Surface Facilities for Oil and Gas Handling

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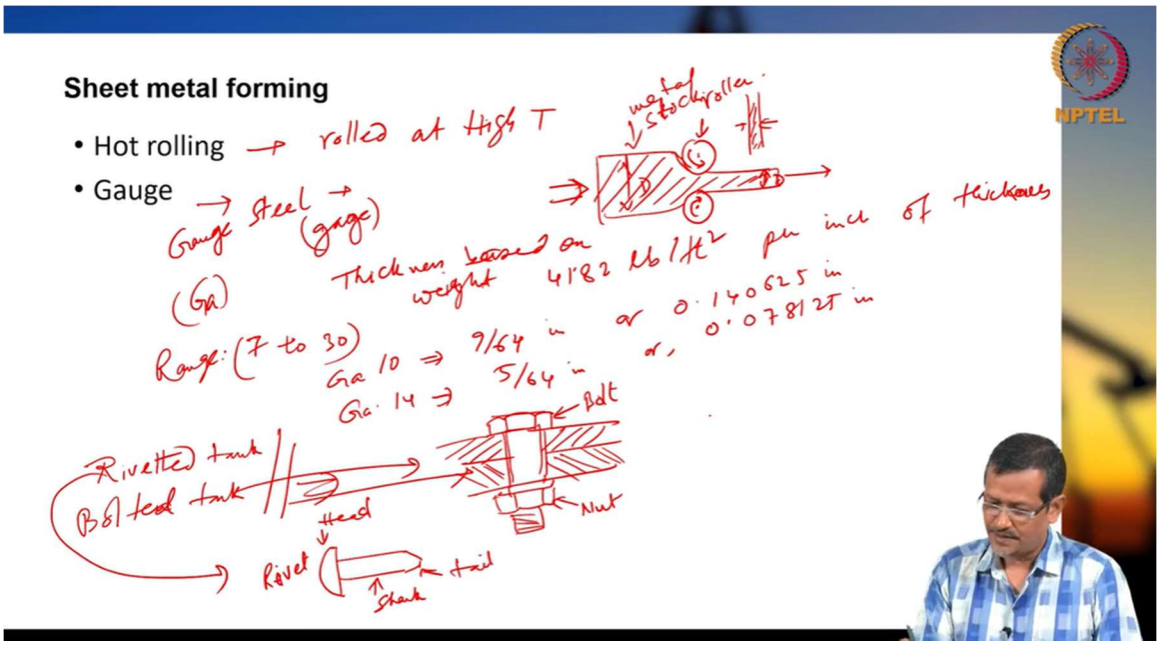
Crude Oil Storage Facilities-02

So, type of storage tanks. So, if we apply pressure, so that may not be atmospheric, but normally the tanks storage tanks should be atmospheric tanks. Atmospheric means inside tank pressure and outside atmospheric pressure will be almost similar. So, there will be no venting normally ok, but because of temperature change and pressure change there will be certain amount of venting required, but if you have blanket gas in that case actually you are maintaining pressure ok. So, you are not allowing outside oxygen to enter into the system ok. So, you are forcefully keeping inside pressure little bit higher.

So, there will be single skin oil tankers above ground storage this is used simply cheaper and leakage can be higher. So, this is one problem. So, it may be simple and cheaper, but leakage can be higher because only one sheet is there for manufacturing. Double skin means twin wall.

So, two walls will be there for double safety ok. Open top tanker that is also older system top will be completely open. So, rain water or any contamination can be going. So, this is not also used actually normally except only few cases for example, wash water storing or waste water storing. So, that purpose you are using that one open top oil tanker ok, but normally it will be or top will be closed ok.



Atmospheric storage tanks will be like this like one open top open top another fixed roof tank roof tank fixed roof tank. So, venting system is here actually this is fixed. So, liquid is here fixed roof tank roof tank and there will be external floating roof ok. So, this is called external floating roof tank. Floating tank another way internal floating tank.

Internal floating tank means one roof will be there ok and your flotation part float there is another roof this roof will be actually floating ok. This one is floating actually ok. This is fixed the upper one is not floating the other lower one is floating ok and another is closed floating roof tank. This is closed actually top one. So, this is accessibility other issues are there ok.

So, this is closed floating tank. This is internal floating internal floating roof tank ok and safety wise if you go left to right improve safety. Left to right if you go improve product loss improve products loss control improve product loss control ok. So, product loss will be lower if you go to right side ok. Anyway I will give this material if you like.

Revaited or bolted shop welded several types of tanks will be there one will be revaited tank, bolted tank, welded tank, shop welded tank, field welded tank ok. So, earliest time where wood I already told the riveted tank it was also very old I will explain what is the riveted and welding other thing. It was developed in 1900 Christian era almost more than 100 years. The later stage came welded tank when welding techniques modern

welding techniques developed. So, they took thicker plate designed with corrosion anti corrosion material anti I think I should write anti corrosion material.

