the obsolete machines may be valued at one-third or one-fifth of the cost of the modern asset. To produce a figure for existing use value, yet again this figure would be depreciated to reflect the wear, tear, age condition and remaining life of the plant being valued.

In summary, the kind of obsolescence determines the approach of valuation to be adopted for such plant and machinery. As an addendum, it behooves us to have a working knowledge of the various kinds of obsolescence prevalent.

KINDS OF OBSOLESCENCE

Technological Obsolescence

This relates to the different relationship between the design and material of the subject machinery item and that used in present day machine. Another example is in the area of space requirement. If for instance the subject machinery requires a floor space of $95m^2$ for its operation while the modern type requires a floor space of $50m^2$. This is a difference of 45/95 or 47.37% less the space required of the previous machine.

Management of industries will always tend to maximize space by working increasing productivity per square meter of plant area and floor space requirement of machine an important condition for desiring the purchase of a particular machine.

Functional Obsolescence

This relates to difference in production rates or efficiency and other characteristics between a new machine and the one under consideration. Another consideration could be direct technical requirements. For instance a seven-year-old machine could be replaced with a machine that is more expensive but increases the efficiency in production by 15%.

This 15% will incorporate labour and energy difference, down time, ease of repair, level and spread of accuracy of finished products. Again, a new machine may produce 100 units per time frame compared with 70 units produced in the same period b y the machine being valued. This is difference of 30/70 or 42.86%.

Items of machinery are usually designed or adapted for a particular or specific use. This could be defined as the highest and best use of the subject item, the most of the profitable likely use to which a property can be put. The ability of a property to be utilized at the highest and best use would have some relationship to value.

Any utilization less than highest and best use will be a contributory factor to depreciation because this represents a loss from the upper limit of value. This limitation in use could be described as functional obsolescence.

Economic Obsolescence

It deals with influences external to the machinery itself. Economic obsolescence seems the most misunderstood and the most difficult for appraisers to quantify. It is defined as the impairment of desirability or useful life arising from economic forces such as, change, in optimum use, legislative enactments which restrict or impair property and changes in supply/demand relationship. These factors can be measured and expressed in percentage of the subject machine productivity or potential use. It is the loss in asset value created by factors unrelated to the asset itself, unlike physical and functional obsolescence that are intrinsic to the asset.

Economic obsolescence is caused by factors external to the asset. Consequently it is often referred to as external obsolescence, since it is beyond the control of the asset owner. Reduction in asset value attributable to economic obsolescence are usually beyond the ability of the asset owner to influence and could not be cured by making modification to the appraised asset. Economic obsolescence could be regarded

as incurable depreciation. The quantification of economic obsolescence is usually obtained based on the examination of financial impact attractable to the external forces acting on the asset. A reduction in selling prices and investor's returns are examples of potential source for the creation of economic obsolescence. Summarily, the following are some of the causes of economic obsolescence: reduced demand for the product, increased computation, changes in raw material supplies, increasing cost of raw material, labour or utilities cost without a corresponding price increase of the product, inflation, high interest rates, legislation and environmental considerations.

OBSOLESCENCE, DEPRECIATION AND THE USEFUL LIFES OF MACHINES

Depreciation is loss in value due to any cause. There is hardly any factor more relevant in the valuation of plant and machinery than depreciation and obsolescence. It is necessary to understand the clear distinction in meaning of depreciation as a different form of obsolescence that has emerged in the evolution of concepts associated with technical developments. Depreciation is a universal phenomenon. It is an attribute of all physical objects that are subject to wear and tear whether in use or not in use. Remember the catchphrase 'every machine begins to depreciate immediately after being manufactured'. Thus, depreciation is therefore a premium for existence in the sense that decay is inevitable. Obsolescence on the other hand is stimulated by exogenous factors, be it technological, functional or economic. Students should recall that during the discourse of the various types of obsolescence, another machine is used as a base in determining whether the machine in question can be classified as obsolete. Hence, obsolescence is externally motivated. The effect no doubt of obsolescence is depreciation in value but it is not depreciation itself.

The useful life of Plant and machinery is paramount in determining the level of obsolescence and depreciation of such items. The longer the useful life of a plant and machine, perhaps the quicker or slower the obsolescence that is likely to be recorded whereas for the sake of depreciation it is usually slower when the useful life is longer if and only if the productivity of the machine is time oriented. The scenario is different when the useful life is shorter as obsolescence could again be slower or quicker whereas depreciation will be so fast.

