Surface Facilities for Oil and Gas Handling

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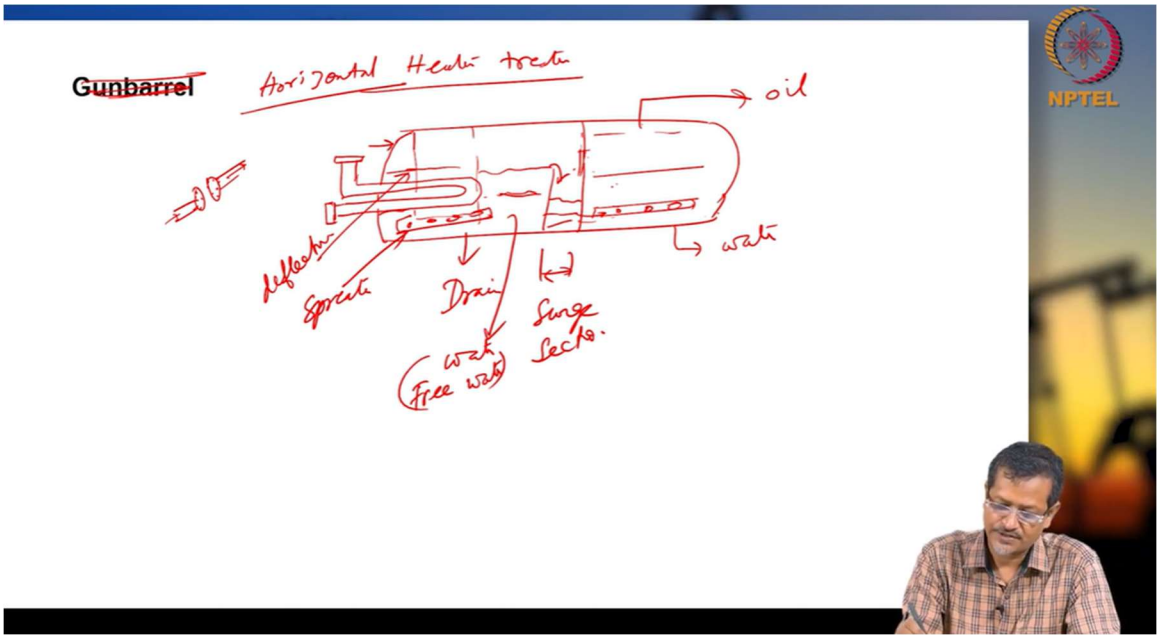
Heater Treater-02

So, coalescing media. So, coalescing media actually this is promotes water droplet to collide each other and creates larger surface area. So, coalescing area may have like corrugated system we have discussed already right or you have hay section or one term they are using excelsior ok or hay section they say. So, this is your small pores when fluid is passing through small pores they will be colliding more and it will be creating more bigger particle. So, excelsior lowers treating temperature, lowers treating temperature however, these clogs with time so difficult to remove ok. So, because very small pores are there so it will be clogging quickly.

So, and again difficult to remove they are saying. So, that is why people are avoiding using this one these days ok. And these are actually tightly packed tightly packed creates obstruction of flow of small droplets and promotes collision ok. So, small small hay section layer by layer you create and it you are creating actually obstruction.

