INDIAN INSTITUTE OF TECHNOLOGY ROORKEE
NPTEL
NPTEL ONLINE CERTIFICATION COURSE
Mechanical Operations

Lecture-08
Effectiveness of screen-2

With
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Welcome to the second part of lecture 2 of week 2 which is on effectiveness of screen. In the first part of this topic we have covered the theory and here in this part we will demonstrate the computation of effectiveness of screen through some examples. So here this is example 1.

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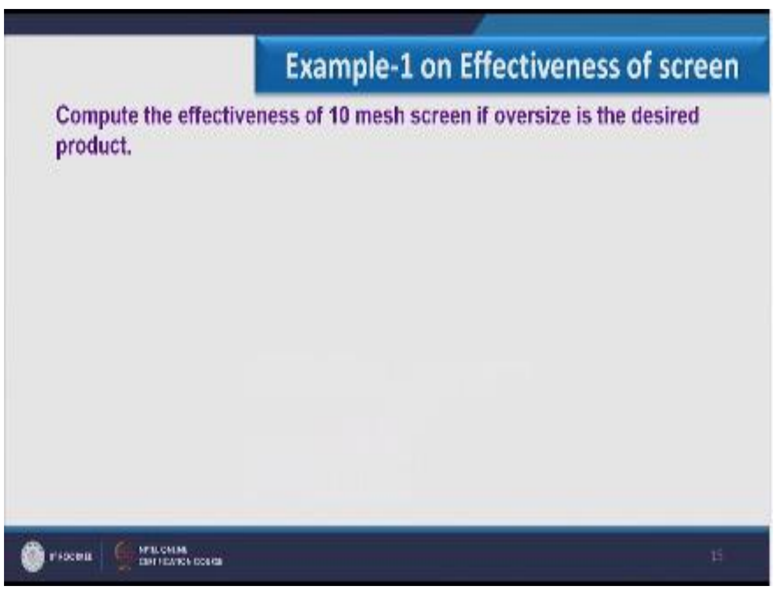

Here we will compute the effectiveness of 10 mesh screen if oversize is a desired product; this is the same problem for which we have computed y_a, y_b and y_c in part one of this lecture.

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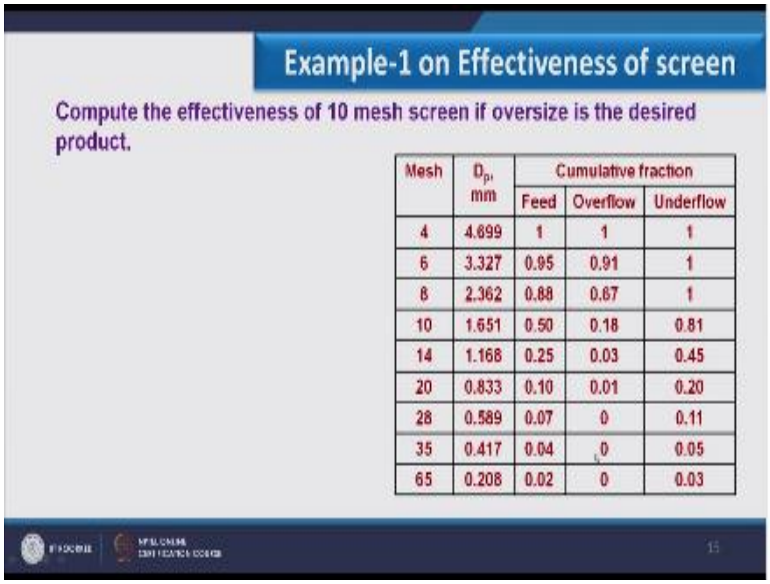

Mesh	D_p, mm	Cumulative fraction		
		Feed	Overflow	Underflow
4	4.699	1	1	1
6	3.327	0.95	0.91	1
8	2.362	0.88	0.67	1
10	1.651	0.50	0.18	0.81
14	1.168	0.25	0.03	0.45
20	0.833	0.10	0.01	0.20
28	0.589	0.07	0	0.11
35	0.417	0.04	0	0.05
65	0.208	0.02	0	0.03

So if you see this is the table where I am having the mesh number from 4 to 65, the opening of screens the cumulative mass fraction for feed overflow and underflow, till now I hope you can understand how these fractions of feed overflow and underflow comes in this table when I am considering the effectiveness of single screen, that is the 10 mesh screen. So for this particular example if oversize is a desired product then y_a, y_b and y_c.

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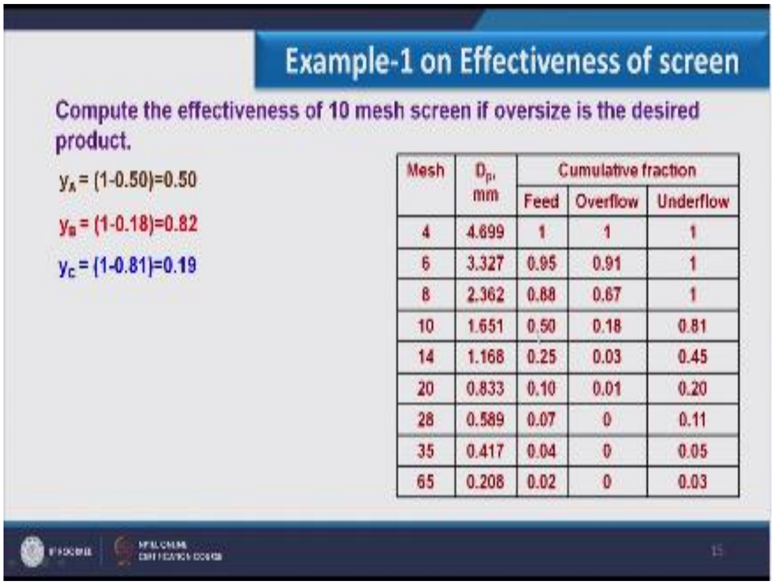

Mesh	D_p, mm	Cumulative fraction		
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20	0.833	0.10	0.01	0.20
28	0.589	0.07	0	0.11
35	0.417	0.04	0	0.05
65	0.208	0.02	0	0.03

You can see either from this table or you can refer the graph which we have discussed in first part of this lecture. So here if you see we have done the cumulative from bottom, so if I consider oversize as a desired product so this particular section over to 10 mesh screen is the region where we have to focus. So ya would be 1-0.5 which is equal to 0.5.

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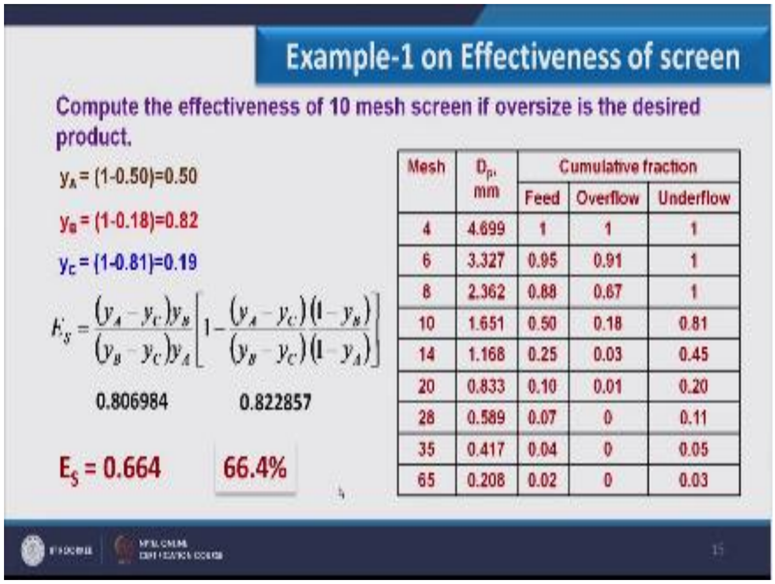

Yb = (1-0.18) = 0.82 and yc = (1-0.81) = 0.19 so in this way we can calculate ya, yb and yc. Once I am having these values of ya, yb, yc we can put this value into this expression which is of effectiveness of screen and then this particular section, the first expression of this is having the value 0.806984 and this particular section is having the value 0.822857, multiplication of these two will give the effectiveness of a screen that comes as 0.664 or 66.4 % is the effectiveness of screen or efficiency of screen which is of 10 mesh size. So here the same example we have completed which we have started in the first part of this lecture.

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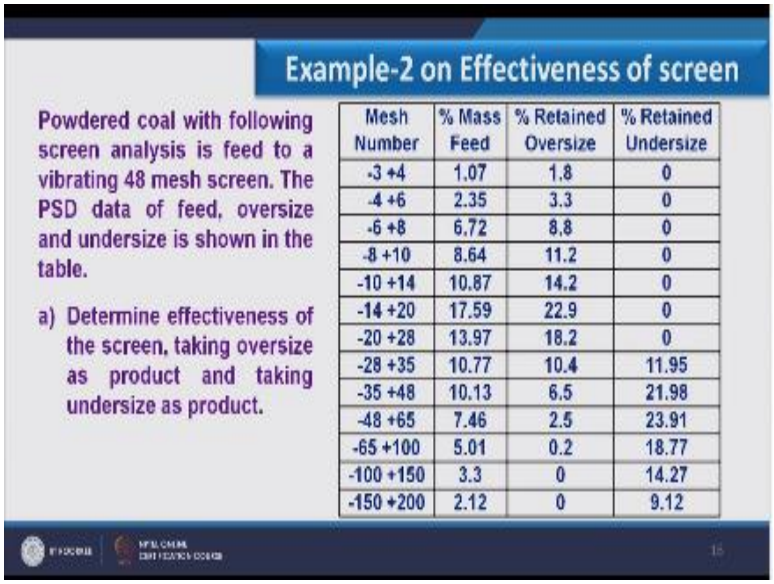

Mesh Number	% Mass Feed	% Retained Oversize	% Retained Undersize
-3 +4	1.07	1.8	0
-4 +6	2.35	3.3	0
-6 +8	6.72	8.8	0
-8 +10	8.64	11.2	0
-10 +14	10.87	14.2	0
-14 +20	17.59	22.9	0
-20 +28	13.97	18.2	0
-28 +35	10.77	10.4	11.95
-35 +48	10.13	6.5	21.98
-48 +65	7.46	2.5	23.91
-65 +100	5.01	0.2	18.77
-100 +150	3.3	0	14.27
-150 +200	2.12	0	9.12

So in this slide I am considering example 2 on effectiveness of screen, in this example powdered coal with following screen analysis is fed to a vibrating 48 mesh screen, the particle size distribution data of feed oversize and undersize is shown in this table. So here if you see the table here I am having mesh number but instead of single number here I have shown the value in terms of minus and plus.

Minus you understand I guess it is the material which is passed through the screen and plus sign shows material which is retained on the screen. So if you see here I am having the percentage mass of feed, percentage of retained oversize, percentage of retain undersize. So instead of mass fraction we have shown the value in terms of percentage. So here we have the screen from 32 to 100.

And these value if I consider 1.07 it is basically retained on 4 mesh screen, similarly 1 point is retained on 4 mesh screen but here the value is shown in terms of minus and plus that is undersize as well as oversize, what we have to compute over here is, effectiveness of screen which is of 40 mesh screen considering oversize as a product and considering undersize as product.

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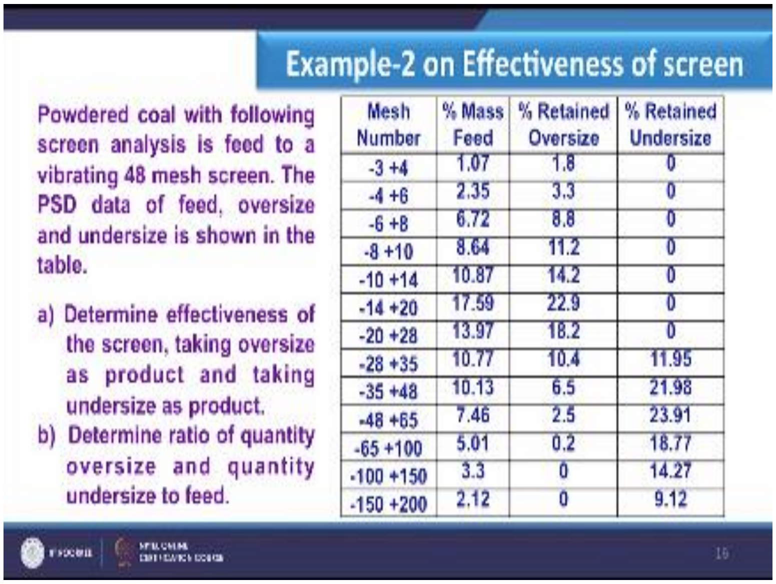

Further we have to compute the ratio of quantity oversize and quantity undersize to feed. If I consider quantity oversize to feed it means b/a I have to calculate when I am considering oversize as a desired product and quality and quantity undersized to feed is again b/a when I am considering undersize as a desired product.