Just as the valuation of land and buildings, the valuation of plant and machinery also entails the valuer's subjective judgment. The sum figure of depreciation in relation to the gross current replacement value can be summarized as follows:

Condition	Depreciation (%)
New(N)	0-5
Excellent (E)	6-10
Very Good (VG)	11-20
Good (G)	21-50
Fair (F)	51-60
Poor (P)	61-90
Scrap (S)	91-100

As the level of depreciation increases, the machine is tending towards obsolescence. Thus, students should have noticed by now that a thin line is said to exist between obsolescence and depreciation, but one point of interest is that while obsolescence is a function of other external factors like the manufacturers, other available machines that can serve as a substitute and other economic factors amongst others, whereas depreciation on its part is a function of the existence of the machine.

VALUATION OF MACHINES AND PLANT FOR INSURANCE PURPOSES

Valuation of plant and machinery for insurance purposes is the most important purpose of plant and machinery valuation. Perhaps, literature has revealed that insurance valuation is the source of the greatest number of instructions received by valuers. Life itself is a risk hence situations occur that causes people uncomfortable and many businesses ruined for no cause of their own through fire outbreak, flood, earthquakes, other personal and corporate carelessness etc. for these unforeseen circumstances and more, the issue of insuring these machines and equipments becomes mandatory to mitigate loss. Insurance valuation is carried out for the determination of the premium payable to the insurance company, in an attempt at guiding against under-insurance. Insurance valuation is carried out so as to provide the client with an accurate assessment of the value of the plant at risk based on the terms and conditions of the insurance policy. It is to guide against under-insurance also to guide against higher payment of premiums. Students should note that this particular purpose of plant and machinery has been singled out because while the open-market purpose is more akin to the basis of gone concern, the financial purpose of plant and machinery valuation can be regarded as being synonymous with the going concern basis. Insurance valuation for plant and machinery on its own part cannot be necessarily confined to any of these bases of plant and machinery valuation. It however has its bases

of either Indenmity or re-instatement. Moreover, insurance valuation could be undertaken to capture all acclaimed assets of the company of which plant and machinery forms part.

In a nut shell this purpose of plant and machinery valuation is important and peculiar as a result of the following:

- Insurance valuation for machines and plant is the source of the greatest number of instructions received by valuers as it is willingly requested for by clients (not necessarily statutorily engendered or coarsed)
- Insurance valuation for machines and plant is not an end but a means to an end. It is required to calculate premium by the actuarial scientist payable by the insured.
- Insurance valuation for machines and plant is not subject to the known going concern basis of financial valuation and gone concern basis of open market valuation rather it has its own typical bases of indenmity and re-instatement.
- Insurance valuation of machines and plant can be undertaken to capture all acclaimed assets of the company of which machines and plant forms part as against the other purposes.

The consequences of under-insurance: the condition of average:

"Whenever a sum insured is declared to be subject of average, if the property covered thereby shall, at the breaking out of any fire or at the commencement of any destruction of, or damage to, such property by any peril hereby insured against, be collectively of greater value than the sum insured, then the insured shall be considered to be their own insurers for the difference and shall bear a rateable share of the loss accordingly".

E.g.

Value at the risk of the contents of the factory N5, 000, 000

Contents of the factory at the time of the fire, were insured for N3, 000, 000

Actual loss sustained (agreed by both parties (insured & insurer) N1, 600, 000

The actual settlement would be calculated according to the below formula:

Agreed loss sustained X Sum Insured

Value at risk = Amount payable

1, 600, 000 X 3, 000, 000

5, 000, 000 =N960, 000

Note: a valuation of plant and machinery to be insured ensures that the insured party is not subject to downward adjustment due to under insurance in case he needs to make a claim, and also that he does not pay unnecessary premium. A downward adjustment will occur on a claim if the sum insured is less than the true value at risk at the time of the loss, in which case only a proportion of the proven loss will be paid, even where the loss is below the sum insured. This in insurance practice is known as the "Condition of Average".

VALUATION FOR INSURANCE: Techniques and principles involved

Once there is an instruction from a client, a current specification of insurance together with a print of the insurance plan showing the layout of the buildings and reference numbers must be obtained from the client or his insurance broker.

The specification of insurance will contain the following information:

- The present basis of insurance
- Division of the total insurance into groupings
- The scope of cover

- Present Basis of Insurance:

There are two basis of insurance in general use for plant and machinery. These are – reinstatement with new and indemnity.