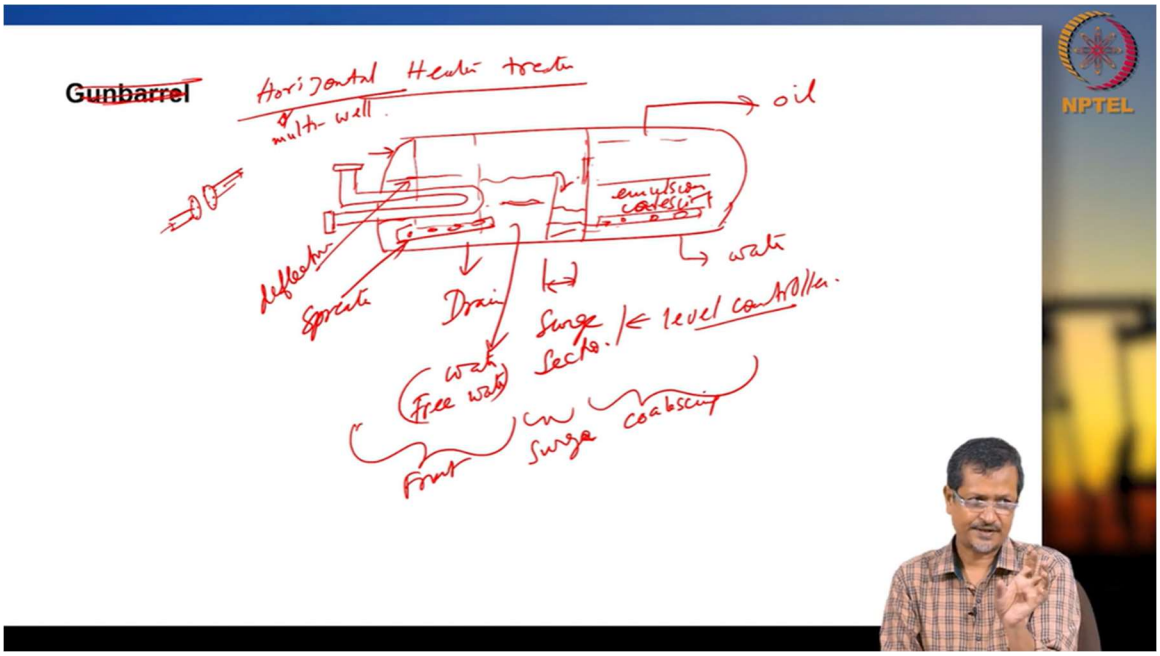
So, obstruction creation particle will be colliding quickly, but it will be clogging also quickly. So, positive negative both sides are there for excelsior ok. We will discuss gunbine later first we will discuss horizontal separator horizontal heater heater ok. The same way you have horizontal separator system as vertical you have seen ok. You have inlet flow inlet diverter right.



Now you will have 3 sections basically one section will be like heater heater system will be going there. Can I draw like this ok. I am drawing this one like this like this is coupling or flange actually we say ok. When a pipe end will be there so you will have certain flange or nut bolt system ok. In mechanical system we say flange so nut bolt thing will be there.

So, we made little bit larger area and there you can put nut and bolt and you can fix with other pipe ok. So, this is a cut view ok like it will be like this one flange will be here another flange will be here ok. Let us say one pipe is here another pipe is here. So, there will be nut bolt ok. Lots of holes will be there then you put bolt in nut and thread you tight it properly ok.

And in between when you are putting nut and bolt and two flange are connected in between you have to give proper sealing arrangement. So, rubber arrangement elastomeric arrangement so sealing will be proper ok. So, again you will have spreader ok and you will have spreader ok. And deflector this is actually deflector plate so lots of fluid turbulence you are creating and deflector ok. And drain valve will be here and your oil will be collected here ok.



This is surge this is called surge section surge ok. And this area lots of water is there so water you have to take out ok. So, free water you are taking actually this is free water. So, it is not linked with emulsion at this moment next level we will go for emulsion thing here. You have again this water will be spread here ok whatever emulsion you are getting here ok then you may have electricity precipitator separator here ok.