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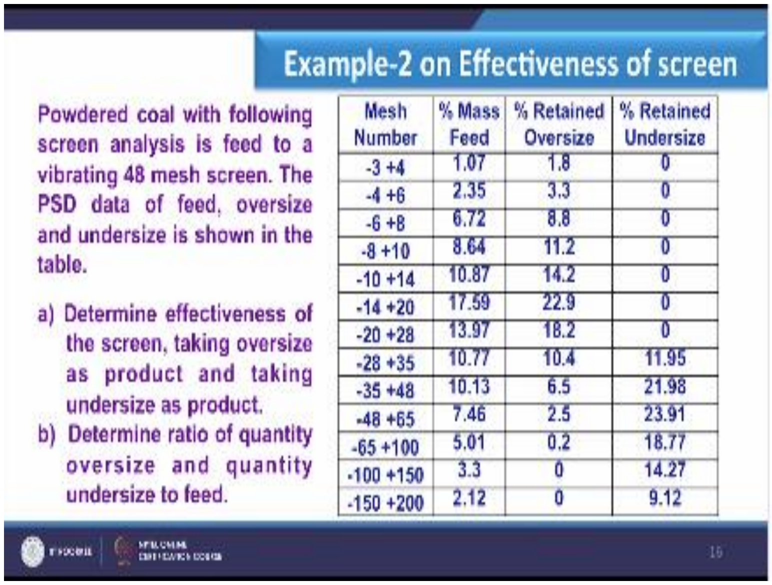

So let us start with the part a, now before that before starting computation of part a here we have to convert the data into desired format and what is desired format? Instead of percentage mass we have to show the value in terms of mass fraction.

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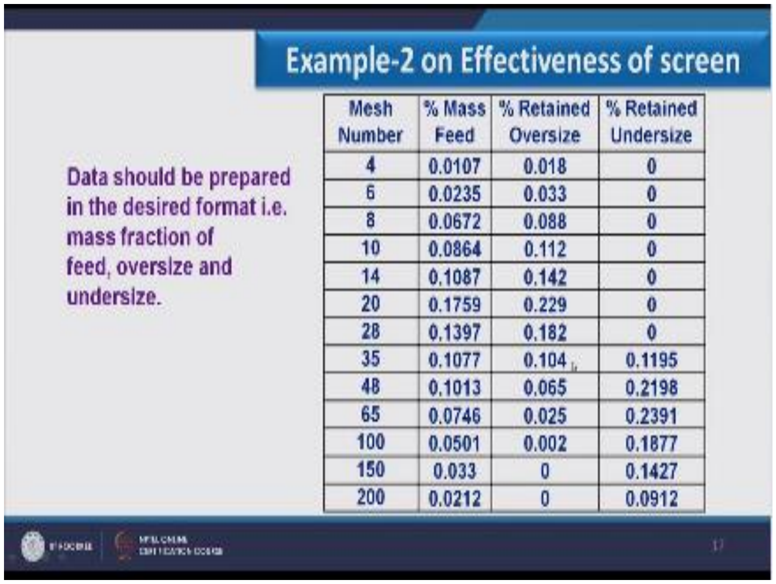

Mesh Number	% Mass Feed	% Retained Oversize	% Retained Undersize
4	0.0107	0.018	0
6	0.0235	0.033	0
8	0.0672	0.088	0
10	0.0864	0.112	0
14	0.1087	0.142	0
20	0.1759	0.229	0
28	0.1397	0.182	0
35	0.1077	0.104	0.1195
48	0.1013	0.065	0.2198
65	0.0746	0.025	0.2391
100	0.0501	0.002	0.1877
150	0.033	0	0.1427
200	0.0212	0	0.0912

So data should be prepared in the desired format that is mass fraction of feed oversize and undersize is should be shown in this table. So here you see here I have written percentage mass but it should be mass fraction. So it should be a not the percentage mass, it is basically the mass fraction of feed, mass fraction of oversize, and mass fraction of undersize, I apologize for this mistake. And here if you see the values here I have written only one mesh number on which material is retained. So from 4 to 200 wherever material is retained as far as feed oversize and undersize is concerned that values are shown in this table.

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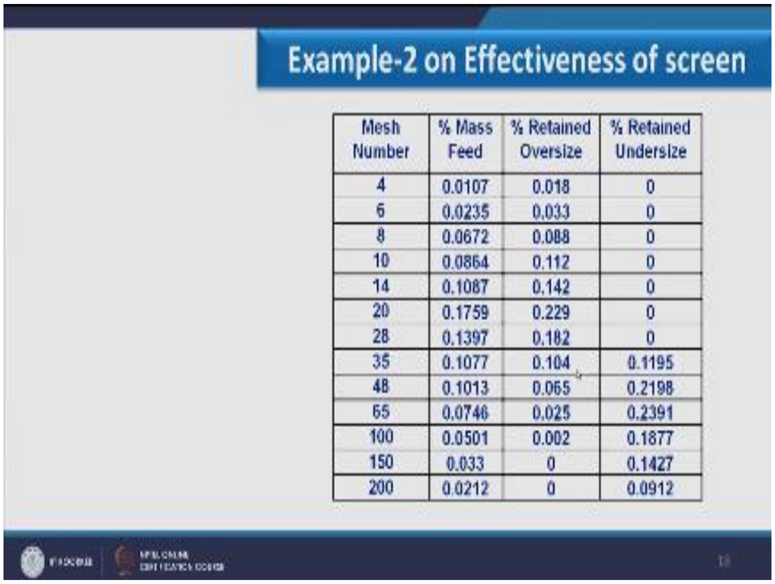

Mesh Number	% Mass Feed	% Retained Oversize	% Retained Undersize
4	0.0107	0.018	0
6	0.0235	0.033	0
8	0.0672	0.088	0
10	0.0864	0.112	0
14	0.1087	0.142	0
20	0.1759	0.229	0
28	0.1397	0.182	0
35	0.1077	0.104	0.1195
48	0.1013	0.065	0.2198
65	0.0746	0.025	0.2391
100	0.0501	0.002	0.1877
150	0.033	0	0.1427
200	0.0212	0	0.0912

Now let us start part 1, here I want to demonstrate that when we do not carry out cumulative mass then how we can calculate the effectiveness of a screen because in example one we have used the data once I am having the cumulative values, here I am not going to make any cumulative mass fraction, without this I want to demonstrate to calculate effectiveness of screen.

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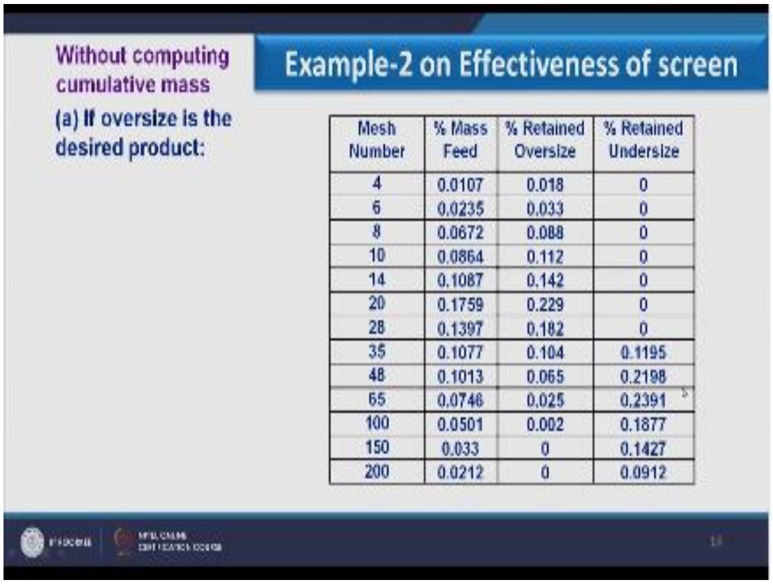

Without computing cumulative mass

(a) If oversize is the desired product:

Example-2 on Effectiveness of screen

Mesh Number	% Mass Feed	% Retained Oversize	% Retained Undersize
4	0.0107	0.018	0
6	0.0235	0.033	0
8	0.0672	0.088	0
10	0.0864	0.112	0
14	0.1087	0.142	0
20	0.1759	0.229	0
28	0.1397	0.182	0
35	0.1077	0.104	0.1195
48	0.1013	0.065	0.2198
65	0.0746	0.025	0.2391
100	0.0501	0.002	0.1877
150	0.033	0	0.1427
200	0.0212	0	0.0912

And here I am considering if oversize is a desired product. So if you see the 40 mesh screen for which I have to compute the effectiveness so whatever section falling above to this 48 that is the region where we have to focus as well as far as ya, yb and yc to be computed.

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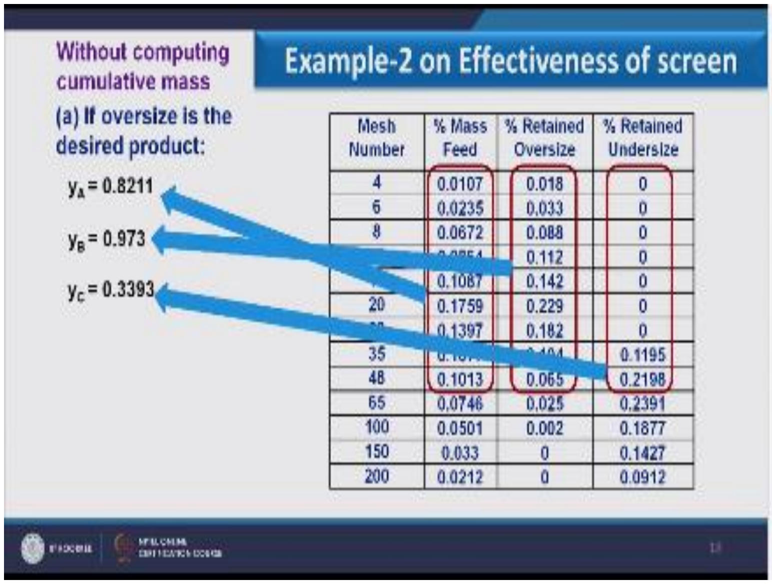

So what is ya is the desired material in feed so we have to consider the screen from 4 to 48 and where the feed is retained. So summation of all these will speak about the value ya which comes out as 0.8211. In the similar line I can calculate desired material in products, so what is desired material is the oversize so obviously the column falling between feed and undersize is the area where we have to focus, so summation of all these values upto 48 will give the value yb which comes out as 0.973 and similarly I can calculate, I can consider the yc while focusing on material retained above 248 screens and addition of these values will give the value of yc which comes out as 0.3393. So by following this we can calculate the ya, yb and yc once I am not having the cumulative mass fraction values.

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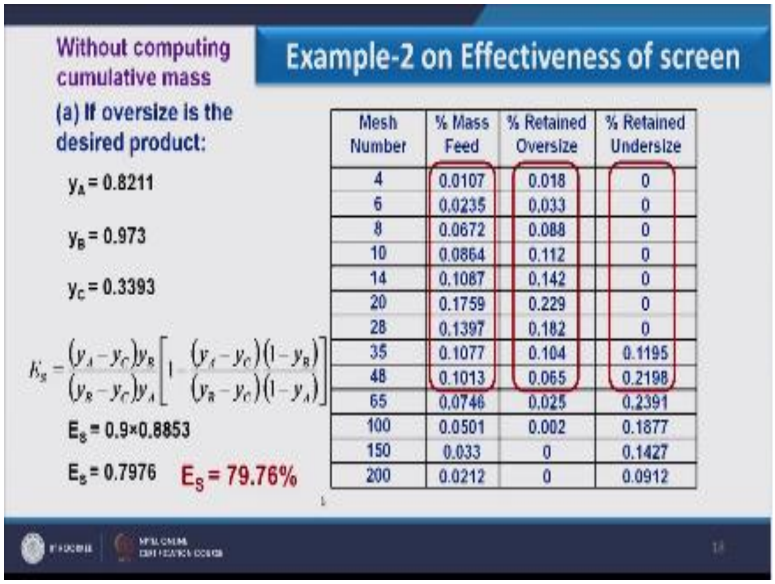

So once I am having ya, yb and yc I can put these value in this expression and then I can calculate the effectiveness of screen, this first section gives the value 0.9 and second section of this expression gives the value 0.8853, multiplication of these two will give the effectiveness as 79.76% so this is one part of this. Now I want to demonstrate the computation of effectiveness of screen if oversize is a desired product considering cumulative mass.