Reinstatement with new value:

The reinstatement with new value of an item is simply the cost of replacing the existing item with a substantially similar new item. It is the sum total of the new ex-works price (terms of sale signifying that the price involved or quoted by a seller includes charges only up to the seller's factory or premises. All charges from there on are to be borne by the buyer) of a new replacement item less an allowance for age and obsolescence, plus the costs of transportation, installation, taxes, duties and fees. The main sources of information for the ex-works costs would be.

- Up-to-date price lists and recent

information from the surveyor's own database:

As noted during the course of study of becoming of an Estate Surveyor, students should be reminded that surveyors work well with information. Hence, every aspiring plant and machinery surveyor must collect as much information as possible; on the prices of every item he comes across either in the trade journals or advertisements. This would be formed into a cross-reference database, which may come in useful someday.

- Enquiries from direct contact with the manufacturer:

This is possible only where the surveyor has full details concerning type, model, capacity and serial number. Where the enquiry reveals that the existing item has been replaced by an updated version, suitable adjustments in the valuation would have to be made for any substantial improvement in the new model, as the insurers will not likely pay for such improvement. What the adjustment would be and what constitute substantial improvement could be subjective. It is important to agree this with the client or their broker.

- The original purchase price (the historical cost approach):

Students will remember that this approach has earlier been used during the valuation of plants and machinery. This entails the adjustment of historical costs by application of trade index. Surveyors are always tempted to use this method, as it seems convenient. Getting in contact with manufacturers could seem thorny and the database system of surveyors is controvertible. Thus, surveyors are left with this option.

However, it should be stated here that this approach also has its glitch. For instance, such costs could have been in respect of sample or prototype machines whose costs would bear no relationship to subsequent mass-produced ones. Again, where the original cost is to be taken from the client's ledger, it may be difficult to determine the precise items to which the ledger entry relates, and the entry may not even show whether the figures are for complete item delivered and installed or not, except perhaps with the assistance of the client or his broker.

In the long run, the historical cost approach when used should be corroborated with adequate and appropriate information.

Having established the current new cost of an item, cost of transportation and the cost of installation must be added to arrive at the reinstatement with new value.

Transportation costs may not be quoted in the ex-works price but they are easy to establish by reference to local transporters who can usually be contacted near the supplier's premises.

Installation costs will vary considerably depending on the item. While some items will require no installation at all, some others may need specially made bases and foundations to receive them. With some major process plant where a lot of services together with deep foundations, steel supporting structures, etc. are necessary for their installations, the cost may be anything up to half of the total cost. Fortunately for the surveyor the supplier of most complex items of plant and machinery usually quote for a full installation and commissioning of such items. Foundations may not necessary be subject to destruction by insured risks such as fire or flood, but their cost must be included in the installation cost. This is because the new plant may not necessarily fit the existing foundation, and at any rate the reinstatement may be on another spot. Where the client confirms the existing foundation will be appropriate for the installation of a replacement item, the cost of foundation will be excluded from the valuation and a note made to that effect in the report.

The technical definition of reinstatement found on insurance specification is:

The carrying out of the aforementioned work, namely:

- "Where property is destroyed, the rebuilding of the property, if it is a building or in the case of other property, its replacement by similar property, in a condition equal to but not better or more extensive than its condition when new"
- "Where property is damaged, the repair of the damage and the restoration of the damaged portion of the property to a condition substantially the same as but not better or more extensive than its condition when new"

Reinstatement with new: New for old but not better than former = replacing existing assets with identical or substantially similar equipment the manufacturer' current prices + costs of transportation, installation, commissioning and import duties plus consulting engineer's fees (where necessary)

Indemnity: monetary value of damage sustained-places the item insured at exactly the position or

condition it was immediately before the occurrence of the loss. The claim settlement is either by repair, replacement with equivalent one where obtainable or by payment of cash equivalent.

However, in recent literatures a third basis of insurance valuation is said to exist. This is known as the debris removal cost. This is the basis of insurance in the case of a plant, which is due for decommissioning in the near future. It generally applies to a complete factory or production section rather than individual machine or equipment.

- Division of the total insurance into groupings:

Lets take a look at an extract from a typical insurance specification in order to aid our discussion.

