# MARINE ENGINEERING

## By

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## Lecture76

**Gravity OWS**

Gravity OWS or Oily Water Separator. Oily Water Separator. It uses parallel plate or filter coalescers to separate oil and water from water. Polypropylene and oleophilic polymer forms parallel plate or loosely packed media. Conventional parallel plate OWS reduces oil concentration 20 to 105 pm.

Ineffective in removing emulsion polyurethane metal. and soluble compounds cannot meet 15 p.m. standard. So, although you are using gravity OWAs, it will be reducing your oil content, but it cannot meet exact regulatory body's criteria. So, you have to use other separator system also along with this one.

So, this is cheaper one and easier one, just you are given certain amount of time for settling and you have certain internal mechanical mechanism. So, based on that you are separating certain amount of oil, but 15 ppm criteria from our pole you are not attaining. So, you can reduce up to 2200 ppm, 4 to 500 ppm you are taking and you are reducing to 2200 and further you can use centrifuge or other mechanism to reduce your oil content. So, in gyro discipline what is happening? You have one tank, your inlet

oily water okay so what will get oily water will be entering here it will create layers okay so oil water and this is oil here and you give sufficient time So that oil particle will be moving up. Give sufficient time. So that oil particle will move up. And if emulsifying agent is there, then this gravity settling option may not work.

If there is no emulsifying agent settling will be better. you can create one mechanism here to take your water out and oil also you can take from here okay so normally there will be floating arrangement floater and other arrangement to control your water and oil level and you are separating this is control valve this oil outer. And if there is any sand in other debris, it will form as lower layer. So, in that way, the gravity settling option will be there.

So, you have to give sufficient amount of time also and your length of separator will be sufficient so that when fluid is moving from left or inlet to right exit so fluid will be passing slowly and slowly the coil particle from moving up so that small laminar flow you create you create laminar flow laminar flow should be created if it is turbulence flow turbulent flow then what will happen Because of turbulent action, some particle will already moved up say. So, the same particle because of turbulence again it will try to move down. So, you should not create a turbulent flow rather it create laminar flow.

Slowly particle should be settling out. So, this is called gravity settlement. So, you have seen all of the particle settlement formula, same formula will be applied. This particle is moving up and we can assume the water is not moving or very slow speed is there. So, particle moving from bottom to top, how much time it takes?

So, that is your total time for settlement. Now, this is simplest form because you just have one tank, inlet flow you are giving, exit you are taking. But this is not so much efficient. So scientists thought let us make something different. So how they made?
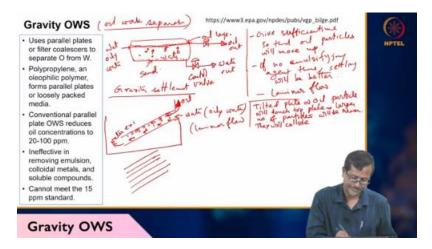
They made like tilted plate separator. How tilted plate? Let us say water enter here. Water entering here. Oily water.

So water will be moving towards this. Let us say I want this one. okay and water is entering like this then the oil particle will try to create layer slowly oil particle also because we are getting laminar flow laminar flowing okay and water is slowly moving down and oil particle will try to float okay when it is trying to float Let us say two channels are there with certain angle. Let us say one channel is here, another channel is here and you are making certain angle.

So this is one and this is another and you made certain angle and oil particular try to move to touch this mobile bottom surface. when it is touching the bottom surface, lots of oil particles will be nearer to each other, closer to each other. So, lots of oil particles closer to each other means there is high chance they will be colliding each other. When tilted plate, this is tilted plate, that oil particle will touch bottom of top surface top plate will touch the top plate and larger number of particles will be

nearer and they will collide when many particles are there nearby here here here here here here here so they will be colliding to each other when colliding they will try to make bigger particle when bigger particle is there so particle will be sliding upward ok so all the oil and water mixture you are giving water will be coming down slowly because high density, oil

particle lower density. oil particle try to float and they will be touching the upper surface. Two parallel plate is there, slant plate. So, oil particle will be touching upper surface and many oil particle will be touching when they are nearby.

So, they will be colliding each other, each oil particle. When colliding each other, they will make bigger particle. When bigger particle is there, particle will be sliding up further and it will be moving out from the system okay in that way you are separating oil and water now i have one tilted plate i can make many tilted plates okay so many tilted plates means my system performance will be higher in that in that in that way i can separate oil and water okay so many particles nearby collides make a bigger particle further moves towards the oil exit , water exit, oil exit.



Gravity OWS

using the same concept tilted plate, there is a tilted plate interceptor or tilted plate. Sometime this plate will be like this. Okay, sometime there will be corrugated plate. Corrugated plate means just to increase surface area, they will make corrugated plate and fluid will be flowing through this one. Let us say water is flowing through this one.

So here oil particle will be collected. So here at the top most portion oil particle will be collected. Now if I have corroborated plate. Let us say I have corroborated plate like this. corrugated plate like this and if I have given little bit slantness then all the oil particles will be collected near this bottom area near the bottom surface of the top plate then it will be collected on the upper somewhere and water will be slowly moving down.

So in that way you are creating larger surface area. So this is called corrugated plate. This is tilted plate. So, corrugated plate and tilted plate purpose same you are separating oil efficiently. Now, let us say if I want to make complete system how to look like.

First let us say tilted plate. So, integrated plate inlet will be here, then here, then this one, then this one. Now, oily water inlet. Then this, it will be entering here. Then it will be passing through this channel.

my interceptors okay so interceptors when we be existing so water out whatever speaking when we are doing here what is that it out water then oil will be floating here oil will be floating it will create one layer here oil layer Okay, so we can see this oil layer is called wear. This is oil wear. Wear is like this.

So I have, let's say water wear. I have water like this. Water is floating. This is called wear. So water will be collected here and water will be getting out.

Water also will have like if water level increasing it will be falling into here. From there you take water out. Oil also you will be collecting in this wear bucket. You can say this one bucket. It is a simple wear.

And in interceptor, what is happening? Oily water will be entering, coming. And coming here, entering. Water coming, coming. Debris collected.

Debris, salt or any dust or any mud, anything is there. Debris collected.  here. And water going there okay water is going here it is going like this okay water is going there but your oil creating upper layer oil is creating upper layer so here oil ah creating

a layer and moving up and what is happening oil is going out oil is going out going out and oil is getting collected here this is oil oil layer so oil layer is on the top oil layer will be moving towards that where and where is having a small bucket. from bucket you are getting oil, you are collecting oil and you are taking oil out from oil output. Similarly water also you are taking out. in that way you are separating oil and water.

This is called tinted plate interceptor. This is also gravitational separator. This is called gravity. Gravity OWS. Oil, water separator.

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