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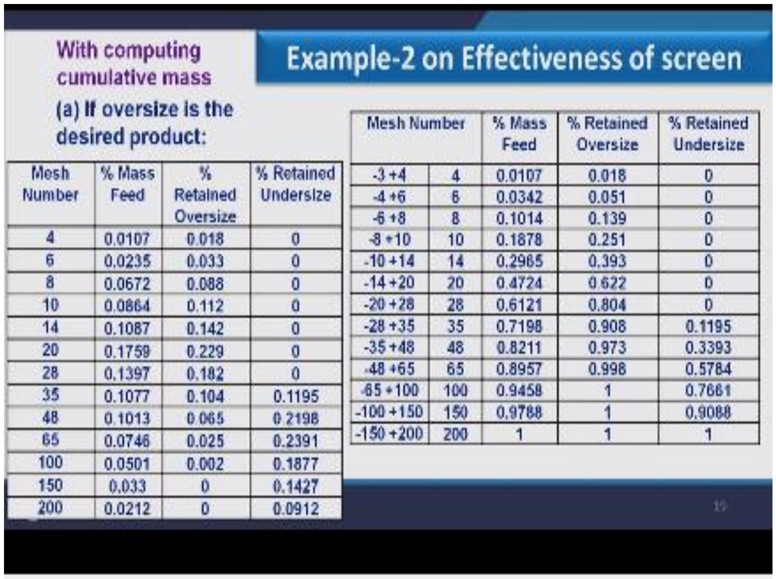

So here you see initially I am having the value in this format where I have represented only single number and the mass retained corresponding to these mesh is available over here, now how I can do the cumulative mass? I have two option first is to make cumulative from top and second is to make cumulative from bottom. In this particular case I am considering cumulative mass fraction from top.

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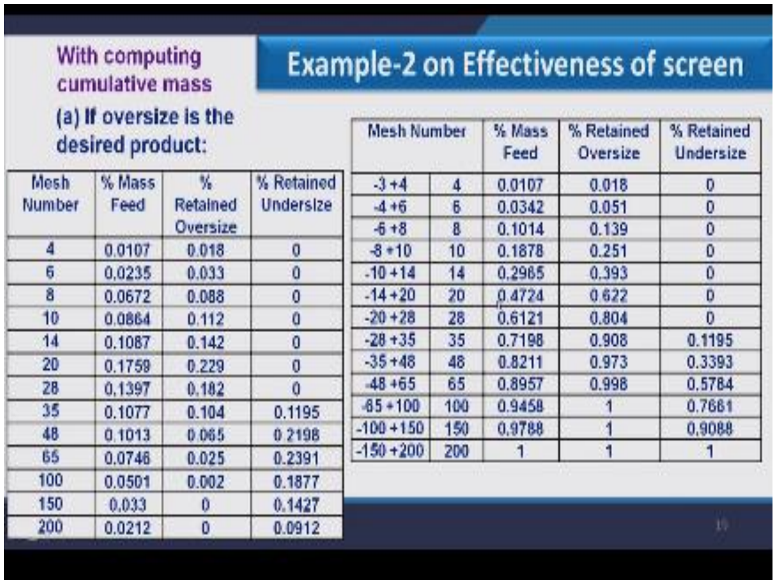

Mesh Number	% Mass Feed	% Retained Oversize	% Retained Undersize
4	0.0107	0.018	0
6	0.0235	0.033	0
8	0.0672	0.088	0
10	0.0864	0.112	0
14	0.1087	0.142	0
20	0.1759	0.229	0
28	0.1397	0.182	0
35	0.1077	0.104	0.1195
48	0.1013	0.065	0.2198
65	0.0746	0.025	0.2391
100	0.0501	0.002	0.1877
150	0.033	0	0.1427
200	0.0212	0	0.0912

Mesh Number		% Mass Feed	% Retained Oversize	% Retained Undersize
-3 +4	4	0.0107	0.018	0
-4 +6	6	0.0342	0.051	0
-6 +8	8	0.1014	0.139	0
-8 +10	10	0.1878	0.251	0
-10 +14	14	0.2965	0.393	0
-14 +20	20	0.4724	0.622	0
-20 +28	28	0.6121	0.804	0
-28 +35	35	0.7198	0.908	0.1195
-35 +48	48	0.8211	0.973	0.3393
-48 +65	65	0.8957	0.998	0.5784
-65 +100	100	0.9458	1	0.7661
-100 +150	150	0.9788	1	0.9088
-150 +200	200	1	1	1

So here if you see this table in this table the first value is corresponding to -3 + 4 and the feed is having 0.0107 so that value 0.0107 is corresponding to 4 mesh screen. Similarly if I consider 6 mesh screen the retain mass over here is this much, now if I want to make the cumulative then I have to add, here you see in this table correspond to 4 I am having 0.0107, corresponding to 6 I am having value 0.0235.

Now if I make cumulative of 6 mesh screen it means all these two value will be added together because these two value would be retained by 6 mesh screen. Similarly if I consider for 8 mesh screen all these three value would be added as the cumulative which is retained by 8 mesh screen. So what is the purpose to do the cumulative analysis that here we have to compute ya, yb and yc, previously also we have done the same thing.

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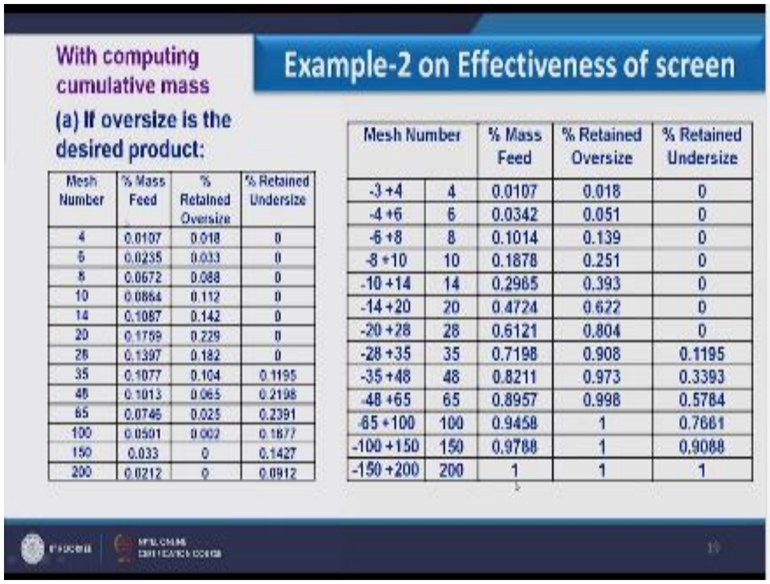

But if we compute the cumulative mass fraction then how the computation should proceed, so here you see if I want to make the cumulative from top and here I am having mesh number of screen in terms of – and + so the cumulative will be shown with respect to all plus number of screen, so if I do the cumulative analysis I have to show the mesh number which are positive in this series.

So here you see 4, 6, 8, 10 and similarly upto 200 we can proceed so once I am reaching to 200 the cumulative mass comes as one which shows that if I consider the finest opening screen which will retain all particles so therefore the value comes over here is one, so if I do the cumulative mass from top I have to consider the mesh number correspond to plus sign.

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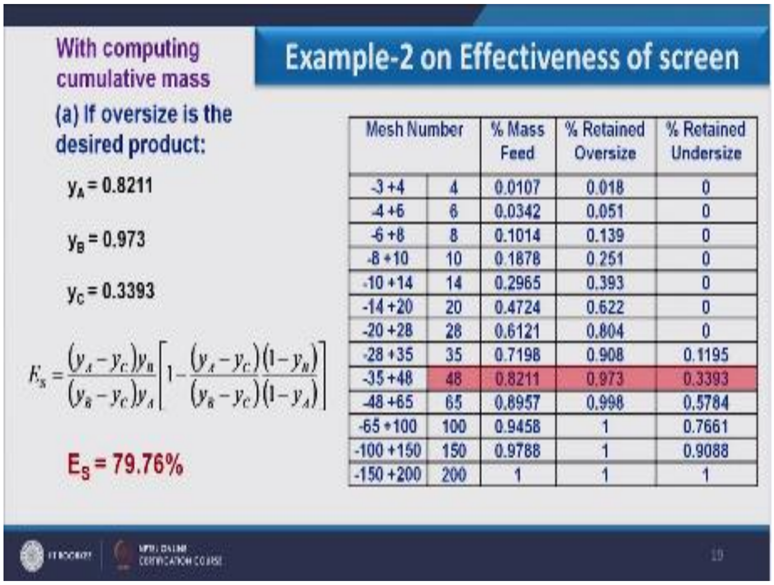

Mesh Number		% Mass Feed	% Retained Oversize	% Retained Undersize
-3 +4	4	0.0107	0.018	0
-4 +6	6	0.0342	0.051	0
-6 +8	8	0.1014	0.139	0
-8 +10	10	0.1878	0.251	0
-10 +14	14	0.2965	0.393	0
-14 +20	20	0.4724	0.622	0
-20 +28	28	0.6121	0.804	0
-28 +35	35	0.7198	0.908	0.1195
-35 +48	48	0.8211	0.973	0.3393
-48 +65	65	0.8957	0.998	0.5784
-65 +100	100	0.9458	1	0.7661
-100 +150	150	0.9788	1	0.9088
-150 +200	200	1	1	1

So I hope you are getting this, now what we have to do that correspond to 48 I have to calculate y_A, y_B and y_C, here this is already the cumulative mass so I do not have to consider all section above to this I can consider this value only, so considering this I can calculate y_A which is 0.8211. Now if you consider this 48 it correspond to +48, so whatever mass is available over here in terms of cumulative mass is retained on 48. So that would be the desired material in the feed that is 0.8211.

Similarly I can calculate y_B 0.973 which is desired material in product and similarly I can calculate desired material in reject that is y_C which comes out as 0.3393. Considering these three value I can calculate the effectiveness of screen using this expression which comes out as 79.76%. Here another section I am considering the same problem while doing the cumulative and considering oversize as a desired product, but in this case I am doing the cumulative from bottom instead of top. So here you see as we have demonstrated in the previous section.

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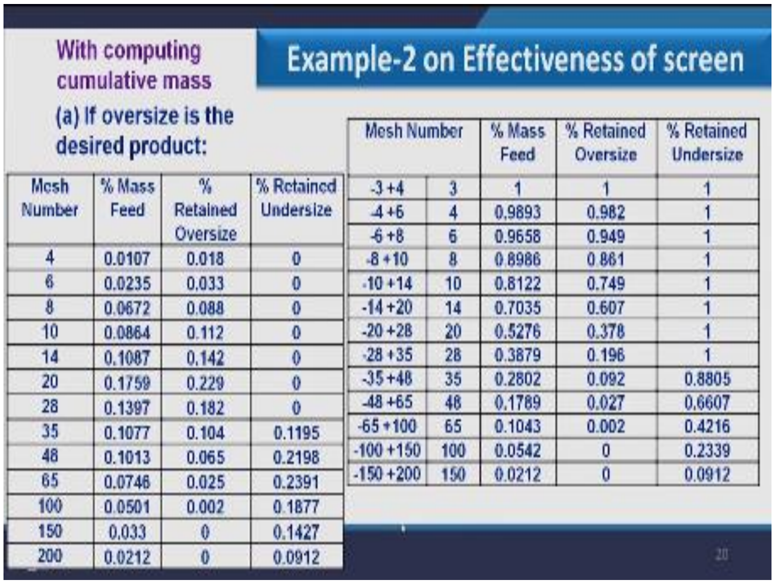

Mesh Number	% Mass Feed	% Retained Oversize	% Retained Undersize
4	0.0107	0.018	0
6	0.0235	0.033	0
8	0.0672	0.088	0
10	0.0864	0.112	0
14	0.1087	0.142	0
20	0.1759	0.229	0
28	0.1397	0.182	0
35	0.1077	0.104	0.1195
48	0.1013	0.065	0.2198
65	0.0746	0.025	0.2391
100	0.0501	0.002	0.1877
150	0.033	0	0.1427
200	0.0212	0	0.0912

Mesh Number		% Mass Feed	% Retained Oversize	% Retained Undersize
-3 +4	3	1	1	1
-4 +6	4	0.9893	0.982	1
-6 +8	6	0.9658	0.949	1
-8 +10	8	0.8986	0.861	1
-10 +14	10	0.8122	0.749	1
-14 +20	14	0.7035	0.607	1
-20 +28	20	0.5276	0.378	1
-28 +35	28	0.3879	0.196	1
-35 +48	35	0.2802	0.092	0.8805
-48 +65	48	0.1789	0.027	0.6607
-65 +100	65	0.1043	0.002	0.4216
-100 +150	100	0.0542	0	0.2339
-150 +200	150	0.0212	0	0.0912

In this table I have shown the value which are retained on respective screen so if I consider this 200 mesh it means this much is retained on this. So if I consider 150 it has this much value to be retained. Now if I do the cumulative from bottom then these two would be added and the addition value of these two would be 0.0542. Now that value 0.0542 will never be in correspondence with 150 because 150 will never retain the particle which are lesser than 150, so in this case instead of using plus sign I will show, I will use the negative sign which shows the material will pass through the screen. Therefore if I consider the cumulative analysis from bottom.