SPECIFICATION OF INSURANCE
-In the name of-
BAJULAWSON ENGINEERING LTD.
23, Anibalewa off Allibababa Street
Victoria Island
Lagos
Nigeria

(1)	(2)	(3)
On the buildings including landlord's fixtures and fittings therein and thereon and on the walls. Gates and fences around and belonging thereto	On machinery, plant and all other contents therein and thereon the property of the insured or held by them in trust for which they are responsible (excuding landlord's fixtures and fittings, stock materials-in-trade)	On stock and materials in trade

Item No	Plan No	Description	Col.1 N '000	Col.2 N '000	Col.3 N '000	Total N '000
1	1-4	Machine Shop, Fabrication Shop and Compressor House	165, 000	550, 000	-	715, 000
2	5	Stacking Area	3,000	9,000	23, 000	35, 000
3	6-9	Offices and Canteen	45, 000	16, 000	-	61, 000
4	10(a)	Gate House	2, 000	600	-	2, 600
5	10(b)	Generator House	1, 500	12, 000	-	13, 500
6	12,13&18	Heavy Machine Shop	265, 000	375, 000	-	640, 000
7	14-17	Foundry	120, 00	66, 000	-	186, 000
TOTAL			601, 500	1, 028, 600	23, 000	1, 653, 000

From an extract of specification as showcased above, it is evident that insurance policies of companies cover certain assets such as land and buildings, machineries and stocks amongst other classifications as prescribed. From extract above one can easily see that in each location certain premium had been paid for the insurance cover for the various asset. Thus, the insurance premium for plant and machinery so far is in the tune of N1, 028, 600.

The content of the valuation will be stated in the specification as shown above and the valuation must be prepared strictly in accordance with the details of the specification. The extract is typical of the content of an insurance covering plant and machinery, and as a general rule the valuation should include all items that are at risk from insured perils and are the property or the responsibility of the insured, apart from buildings, stock and materials-in-trade. Items generally regarded as landlord's fixtures and fittings will be insured with the buildings rather than the plant and machinery. Any doubt about what should be designated building or plant and machinery should be discussed as agreed with the client or his insurance broker. Where a surveyor is

instructed to classify as plant and machinery an item, which should be part of the building he must make a note of this in his report.

- The scope of cover:

Plant and machinery valuations are carried out to provide the insured with an assessment of the value at risk of the plant and other equipment for which he is responsible in accordance with the terms of the insurance policy. The insurance cover generally takes care of:

The plant and machinery (including special purpose machinery) all other contents therein or thereon the property of the insured the property held in trustby the insured for which they are responsible excluding landlord's fixtures and fittings excluding stock and material-in-trade. Unless otherwise stated, items in the nature of landlord's fixtures and fittings will normally be insured with buildings rather than plants and machinery.

Information required includes: manufacturer's name, trade name or model name; capacity of the machine; serial number of the machine; date of manufacture of the machine; ancillary plant . ad equipments; small tools and equipments; items outside the factory-underground installations.

Sources of cost information are: up-to-date price lists; direct contact with the manufacturer; original purchase price from the client's records. Transportation costs and installation costs are added to either of these.

Where there are supplementary conditions and memoranda attached to the insurance specifications such as "all other contents", this will mean that proper records of the following should be taken care of:

1. Money and stamps: where this is not covered by a separate "all risks policy"
2. Documents, manuscripts and business books: this is to the value of the materials with the cost of clerical labour expended in writing up.
3. Computer systems records: this is to the value of the materials, cost of clerical labour and computer time expended in reproducing such records
4. Plans, design, etc: cost of replacement
5. Personal effects of employees and visitors: reinstatement clause does not cover personal effects. The correct basis of valuation is indemnity.

For plant and machinery held on trust, lease, or rented, the question of insurance liability must be considered first.

Insurance on a "first loss basis policy" In the context of plant and machinery, the following items are usually concerned: debris removal cost, consultants' fees, disused or little used plant, plant foundations and piling, administration and computer records, specific product items

VALUATION OF PLANT AND MACHINERY FOR INSURANCE PURPOSES (Cont.)

In this section, the detailed scope of insurance valuation for plant and machinery will be the focus of discourse. Perhaps this can also be regarded as the contents of insurance valuation for plants and machineries. Thus, apart from core plant and machineries other items likely to be considered in this purpose of valuation include:

- Special Purpose Item:

Unless such an item was recently made for the client, the manufacturer may not be able to help with the price of the new one. It is even possible that such item has been built in the client's own workshop and no prices are available. The surveyor will therefore have to adopt one of the following options:

Estimate the value by reference to details available in the client's workshop, plant book and payment ledgers. This estimate should exclude the cost of the construction drawings and records, which will be valued with other documents.