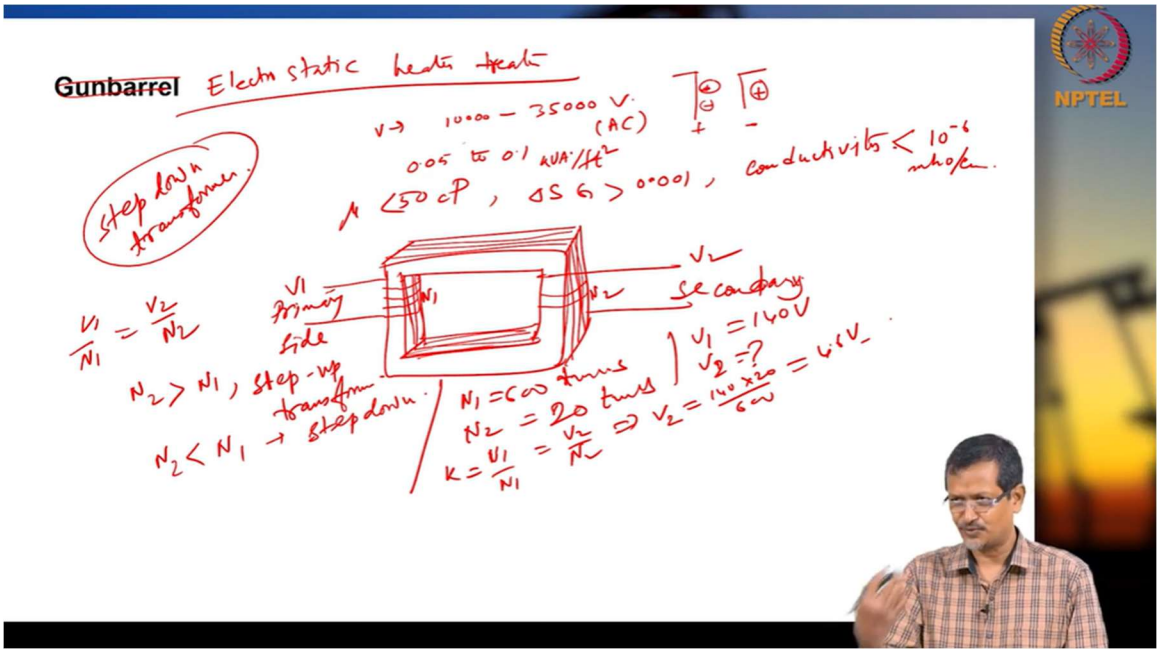
And you can take oil from out ok you can take from oil from top or some other mechanism you can make you take oil out. Because this area this right side area you are giving more time for settling ok. You may have your electrostatic system or you give more time so that settling will be here especially this coalescing will be happening there ok. Initially you are heating the surge section is coming so oil you are taking out so that oil again you have to separate and you have to make water out ok small amount of water you are getting and oil you can get out here and this is actually emulsion coalescing section ok. So, then it is having three section actually this is front section and this is surge section surge and last section is your coalescing media section ok.

So, this is this is having three distinct section but in vertical separator you had actually four sections gas section was there separately separately ok. For low gas oil this is most used for multilateral sorry multiple well bore multival case many well bores are there so in that case you can use ok. Then but vertical separator normally single well case you can use vertical heater heater ok. For low gas oil ratio blanket gas may be provided so that

internal pressure you can maintain ok if it pressure is very low so in that case you can use gas from other source and you can maintain the pressure ok. Level safety low shut down valve will be required because level if not maintained in both cases in horizontal vertical.

So, let us say water level is gone very low and the pipe heater heater heater pipe is gone in gas area. So, what will happen the heat will not be carried out so it will be heated too much when heating rate is very high and you are not heating removing the heat so that heat accumulation will be creating problem it can create fire because high temperature it can reach to ignition temperature or burning temperature of fuel oil or gas. So, burning temperature means again chemical reaction will occur so that can be disastrous. So, you must have level controller so you have to check how much level is there for oil or water if you are not maintaining that one then that can be a disaster ok. So, temperature control must be there so you have to check temperature you have to maintain level then you can use safely ok.

So, in short section there must be level controller ok. So, if you do not have level controller then temperature can go up suddenly ok then you have tension you must have temperature sensor also ok. So, front must be sized to handle settling of the free water and you have to heat oil and water ok. Coalescing section must be sized to provide adequate retention time for coalescing and allow coalescing water droplet to settle down ok. So, water droplet will be settling down water oil will be going up in coalescing section the right side section.