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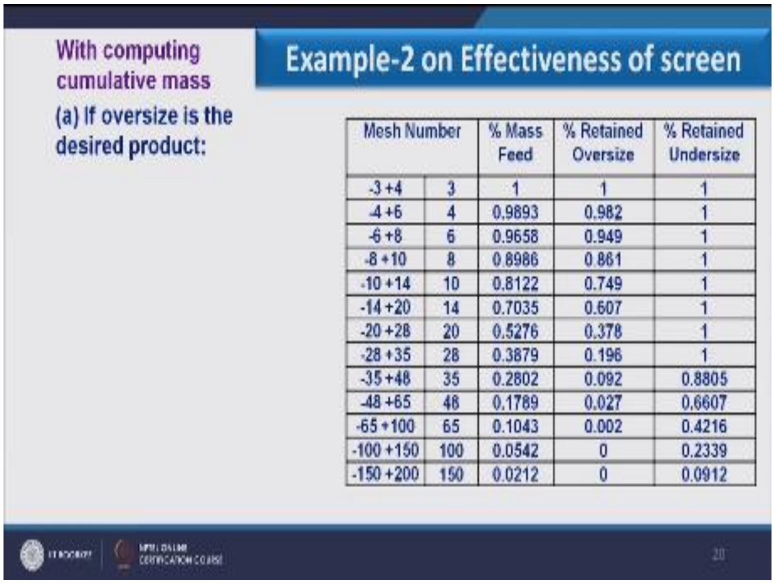

Mesh Number		% Mass Feed	% Retained Oversize	% Retained Undersize
-3 +4	3	1	1	1
-4 +6	4	0.9893	0.982	1
-6 +8	6	0.9658	0.949	1
-8 +10	8	0.8986	0.861	1
-10 +14	10	0.8122	0.749	1
-14 +20	14	0.7035	0.607	1
-20 +28	20	0.5276	0.378	1
-28 +35	28	0.3879	0.196	1
-35 +48	35	0.2802	0.092	0.8805
-48 +65	48	0.1789	0.027	0.6607
-65 +100	65	0.1043	0.002	0.4216
-100 +150	100	0.0542	0	0.2339
-150 +200	150	0.0212	0	0.0912

I can correspond this with the mesh number where I am having the mesh number with negative sign. Therefore, if you consider this when I do the cumulative from bottom I have to use the mesh number with negative sign and when I am carrying out cumulative from top I have to use mesh number with positive sign. So here we do.

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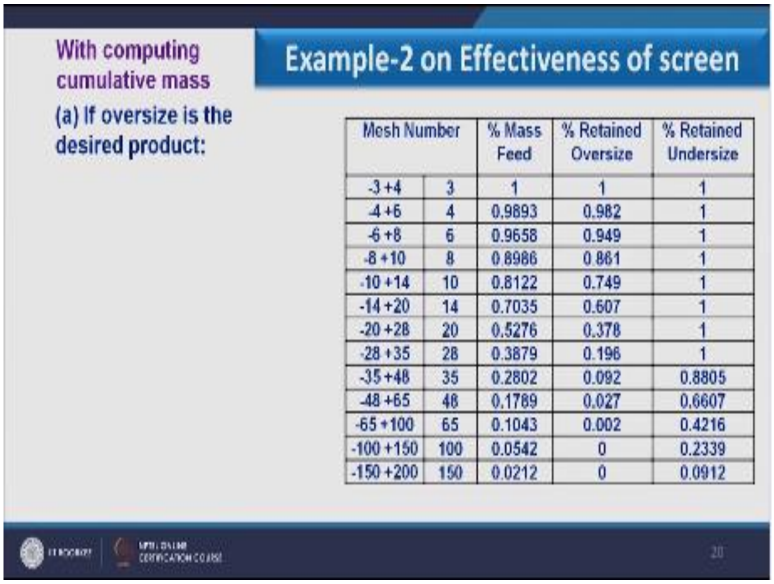

Mesh Number		% Mass Feed	% Retained Oversize	% Retained Undersize
-3 +4	3	1	1	1
-4 +6	4	0.9893	0.982	1
-6 +8	6	0.9658	0.949	1
-8 +10	8	0.8986	0.861	1
-10 +14	10	0.8122	0.749	1
-14 +20	14	0.7035	0.607	1
-20 +28	20	0.5276	0.378	1
-28 +35	28	0.3879	0.196	1
-35 +48	35	0.2802	0.092	0.8805
-48 +65	48	0.1789	0.027	0.6607
-65 +100	65	0.1043	0.002	0.4216
-100 +150	100	0.0542	0	0.2339
-150 +200	150	0.0212	0	0.0912

The cumulative from bottom so obviously all minus sign will appear in this. Now this we will use for the computation of effectiveness of screen.

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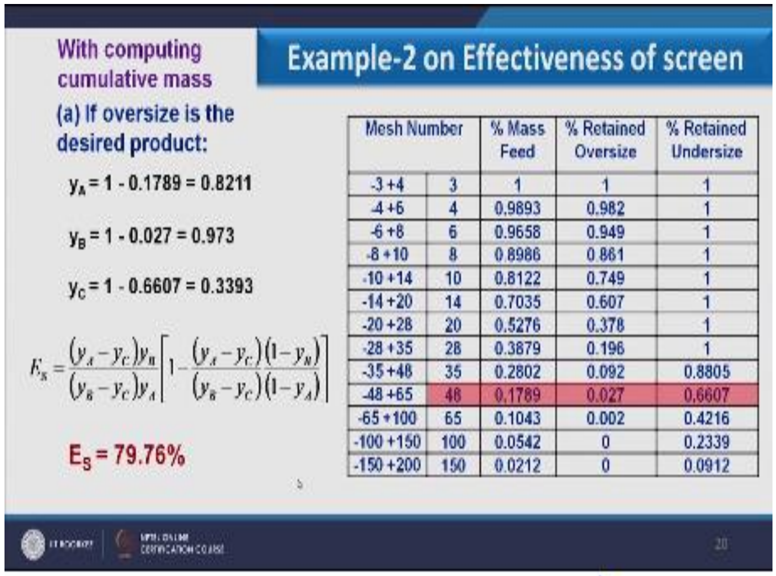

Correspond to 48 these are the values of cumulative analysis, now if you consider this 48 it comes as -48 it means this much material is passed through 48 screen. So as far as y_A is concerned I do not have to consider with the material which is passed through but I have to consider the material which is retained on 48 screen, so obviously y_A would be 1-0.1789 which is equal to 0.8211. And similarly y_B and y_C I can consider by considering cumulative correspond to 48 in oversize as well as in undersize.

Considering all these three value in this expression I can calculate the effectiveness of screen which comes out as 79.76%. So that is the calculation of three different way, one is without cumulative, second is with cumulative when we do the cumulative from top, and third is with cumulative when we do the cumulative mass from bottom. So this is the sieve example and here we have to compute without cumulating and what we have to compute, effectiveness of screen when undersize is a desired product, so here without computing the cumulative mass.

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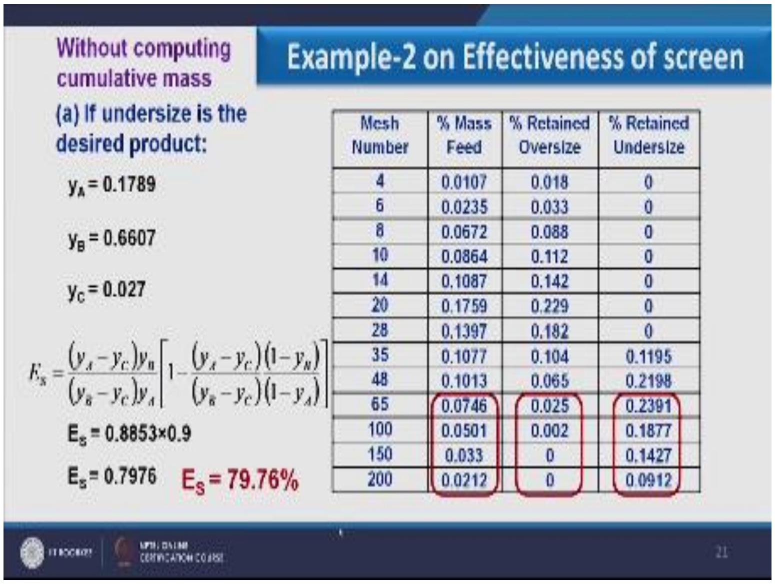

$$E_S = \frac{(y_A - y_C)y_B}{(y_B - y_C)y_A}\left[1 - \frac{(y_A - y_C)(1 - y_B)}{(y_B - y_C)(1 - y_A)}\right]$$

Here you see all these three section which are falling below 48 is the region where we have to focus, so what is the y_A that is desired material in feed. Now desired material is undersize so whatever undersize to 48 is available below 48 mesh screen. Available in feed so that y_A would be 0.1789 that is summation of these four fractions and similarly y_B is the desired material in product. In this case this is the product so summation of these four value will give y_B and similarly summation of these four value will give y_C which is the rejection, so here y_A, y_B once I know I can calculate the effectiveness of screen and the first section gives the value 0.8853 and second section 0.9, multiplication of these two will give the value that is 79.76%.

So here you can see that effectiveness is 79.76 only, either I consider oversize as a desired product or I consider undersize as a desired product because the performance of equipment will not differ when I change the desired product.

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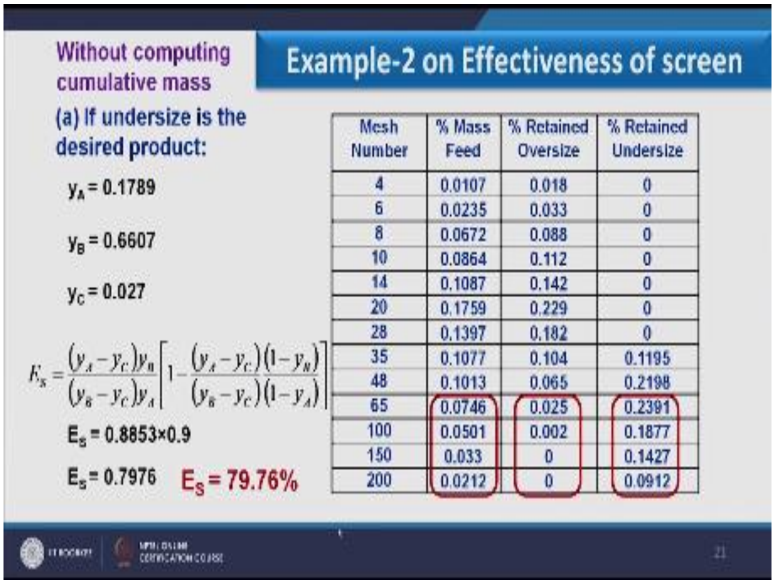

So whatever it is either oversize or undersize effectiveness of screen will remain same. Here I will show again with cumulative mass when undersize is a desired product.

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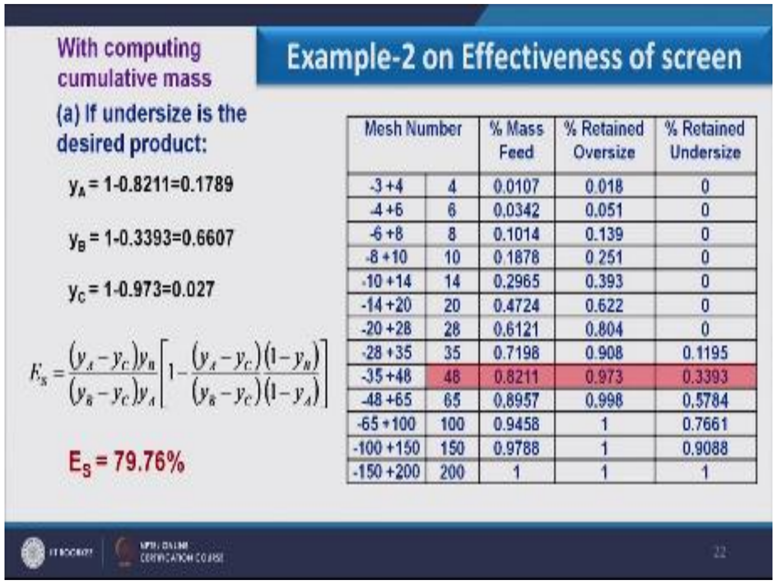

Here you can understand I have done the cumulative from top considering all positive mesh numbers, so what is the reason behind this that we have already discussed. Correspond to 48 we have to compute the y_A, y_B and y_C so y_A is the desired material in feed. So if undersize is a desired product and this 48 shows the oversize of this, so 1-0.8211 is equal to 1 equal to 0.1789 which is the desired material in feed. And similarly I can calculate y_B and y_C considering oversize as well as undersize of this table.