Base the value on a similar item that is currently available by estimating the current cost of such item and then making allowance for any modifications or improvement to the existing item.

Up dating the historic costs

- Money and stamps:

Where money is to be insured on a separate basis it may not be necessary to include it in the valuation. In other cases enquiries should be made into the maximum amount of cash that may be held on the company's premises at any given time, such order is to be included in the valuation.

- Documents:

Insurance cover on documents, manuscript and business records kept on the company's premises are to be included in the valuation especially for the materials only together with the costs of clerical work involved in writing them. Insurance cover on these items would not include the commercial value of information contained in the items. Estimate of the valuation of these items in circumstance can only be an approximation. It is not usually feasible to calculate the exact cost of reinstating records in such items. In making the approximation, records, which

should be taken into account include: ledgers, order books, personnel records, stores and works progress records, market research documentation, plant register, laboratory records

- Computer data and software:

It is now the general practice to make duplicate copies of computer records and software regularly and the maximum loss in respect of such items would be the cost of taking copies and reproducing the work. The surveyor must seek assurance that that the duplicate copies are kept in other premises besides where the insured risk is located. If this is established the valuation would include only the cost of reproduction.

- Product- dedicated items:

These are items used in connection with the manufacturing of an individual product. They have no general application and are not considered as part of the process plant. Insurance covers usually stipulates that in the event of loss, the basis of settlement will be the reinstatement costs for those product dedicated items in current use and which the insured would wish to replace in the event of damage or destruction by any peril insured against. The valuation will therefore need to establish the cost of replacing these items at current new prices. A great deal in this regard will depend on the accuracy and veracity of the records kept by the company, because while it may not be possible to establish an exact figure, a realistic and practical value must be provided. If the company keeps accurate records, there will likely be noticed a constant demand for such items, and with this, it should be possible to establish a level for the current new price without much difficulty. If suitable records are not available, the only way to establish quantities of these items will be to organize a physical inspection which can be time wasting. On the other hand it is crucial that a thorough investigation into the value of this asset be done, because in some industries, such as plastic moulding and foundries, the insurance value of these items could exceed that of the process plant.

- Personal effects:

Allowance must be made in the valuation for the personal effects of directors, employees and visitors that could be kept on the insured premises at a given time and not otherwise insured. The valuation should make sure the value limit in respect of these items in the insurance memorandum is realistic, but if not, the client should be so advised and an opinion of a reasonable value given. The correct basis of this valuation is indemnity.

- Items off site:

These are properties of the company not available at the time of inspection, either on loan to a sub-contractor or have been sent for repairs and overhaul. If such items are covered by the insurance policy, they must be included in the valuation.

- Items held on trust:

There may be items on the insured premises, which are not the property of the insured. These will include items on loan or lease to the insured. The agreement for each lease or loan will include liability for insurance and this should be studied carefully as the relevant as the relevant clause in the agreement may state for how much it must be insured. Where the agreement is silent on insurance value, the surveyor must agree a figure with the client. If the loaned item is to be excluded on the instructions of the client, this should be stated in the report.

In the cases of items held by the client on behalf of customers, the client will have to decide whether such items should be included in the valuation or not. Where such items are included in the client's insurance policy as an extension they must be included in the valuation.

- Separate policies:

Items that can easily be stolen or damaged are usually insured under an all-risks policy (an insurance policy covering personal possessions against many risks but not, of course, all risks. A policy of this kind does not list the risks covered; instead it lists only the exclusions. Such wide cover often merits very high premiums and items covered on the basis often include jewellery, photographic or electronic equipment, and other valuables), which may include risks covered by the main insurance. In that case, it is not necessary to include such items in the valuation.

Items of plant and machinery, which are usually covered by a "First Loss" policy (an insurance policy for goods in which a total loss is extremely unlikely and the insurer agrees to provide cover for a sum less than the total value of the property), where the total value at risk is spread over separate areas of risk include: Debris removal costs, Consultants' fees, Plant foundation and piling, Administration and computer records, Specific product items. These items, which are covered by specific insurance, should be excluded from the valuation and a note to this effect should be included in the report.