So, this horizontal heater heater built today do not use fire tube what they are doing heat is added to emulsion in heat exchanger before it is entering. So, inside separator they are not giving fire. So, outside giving heat heating up system then you are putting emulsion mixture inside separator ok just to make things safe ok. Before the emulsion enters the heater hence the inlet section of the heater can be fairly short ok, because heater heater is not there inside the pipe. So, in inlet section can be shorter.

Now electrostatic heater heater ok, electrostatic heater means you are heating plus you are giving electric field. So, that way you are reducing temperature fuel requirement and you are separating again ok. So, it contain 2 or more electrodes ok. So, you know electrode if it is positive is negative. So, negative ion will be coming towards positive electrode right and positive ions will go to negative electrode ok.

So, you know from basic chemistry book one is grounded to the vessel and other will be suspended in the liquid ok. And volt applied will be like 10,000 to 35,000 volt you are applying ok. So, normally AC voltage you are applying AC current and power consumption will be 0.05 to 0.1 kVA per feet square, square feet area.

So, kVA I think you know the unit kilo volt, kilo volt ampere means kilo watt actually.

So volt into ampere is kilo 1000 right. Used for electric field in most effective when viscosity less than 50 CP ok, viscosity less than CP in this case electric field application is very good, very efficient ok. And del SG specific gravity difference 0 0 1 ok, so specific gravity and electric conductivity of oil and water phase does not exceed conductivity, does not exceed should be less than 0.

0 no not 0.0 10 power minus 6 M h o per centimeter. You know MHO OHM, OHM is resistance, so resistance means you are resisting something and conductivity means you are pushing quickly ok. So, just opposite, so that is why they put the name MHO ok. O means resistance, MHM is conductivity, conductance ok. So, electric control transformer must be used to increase the voltage because voltage is very high you can see 10,000 to 35,000 voltage normal hour electricity supply at homes will be 220 volt and 440 volt will come to your nearby transformer.

So there will be one step down transformer ok, step down transformer ok. So, what does it do? You have 440 volt supply like 3 wires will be there right and when 3 wires to your home it will be coming as 220 volt and your normally your electrical system at home it will be 20 220 volt, if you go 440 volt everything will get burned ok. So, for our day to day application 220 volt we are using right and many our electronic system they do not use 220 volt also in that case we will have some rectifier and other mechanism so that you are reducing voltage ok. So, how transformer works? Transformer will be like this ok, it will have better I will draw other way this is will be there will be laminated core, it is a laminated core ok. So, laminated core means lots of thin sheets will be there ok, you are creating rectangular thin sheets ok, what central hole ok.

So, one sheet, two sheet, three sheets many sheets you create laminated core iron core. Now, you have that coil ok. So, this is primary side, this is secondary side, secondary side will be like this it is going ok, this is secondary. So, here number of turns in primary and secondary this is this will be deciding how much voltage you are increasing or decreasing ok. This is a primary side 440 volt and secondary side you side you want to 220 volt, so how many terms will be there, turns should be there you have to calculate ok.

So, let us see simple calculation. So, normally copper wires will be used, why do you use copper wire in electrical system? Because conduct will be very high, conduct will be very