Here undersize is a desired product so y_B would be 1-0.3393 and similarly y_C would be 1-0.973, so once I am having y_A, y_B, y_C I can calculate the effectiveness using this expression which I can find as 79.76%. In continuation to this I will do the cumulative analysis from bottom while considering all negative mesh number screens.

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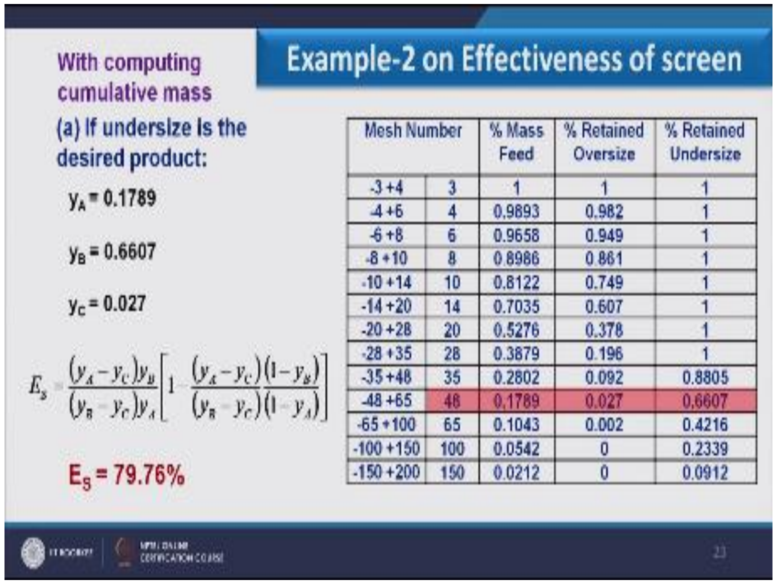

Mesh Number		% Mass Feed	% Retained Oversize	% Retained Undersize
-3 +4	3	1	1	1
-4 +6	4	0.9893	0.982	1
-6 +8	6	0.9658	0.949	1
-8 +10	8	0.8986	0.861	1
-10 +14	10	0.8122	0.749	1
-14 +20	14	0.7035	0.607	1
-20 +28	20	0.5276	0.378	1
-28 +35	28	0.3879	0.196	1
-35 +48	35	0.2802	0.092	0.8805
-48 +65	48	0.1789	0.027	0.6607
-65 +100	65	0.1043	0.002	0.4216
-100 +150	100	0.0542	0	0.2339
-150 +200	150	0.0212	0	0.0912

So if undersize is a desired product correspond to 48 mesh screen, y_A would be 0.1789 and similarly I can calculate y_B and y_C, putting these values in this expression I can calculate the effectiveness of mscreen. So in this way I can calculate the effectiveness of screen considering oversize as well as undersize and in this particular problem I have taken all possibility to make the cumulative mass fraction.

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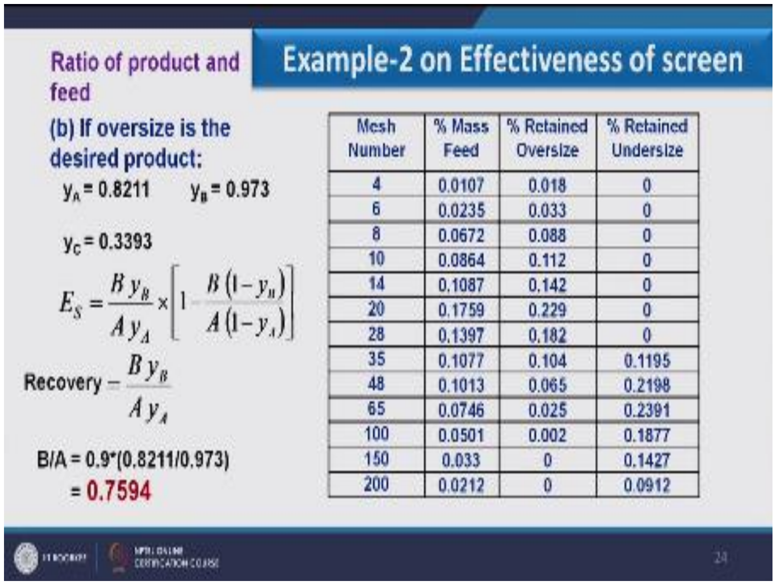

Now in this slide I will consider the second part of the problem that where I have to calculate the ratio of product and feed. If oversize is a desired product we have to calculate B by A, so if oversize is the desired product these are the value of y_A, y_B and y_C that is nothing but the addition of this, I have already explained from where these values has come. So considering this, this is the expression for effectiveness of screen where we have to calculate B by A. And if I consider recovery that is B/A y_B and y_A and here I can have the recovery as we have done it previously so that recovery we have considered as 0.9, and considering this expression also we can have the value of B/A which comes out as 0.7594.

In the similar line I can calculate the ratio of product and feed when undersize is a desired product and these are the fraction of undersize where I am having values of y_A, y_B and y_C.

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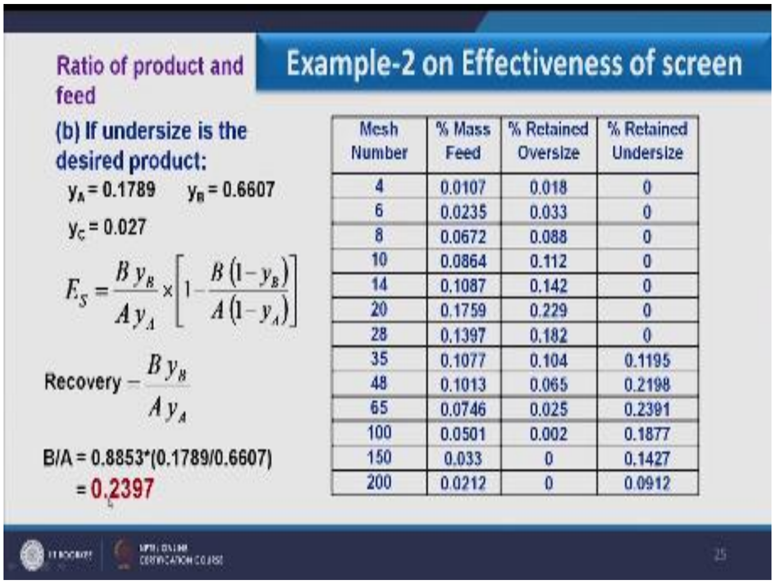

This is the expression, this is the recovery, I am already having the value of recovery 0.8853 you can refer the previous slides, so considering these recovery value as well as this y_A and y_B I can calculate the ratio B/A which comes out as 0.2397, so this is, it was example two. So here I am having third example on effectiveness of screen which says that following is the particle size distribution of three cuts obtained from a double deck vibrating screen. Double deck vibrating screen where I am having two screens of 48 as well as 65 mesh.

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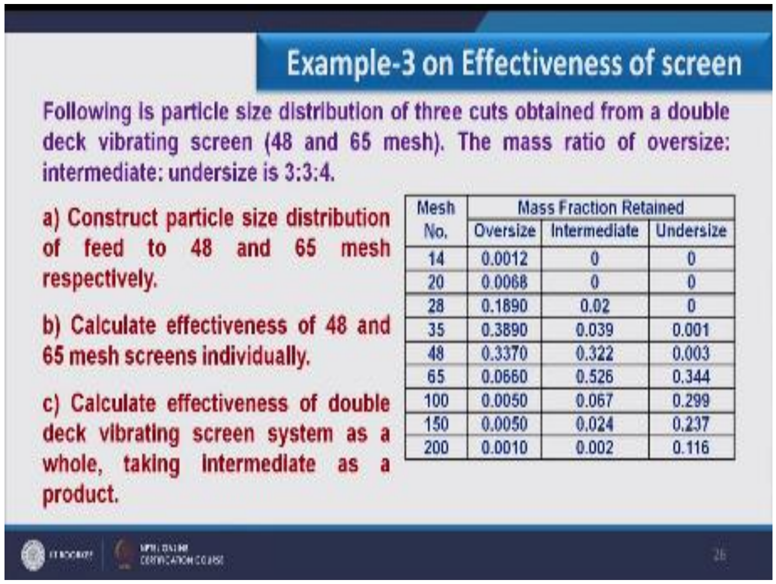

The mass ratio of oversize intermediate and undersize is 3:3:4, so if you consider this particular table here I have shown the mesh number of screen where I am having 48 as well as 65 and here the mass fraction of oversize intermediate and undersize are shown, so what we have to compute over here? First of all if you see this table it has basically three sections, oversize, intermediate, and undersize but it does not have any column of feed, so first of all we have to construct the particle size distribution of feed to 48 and 65 mesh screen respectively.

Secondly we have to calculate the effectiveness of 48 and 65 mesh screen individually and finally we have to calculate the effectiveness of double deck vibrating screen considering intermediate as a desired product. So before you starting the calculation the computation for this particular example you should understand what is double deck screen. Double deck screen is the set of two screen in which I am having 48 mesh screen at the top and below I am having 65 mesh screen and below to 65 mesh screen I have pan and.

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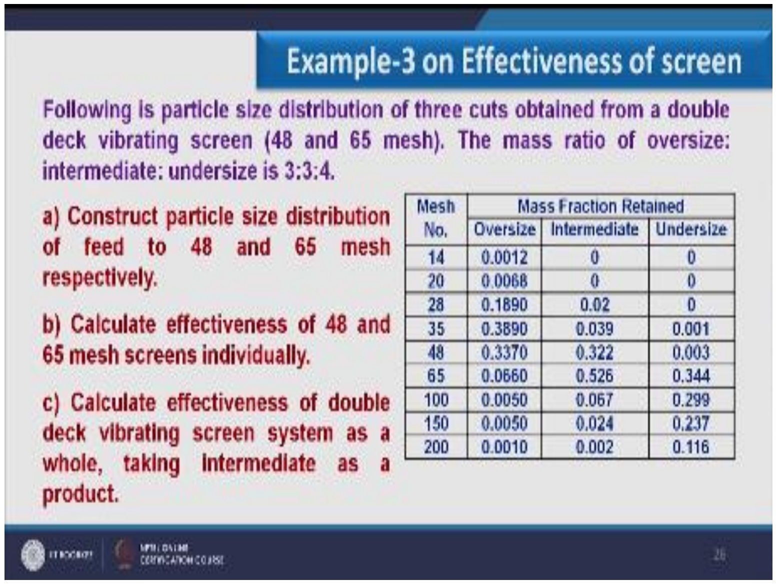

At the top of 40 mesh screen I have the cover, so this is a set of two screen, one pan and one cover. This particular set we put into the shaker, screen analysis will be done and here I will have three different section, first is which is retained on 48 screen which we call as oversize which is shown over here.

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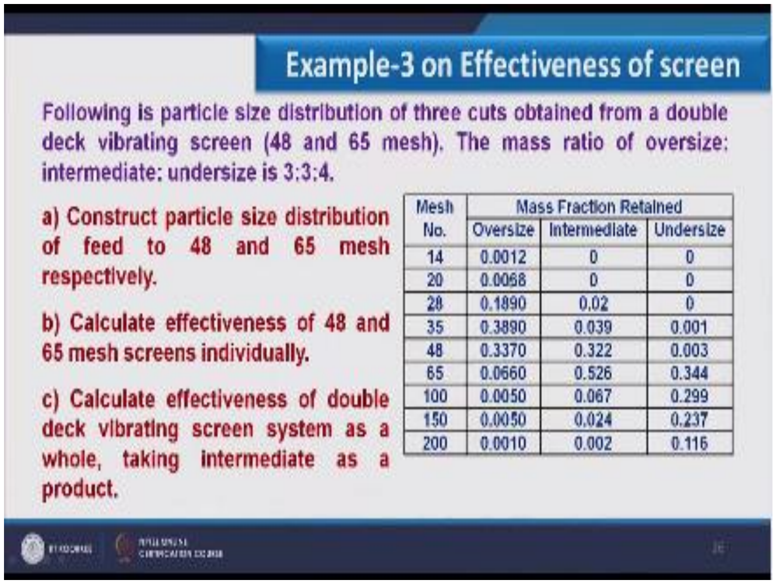

Second section is which is falling over to 65 which is pass through 48 so that we have represented as intermediate and finally whatever is collected in the pan which is below to.