- Motor vehicles:

These are covered by the main policy only to the extent that they are not covered by their specific motor policy. In the case of damage due to any peril covered

by the main policy, claims can only be made on the difference between the amount recoverable under the specific policy and the indemnity value. The reinstatement clause does not normally apply to motor vehicles.

Motor vehicles and their contents are usually specifically insured and as such excluded from the policy except in respect of the amount over and above that recoverable under the more specific insurance. Thus, the difference between the amount recovered on the specific motor vehicle policy and the indemnity value is equal to the amount by which the vehicle was under-insured on the motor vehicle policy at the time of loss.

However, unregistered internal transport fleets will normally be included with the plant and machinery on the fire insurance policy.

- Professional fees:

Consultants' fees for estimates, designs, specifications, supervision and commissioning that will be incurred in the reinstatement of an item will be taken into account in the valuation. It is possible that the design, supervision, etc. would be done by the insured's own staff, but allowance must still be made since direct expenditure and overheads would be involved.

- Uncompleted plant:

During the valuation survey, there could be items, which are still being installed. If they are small items, which are quickly installed, they could be included. However, the treatment of major process plant, which could be expensive and may take months to install, will depend on the installation agreement.

If the contractor is expected to insure against risks already covered by the factory policy, the correct approach is to exclude the item from the valuation. The report will however include a recommendation to the client to amend the main policy at the time of commissioning the item.

If the client is liable for insurance cover, either the total estimated contract price is incorporated in the valuation or a suitable amount included to cover work completed up to date. A note on this should be included in the final report when submitting the valuation.

Where the valuation survey reveals that a major item is to be installed in the near future, no allowance would be made for the item in the valuation, and the report will make a note of this.

- Public authorities' requirements

Where the public authorities' requirements clause is attached to the specification of insurance, the amount recoverable under the policy will extend to include such additional costs of reinstatement of the destroyed or damaged property that may be incurred by reason of the necessity to comply with any Act of Parliament or Local Authority bye law.

Same goes for a plant or factory that represents a major risk or hazard near a residential area irrespective of whether or not the plant is entirely within the factory building or not. Where public authority requirements are likely to have a profound effect on the reconstruction of the building in the event of a major loss that may have a knockout effect on the type of plant, which could be accommodated, each case should be assessed on its merit.

- Debris removal:

Most fire insurance policies will cover the cost of removal of debris together with costs of dismantling. These must be reflected in the valuation as it can form a significant proportion of the total value at risks, especially for complicated items like chemical or petroleum plants. The sum total of the value at risk to be insured will be the assessed value of each item plus the cost of debris removal where appropriate. Industrial fire insurance policies usually cover the cost of removal of debris together with costs of dismantling and where necessary, shoring up or propping up.

- Loss assessors' fees:

Unless specifically stated the costs of compiling and negotiating a claim in the event of a loss or damage by an insured peril will not be payable under the terms of most industrial fire insurance.

-Value added tax

Insurance valuations are generally reported exclusive of value added tax.

- Inflation protection:

Valuation of risks to be insured will be based on prevailing prices at the date of the valuation while in fact the loss or damage being insured against may not take place for a long time during the life of the policy. It is necessary to give due consideration to changes in prices, which may occur during the life of the policy and in the case of reinstatement with new policies, during the reinstatement period after the loss.

Inflation will not be of importance in an indemnity valuation where the value represents the worth at the time of the loss and not at the date of reinstatement. It is however very important with reinstatement with new valuation, especially with items which take considerably long period to re-install such as chemical plants and refineries.

In reinstatement with new policies, it is usual to find clauses provided for the cost to rise automatically in line with inflation.

The report:

As an absolute minimum, the surveyor's report must include the following amongst others to be discussed under report writing.

1. The name and address of the insured
2. The location of items in the valuation
3. Date of the valuation
4. Basis of the valuation
5. Content of the valuation
6. Grouping of the contents
7. Relevant points needed to be highlighted
8. Projections for future inflations
9. Surveyor's name and seal

Unless otherwise requested the valuation for insurance should be reported in the local currency with a note in the report on the exchange rate between the local currency and the currency of the country of supply of the items at the date of the valuation.

The report should endeavour as much as possible to follow the format of the insurance specifications when showing the separation of the total amounts into groups. The value of buildings and plants and machinery should be reported in one document, but in different columns. (See insurance specification of BAJULAWSON ENGINEERING LTD. In lecture above)