So, shop welded shop welded means like one machine shop is there you are welding there. So, shop then from there you are carrying to your location ok. So, that means, you cannot make very big system. So, it will be smaller system ok shop welded when you are talking about. So, alternative to bolted construction I will discuss bolted later ok.

So, size capacity limited because of transportation issue ok because smaller size must be there because you have to carry one truck size limited right. API spec 12F they describe how to design it different design calculation parameters and you see this capacity 9 to 500 barrel very small actually ok provide adequate safety and reasonable economy test leak also test can be tested in the shop. So, it is better for smaller application in shop you test everything and just put there in field ok ready for use transferred by truck. So, non metallic tank shop fabricated or field assembled another alternative to bolted tank. So, I will discuss bolted later ah plastic material non these are non corroding durable low cost lightweight ok plastic will be lightweight material it will not be corroding ok ah cost also low they are saying.

So, common type like fiberglass FRP they are using it will be suitable for outdoor as well as indoor application. So, API spec also there API spec will be for that ah, but temperature limited is there ok 4 40 to 150 degree Fahrenheit 150 degree Fahrenheit means ah how much centigrade 90 maybe 50 60 degree centigrade about ok. So, plastic tank degrades quicker than metal tank in fire because temperature issue ok. So, color added to the outer liner to protect from ultraviolet radiation because plastic will be degraded using UV falling on the plastics ah inner lining section should be compatible with product whatever oil you are using. So, that should be compatible ok.

So, protection from mechanical impacts also needed ah because plastic softer material. So, if some impact is there because of stone throwing or anything ok. So, some mechanism should be there. So, that something should not get hit plastic tank should be away from flammable storage tanks ok. If there is any flame source then plastic tank will be much more dangerous than metallic metal source metal systems.

So, bolted tank. So, bolted tank ah API 12B they have given. So, the you see this size increase. So, 10000 barrel currently 40000 barrel, but one company here I found a super

superior tank they have like bolted tank like 2.5 million gallons also ah storage capacity there ok. So, welded tank also.

So, it is a very big tank they are producing this company ok, but book is writing 40000 maybe these are newer ah designs ok. And normally the metal sheets will be galvanized is what is galvanization? Galvanization means to to protect metal sheet using zinc. So, molten you you take molten zinc like at very high temperature then dip your metal. So, metal will be coated over this ah coated over this steel zinc will be coated over the steel. So, why why you do this one? Steel is corrosive although we are changing material with chromium and other thing, but steel corrosion and other property have to improve.

So, for that zinc is non-corrosive or zinc softer material. So, later stage again recoating also possible, but manufacturing with metal with sheet. Is expensive and difficult ok. So, it is easier to coat with a galvanized zinc. So, that is called galvanization ok.

To protect steel from corrosion common method hot dip galvanizing. So, this company they are making hot dip galvanizing actually HDG ok. There are other option also the electro galvanizing. So, electrode you put and you galvanize or you coat with zinc metal surface ok. So, benefit corrosion resistance, durability, low maintenance and aesthetics option also possible.

So, metal like black iron will not be there. So, different color also possible ah this is called galvanization. So, metal should be coated. So, normal painting if you do it will be eroded quickly. So, you do galvanization other option may be possible a nickel coating, but nickel also they are not suggesting they are suggesting galvanization metal ok.

And welded storage tank so, it be very high dimension ok. Like 1.5 million barrel diameter 420 feet and height will be 72 feet this is so, large ok. For smaller tank API specification 12 D is there for larger tank different specification is there ok. So, normally this will be used for refinery side ok.

The standard is for open top or fixed storage tank. So, typically operate at atmospheric pressure design ah atmospheric at it can be little bit more atmospheric pressure more than

atmospheric pressure and temperature will be more than 200 degree ah Fahrenheit ok. Sheet metal like whenever you are making tank you need sheet metal ok. Sheet metal means it will have specific thickness ok. You cannot use very large thickness material that we rolling will be very difficult ok.

Again you cannot make very thin also strength will be very low. So, you should have some optimal thickness where your strength will be sufficient and rolling or bending also will be easier and working for metal. So, metal working means like you are making hole you are putting nut and bolt and other thing. So, that should be also easier ok and if you are making very thick it will be very good for strength, but weight will be increased too much. So, carrying and transporting and handling whole thing will be very difficult ok.

So, the steel that has been rolled at higher temperature ok that is called hot rolling ah rolled at high temperature ok. How how how it is rolled? You take steel bar like this then you pass through 2 roller ok and give rotation of roller like this and you are pushing this one this direction ok. This is roller. So, what will happen? The dimension will change that way you are making sheet actually. These days if you see this roti makers lots of big like social help group they make roti like this actually.