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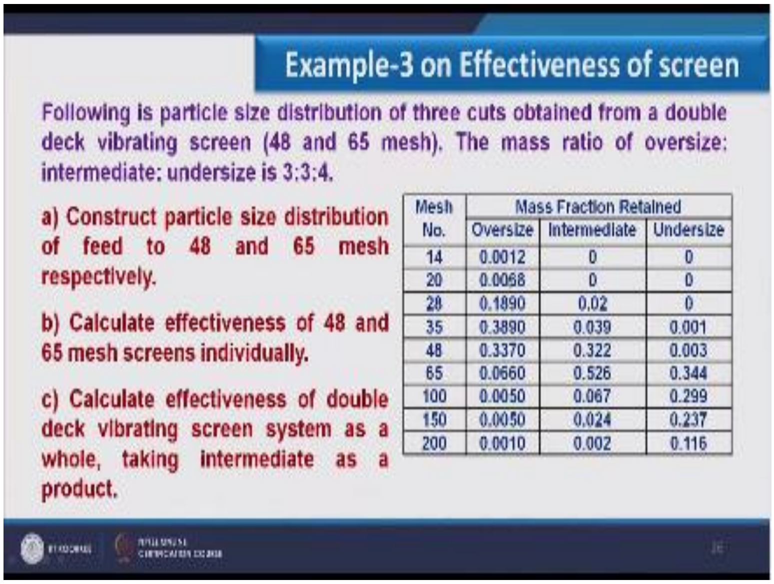

65 that we name as under size, so if I am having double deck screen I will have three different sections, so this example is entirely different whatever we have discussed previously.

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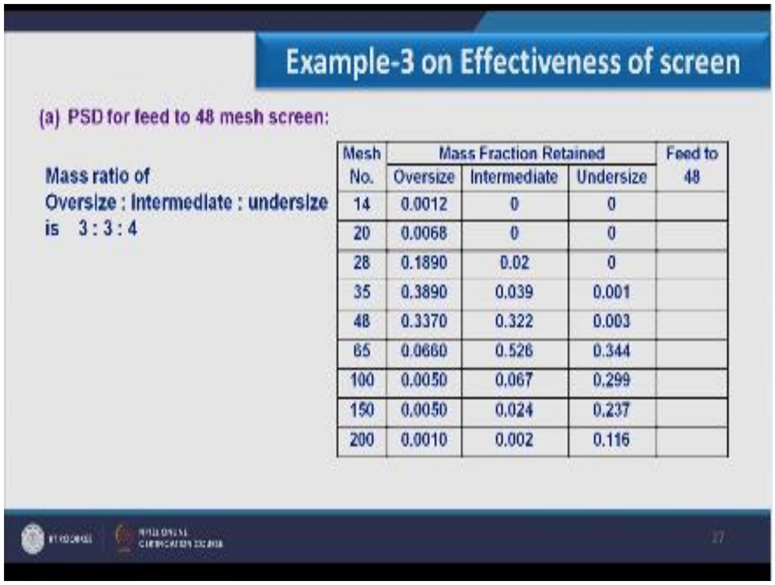

Mesh No.	Mass Fraction Retained			Feed to 48
	Oversize	Intermediate	Undersize	
14	0.0012	0	0	
20	0.0068	0	0	
28	0.1890	0.02	0	
35	0.3890	0.039	0.001	
48	0.3370	0.322	0.003	
65	0.0660	0.526	0.344	
100	0.0050	0.067	0.299	
150	0.0050	0.024	0.237	
200	0.0010	0.002	0.116	

So here first part of this we should consider that is particle size distribution for feed to 48 mesh screen how we can find that particle size distribution on this. Here if you see the mass ratio of oversize intermediate and under size is three, for example if I am having 100kg of feed in this 30kg has gone to oversize, 30kg has gone to intermediate, and 40kg will remain as undersize, so when I join these three we can have the feed to 48 because if I am considering 48 mesh screen that is the topmost screen.

In which total feed should be fed which consist of oversize, intermediate, and undersize, so to compute the feed for.

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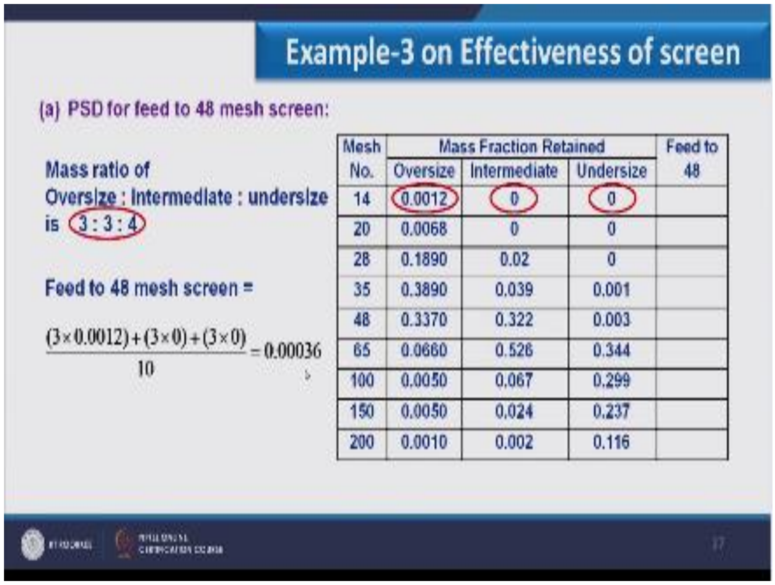

48 screen I have to consider these ratios that is 3:3:4 and the value which is shown with respect to each mesh number screen. So for 40 mesh screen how we have to compute the feed to 48 that would be nothing but simply the component balance that is 3 x 0.0012 which is of oversize, 3 x 0 which is of intermediate, 4 x 0 which is of undersize / 10, so all these value will give the feed correspond 240 mesh screen to 48 screen, so here I am having the value 0.0036.

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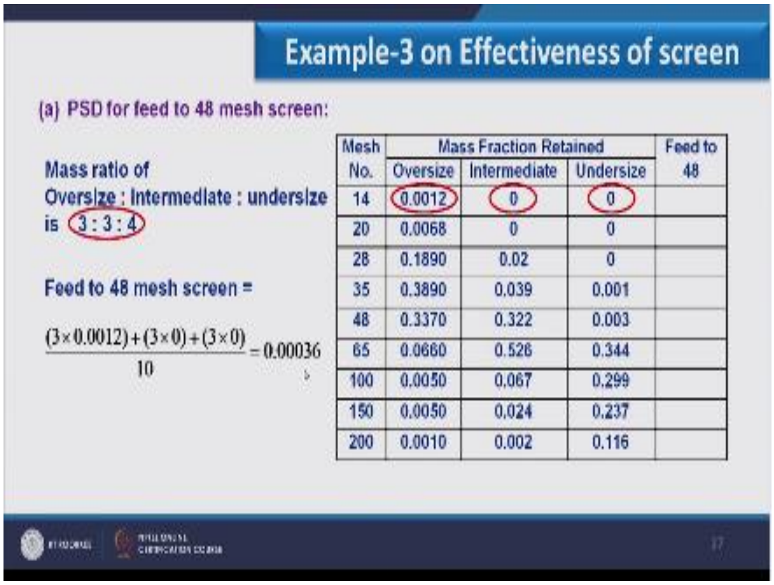

Mesh No.	Mass Fraction Retained			Feed to 48
	Oversize	Intermediate	Undersize	
14	0.0012	0	0	
20	0.0068	0	0	
28	0.1890	0.02	0	
35	0.3890	0.039	0.001	
48	0.3370	0.322	0.003	
65	0.0660	0.526	0.344	
100	0.0050	0.067	0.299	
150	0.0050	0.024	0.237	
200	0.0010	0.002	0.116	

And in similar line I can calculate value for other mesh number screens also, so in this way I can calculate the feed to 48.

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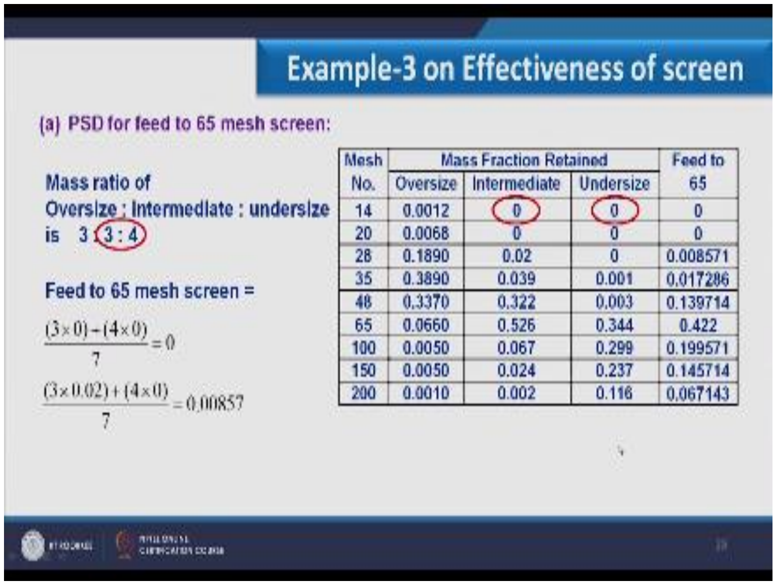

Here I have to calculate feed to 65, now if I consider 65 it is only the single screen in which whatever material is available that is distributed as oversize as well as undersize, so over size I am calling as intermediate in this particular example and under size will remain as it is, so to compute the feed to 65 mesh screen I will consider the ratio of intermediate to undersize and the fractions correspond to each mesh number which are present in intermediate as well as under size columns.

So if you consider the 40 mesh screen we have feed to 65 we can compute feed to 65 as 3 x 0 + 4 x 0/ 7 so 0 will appear over here, however if I consider for 28 mesh number screens we have 3 x 0.02 and 4 x 0.0/ 7 it will give the value 0.00857 which you can see over here, so accordingly I can calculate the PSD for feed to 65 mesh screen for the rest of the mesh number screens, so here I am having the complete PSD data.

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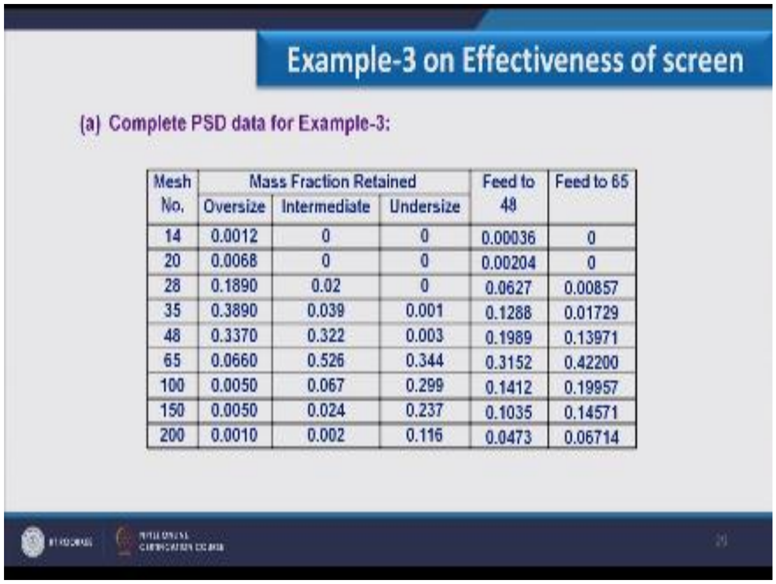

Mesh No.	Mass Fraction Retained			Feed to 48	Feed to 65
	Oversize	Intermediate	Undersize		
14	0.0012	0	0	0.00036	0
20	0.0068	0	0	0.00204	0
28	0.1890	0.02	0	0.0627	0.00857
35	0.3890	0.039	0.001	0.1288	0.01729
48	0.3370	0.322	0.003	0.1989	0.13971
65	0.0660	0.526	0.344	0.3152	0.42200
100	0.0050	0.067	0.299	0.1412	0.19957
150	0.0050	0.024	0.237	0.1035	0.14571
200	0.0010	0.002	0.116	0.0473	0.06714

Complete PAD data means a feed to 48 feed to 65 oversize, intermediate, and undersize so that we have part one of this example we have already completed.