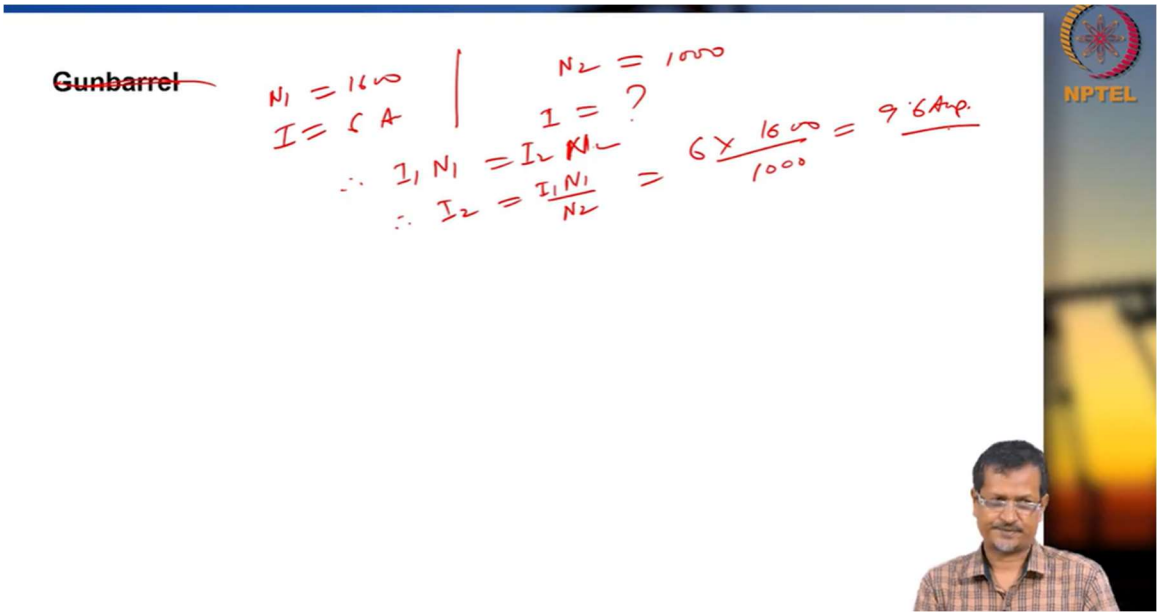
high, we can use gold also, but gold is expensive. So, we have to optimize somewhere, so copper wire we use for normal common applications. Aluminum wire also can be used, many places it is used actually for high tension lines aluminum. So, based on cost and conductivity people will be using ok.

And this transformer mechanism works on Faraday's law, 200 years back he developed ok. Electromagnetic principle will be used, so conductance of one it will be inducing conductance of another circuit ok. So, left side or primary side you have some electricity voltage, so that will be induced that will induce voltage and current in secondary side. And you have to insulate the conductors and when you are insulating the you have insulator oil, so many time you use transformer oil you see ok. And sometime insulation tape will be there, normal electric circuitry wherever will be there, so you will be seeing rubber or plastic or some material will be there over the wire.

So that electric leakage will not be there, things will be safe ok. And sometime wood or laminations also possible to cover things ok. Now voltage and current voltage and turns relationship is like this V1 by N1 equals V2 by N2 this is the formula. Voltage in primary divided by turns in primary, voltage in secondary, turns in secondary ok. Now if N2 greater than N1, N2 means this is N2, this is N1, this is V1, this is V2.

So if N2 is more number of turns in monosecondary that means you are stepping up, voltage will be increasing ok. So this is step up, step up transformer ok. If opposite N1 less than N2, N2 less than N1, so it will be step down ok. So in your household current coming nearby transformer they are actually step down transformer they are using ok. Now if I give one problem let us say the problem will be like this.

Let us say N1 I am giving N1 equals 600 turns and N2 is equals 20 turns V1 equals 140 volt what will be your V2? So simple formula you can apply right. So K equals E1 V1 by N1 equals V2 by N2. So this will be giving E instead of E you can write V. V2 equals ok. So V2 equals 140 into 20 divided by 600 equals 4.



6 volt ok. So initially I had 140 volt it became 460 volt so step down happened ok because number of turns change 600 to 20 one small thing then I will close. Now same similar type of transformer let us say I have N1 equals 1600 I equals 6 ampere ok. N2 is given 1000 so what will be the I ok. So in that case again I1 N1 equals I2 N2 this formula you can use and directly I2 you are getting I1 N1 divided by N2 equals 6 into 1600 1000 equals 9.

6 ampere ok. Thank you very much for this lecture. Tomorrow we will start new topic. Thank you very much.