They will take lots of dough then they will passing through the roller and thin sheet they will be preparing actually. So, similar way. So, the pressure is very high pressure is required. So, that way you are making thin sheet ok thin sheet does not mean like 1 millimeter to millimeter maybe 4 5 millimeter also ok. So, rolling is metal forming process in which metal stock this is called metal stock ok.

Metal stock is passed through one or more pairs of roller one or more pairs of rollers to reduce thickness ok to make it uniform unevenness is there. So, that will be making uniform and uniform thickness sheet will be produced ok. Just take one more thing ok. So, here one term gauge steel is used. Gauge steel actually this is one unit they use for sheet metal or wear measurement wear wear thickness wear diameter will not be saying in terms of millimeter or we will say gauge wear gauge 2 3 4 5 like this.

Sheet metal also will have gauge like gauge number 4 5 6 7 8 something like that. So, what is gauge number and what is what is millimeter how is the relationship ok that we should know. Standard thickness of sheet metal for a specific material ok this is called steel gauge steel ok steel gauge steel or spelling is g a g e sometimes they write like this

also ok. gauge for steel based on weight thickness on weight 4 1 8 2 4 1.82 pound per square feet per inch of thickness ok.

So, g a sometime they write g a the unit they are not it is not unit it is a there is a number like a gauge number ok gauge steel number something like that. So, gauge ranges 7 to 30 ok gauge number 7 to 30 it ranges for steel sheet ok. So, gauge number 10 let us say g a 10 it is implies 9 by 64 inch or 0.140625 inch ok. So, g a g a gauge number 14 implies 5 by 64 inch or 0.

078125 inch ok. So, higher number lower thickness ok. So, how to remember this one? So, roller when you are passing. So, one time passing you got less is 1 millimeter thickness second time passing you reduce maybe 0.

9 millimeter third time maybe 0.8 millimeter. So, every time you pass through roller you reduce about 10 percent size 10 percent thickness ok. So, gauge number means how many numbers you are passing. So, larger number of passing means your thickness reduced ok gauge number higher means lower thickness ok how many times you are passing that is the number ok. So, every time you are reducing. So, just opposite higher number means thickness lower fine you can remember easily now.

So, gauge of a wear number or steel is how many times it is drawn to reduce temperature to reduce the thickness about 10 percent ok. So, lower time drawn lower thickness and higher gauge number. So, normally your because I have given example 10 to 14 other numbers also there 10 14 means these are actually commonly used for your steel tank manufacturing purpose. See the difference between riveted tank, riveted tank and bolted tank, bolted tank ok.

So, riveted tank they would not loss ok. So, whenever you are talking bolt first you have to understand what is bolt was just a rivet. So, bolt means like you have not bolt you have seen right not bolt like this not bolt will be like this. One sheet is here another sheet is here sheet or metal and you have bolt like this ok and here also you will have bolt like this right.

So, not bolt you have. So, bolted. So, two sheet you take one two sheet make a hole you put nut and bolt. So, this is called bolted tank. So, bolted tank if you have any vibration. So, bolt can be loosen actually if there is any vibration in shocking anywhere because of any reason because wind flow or blow or anything. So, bolt can be loosen, but easy to fix actually because bolt is there not bolt is just tight ok.

So, this is your bolted tank this is bolted ok. So, two sheets are there nut and bolt you have seen already right and riveted. So, rivet is like this the rivet is called head. So, nut bolt also this is called bolt nut this is called bolt head. So, the bolt means one hexagonal system will be there one will be there and nut part only this hole like donut shaped thing ok. And for rivet riveted this is bolted tank bolted riveted this one.

So, rivet will be like shank this is tailed. So, what happens you take two metal two metal like this ok. So, it is like this two metals two hatching two direction is two metal actually ok. When you are showing two different material mechanical part. So, hatching direction will be changing ok. So, that is why I am putting different angle you can see one will be around 40 degree one will be 135 degree and this one also like this ok.

What you do? Let us say this one my rivet one metal is there you made a hole another metal is here ok one rivet you see this one rivet head is there. So, one part already curved another part you like pin is there shank is here my tail is here what you do you put one very big hammer make this one also curved ok. So, this will be permanent joint ok. So, if you want to remove this two you have to break this one, but in nut bolt you do not need to break rather you rotate it remove it ok. So, both are having positive mechanical aspect riveting is more permanent type ok and bolted means you can remove quickly easily ok.

So, then what is the benefit and ok riveted they do not loosen when vibrate ok. So, if vibration is there they will not loose because they will be joined almost permanently ok can secure joints with short clamp length ok. So, just hammer it fix it done ok. They are cumbersome and time consuming to uninstall if you are uninstalling or removing is very difficult ok riveting. Limited clamp load design for permanent or semi permanent joints ok almost permanent actually ok.

If you say purely permanent means complete welding welding will be permanent actually welding means two metal joined together fusing metals later we will discuss. So, next day we will discuss on welding joint and other topics. Thank you very much.