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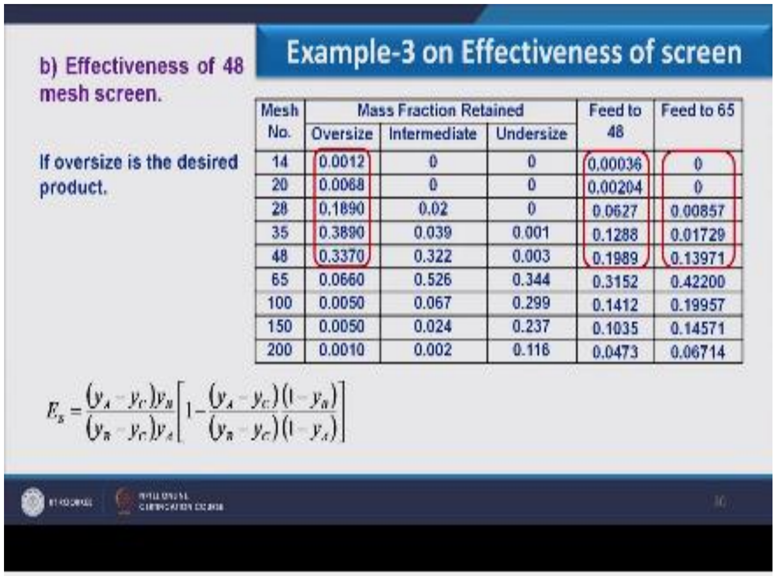

Let us start with part two which says that to calculate the effectiveness of 48 mesh screen here I am considering oversize as a desired product and this is the expression which we have to consider, so if oversize of desired product you can understand very well that above to 48 would be the region where we have to focus, y_A is the desired material in feed.

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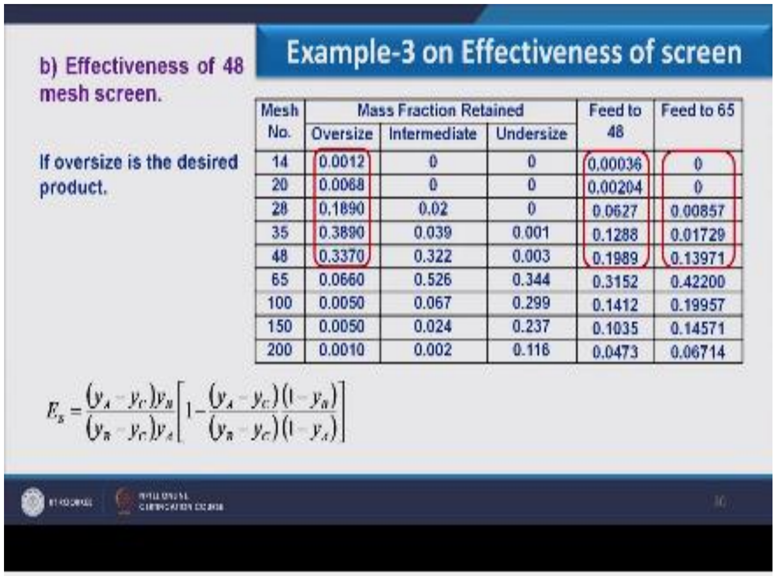

So ∑ of all these mass fraction will give y_A ∑ of all these will give the value y_B and ∑ of all these will give the value y_C, so here you see feed to 65 I have consider as reject, in other word you can consider intermediate as well as undersize as reject because in this particular case oversize to 48 is the desired material, oversize to 48 is a desired product so considering intermediate as well as under size in 3:4 ratio you can calculate y_C which we have already shown.

When we have computed the feed to 65 so therefore this particular column we have chosen to calculate y_C, once I am having y_A, y_B, y_C we can calculate the effectiveness of a screen which comes out as 67. 8%.

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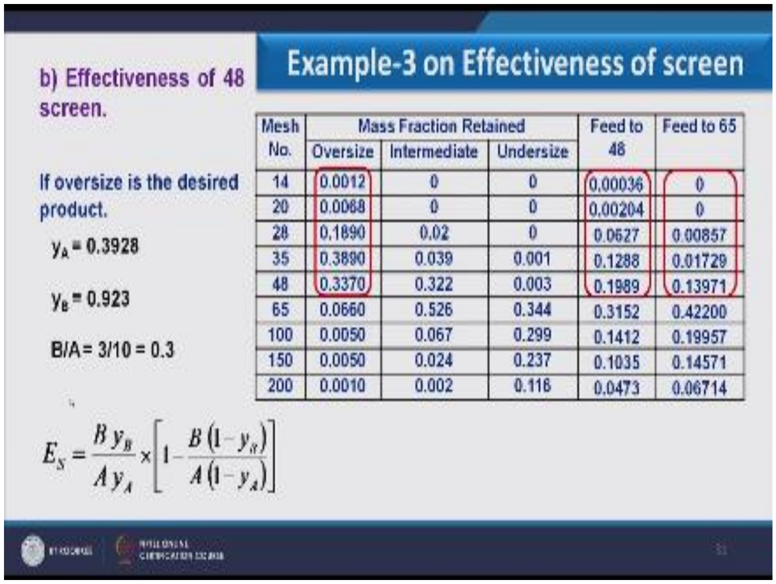

And similarly we have 40 mesh screen effectiveness we have to calculate considering oversize as a desired product. Now in this case what is the difference the expression to calculate effectiveness is different so here instead, instead of y_C we have used the ratio B over A so here y_A and y_B you can calculate from this table. However B/A if I consider that ratio I already know so I can calculate B/A value which comes out as 0.3. Considering these three value effectiveness can be calculated which comes out as 67.8%.

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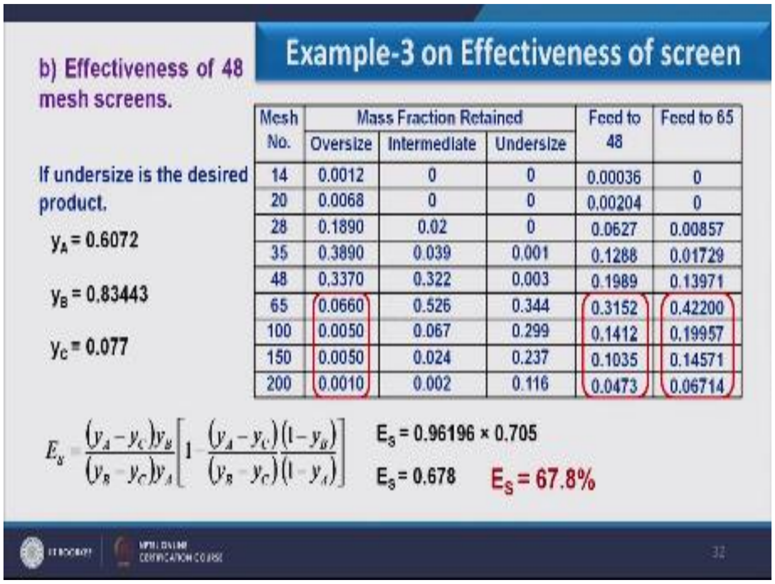

Similarly we can calculate effectiveness of 48 mesh screen if undersize is a desired product so undersize to 48 this is the region where we have to focus, so this is $y_{C,}$ this is $y_{B,}$ and this is $y_{A,}$ summation of these three will give the value and using these value in this expression we can have the effectiveness of screen which comes out as 67.8%. And here we have to calculate the effectiveness of 65 mesh screen if oversize the desired product following similar method.

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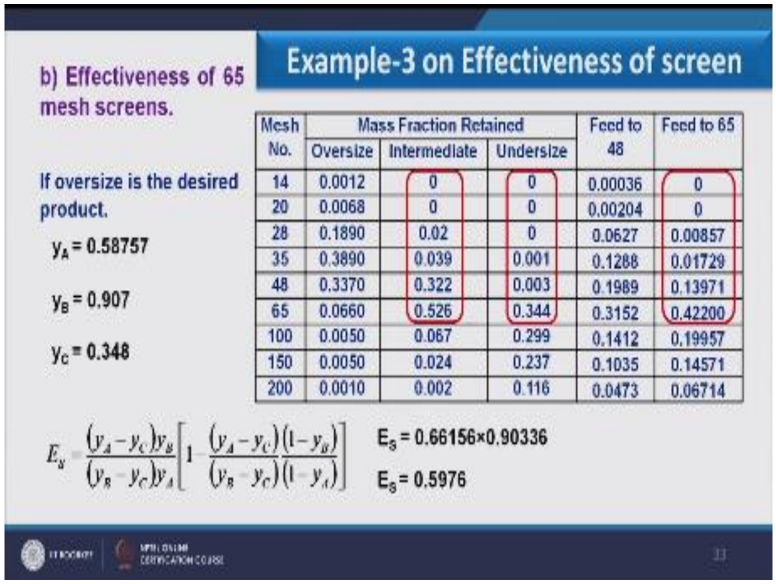

Here this would be the product, this would be the feed and this would be the reject. So y_A, y_B and y_C I can calculate over here and similarly I can calculate the effectiveness of screen. So for 65 I am getting 59.76% as.

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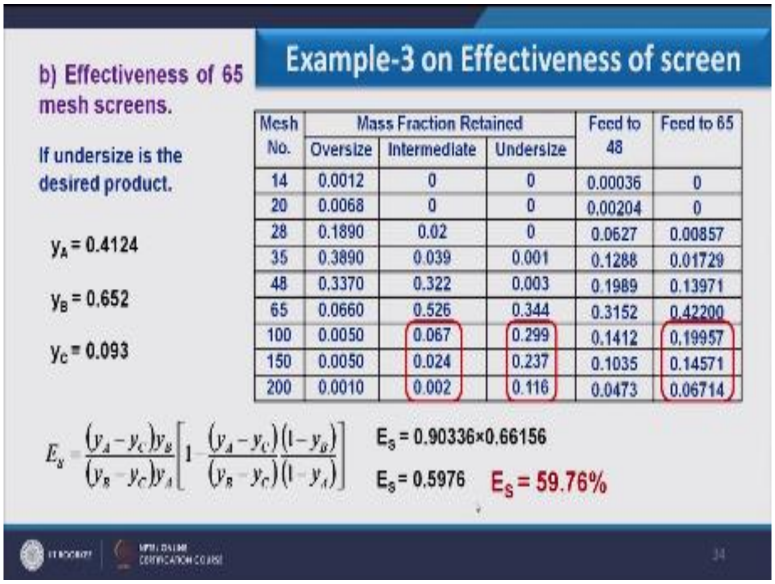

Mesh No.	Mass Fraction Retained			Feed to 48	Feed to 65
	Oversize	Intermediate	Undersize		
14	0.0012	0	0	0.00036	0
20	0.0068	0	0	0.00204	0
28	0.1890	0.02	0	0.0627	0.00857
35	0.3890	0.039	0.001	0.1288	0.01729
48	0.3370	0.322	0.003	0.1989	0.13971
65	0.0660	0.526	0.344	0.3152	0.42200
100	0.0050	0.067	0.299	0.1412	0.19957
150	0.0050	0.024	0.237	0.1035	0.14571
200	0.0010	0.002	0.116	0.0473	0.06714

Efficiency of screen 65 mesh screen, if I am considering undersize as a desired product so this would be the region where we have to work in this, this is the y_A section, this is y_B section and this is y_C section. So joining these two adding these two will give value y_A, y_B, $y_{C,}$ using this expression I can have the effectiveness of screen which is as 59.76%. In this case in this particular slide we are discussing the effectiveness of double deck vibrating screen taking intermediate as desired product.

So here you see I am considering double deck so all.

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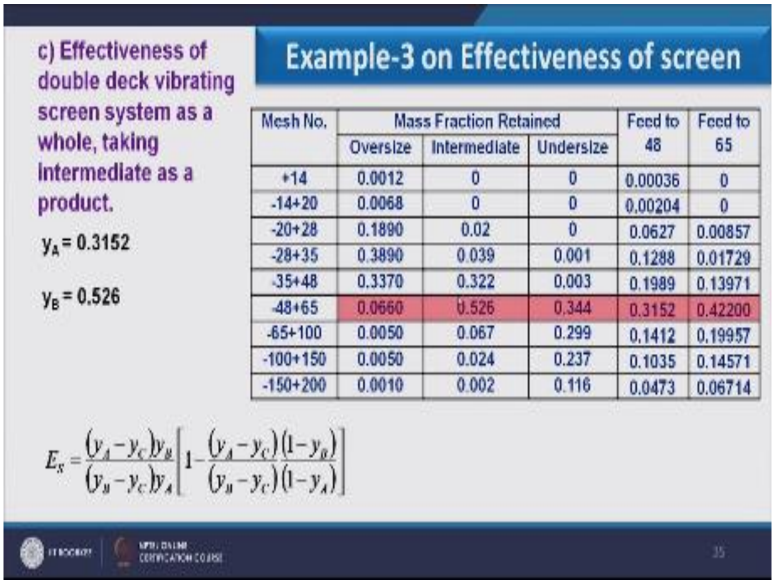

We have shown in terms of all value we have shown in terms of minus and plus. So here if I am considering double deck I have to consider the fraction which is passing through 48 and retained on 65 that we call intermediate as a desired product, so in this case correspond to -48 +65 this section I have to consider as region where I have to work for y_A, y_B and y_C, so what is y_A is the desired material in feed, so you see the value. Here I do not use the cumulative or addition, only this particular section would be the desired material. So y_A is the desired material in feed which comes out 0.3152. y_B desired material in the product

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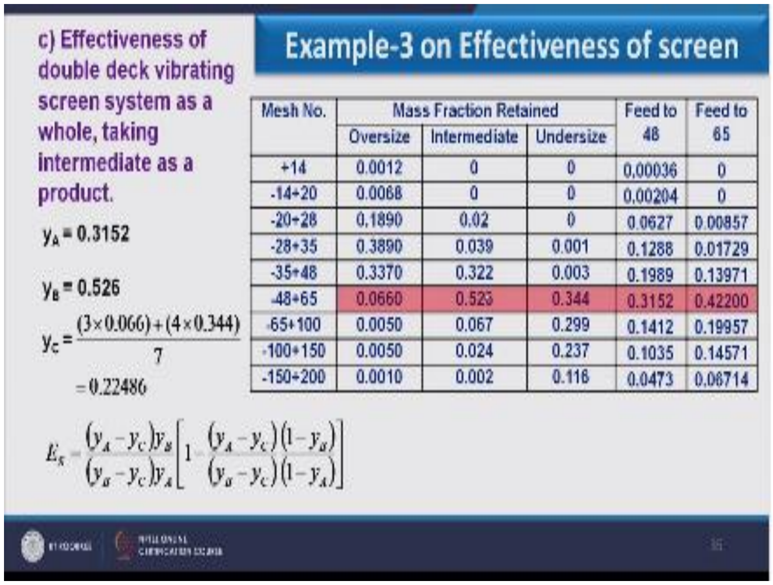

So y_A is the desired material in feed which comes out 0.3152 y_B desired material in the product and intermediate is the product so point 5 to 6 and similarly y_C how we can compute y_C because if I am considering intermediate as a desired product so oversize as well as undersize both would be rejected.

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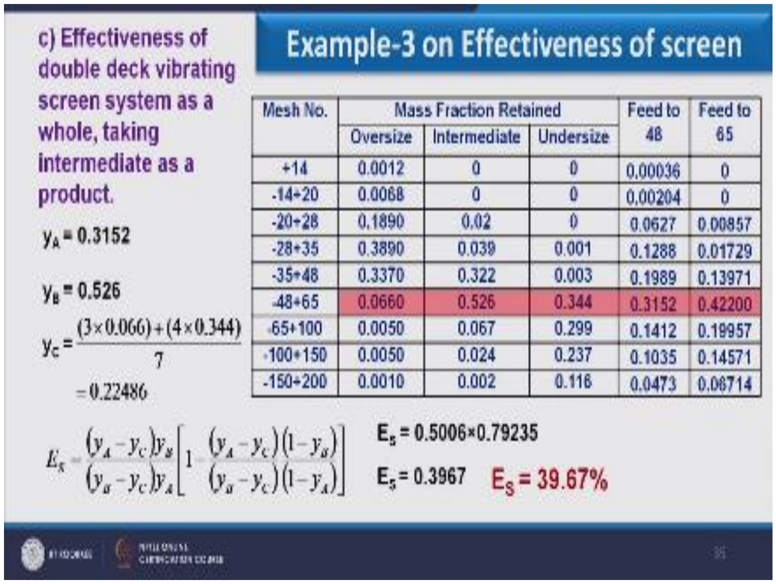

And this its ratio is 3:1 so 3into .066 + 4 in 2.344/7. So 0.22486 is the value of y_C considering y_A, y_B, y_C in this expression I can calculate the effectiveness of double deck screen which is 48 as well as 65, so if you consider the double deck screen its efficiency is quite low in comparison to individual screen or 48 as well as 65 and that is quite obvious because here I am having the hindrance at 2 screens instead of single screen so if I consider two screens the efficiency of.

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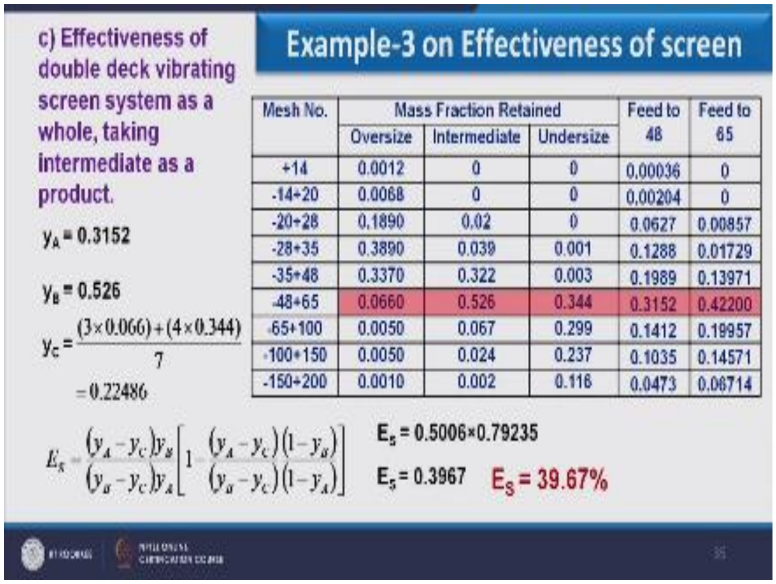

Both screen together would be lesser in comparison to.

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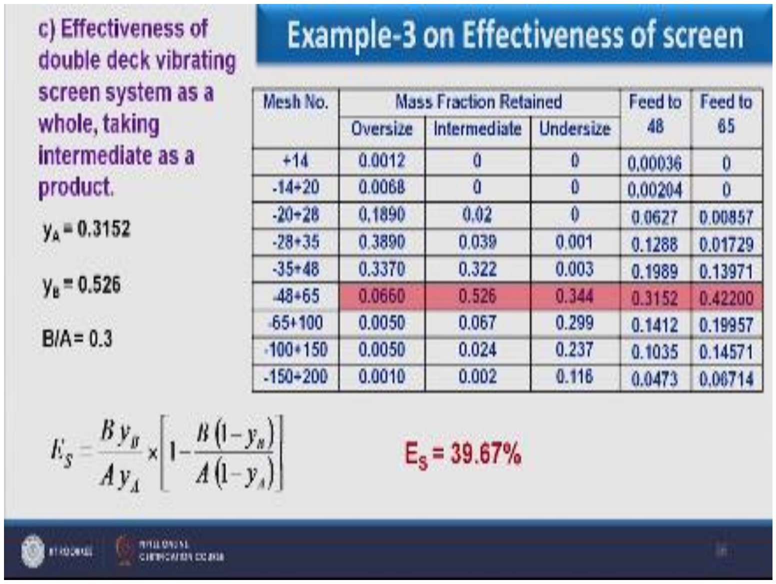

Effectiveness we have computed individually for these screens, so here in this part two of lecture two that is effectiveness of a screen I have considered three different example to illustrate how the competition of effectiveness of a screen will be done, now here I have the summary of the lecture two.

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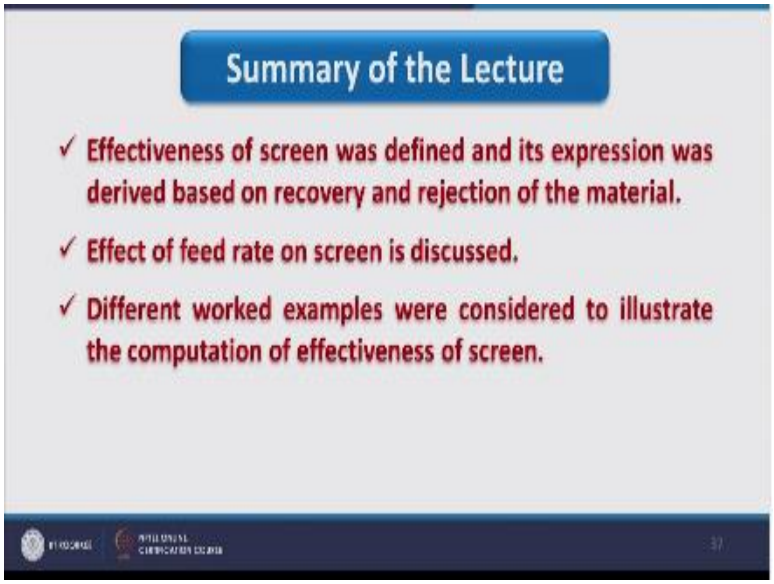

First is effectiveness of a screen was defined and its expression was derived based on recovery and rejection of the material, this we have covered in part one of lecture two, second I am having effect.

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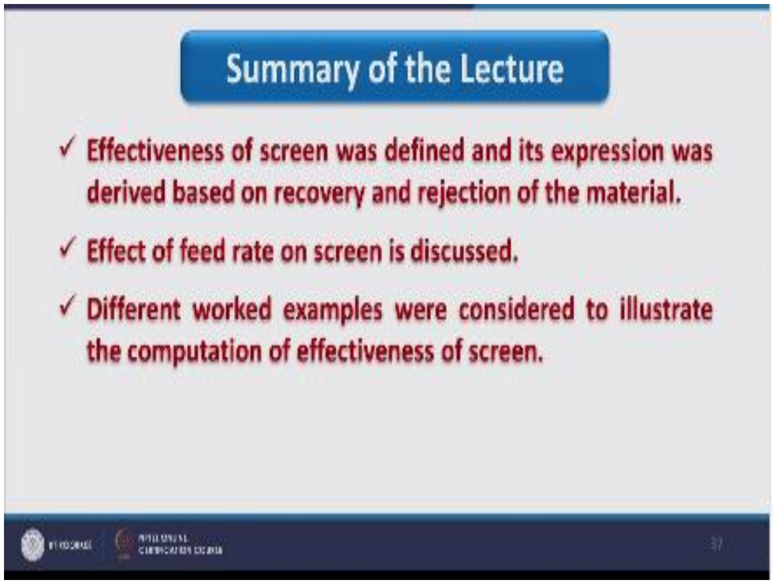

Of feed rate on the screen is discussed, that also I have covered in part one of lecture two.

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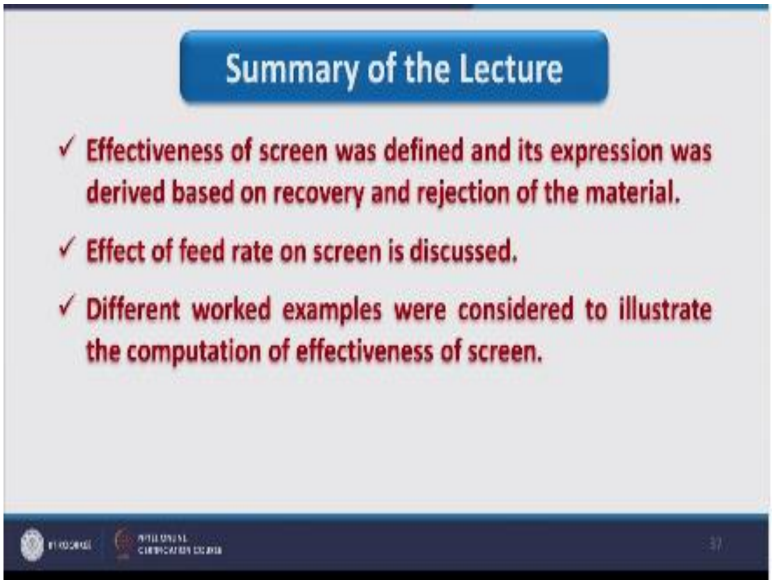

And finally we have discussed different work examples to illustrate the computation of effectiveness of a screen l so that is all for this particular lecture, that is lecture two and here.

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The references are you can refer this, so that is all for now, thank you.

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Acknowledgment

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