Introduction to Abrasive Machining and Finishing Processes

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Lecture- 04
Grinding/Cutting Fluids Emissions & Sustainable Grinding Process

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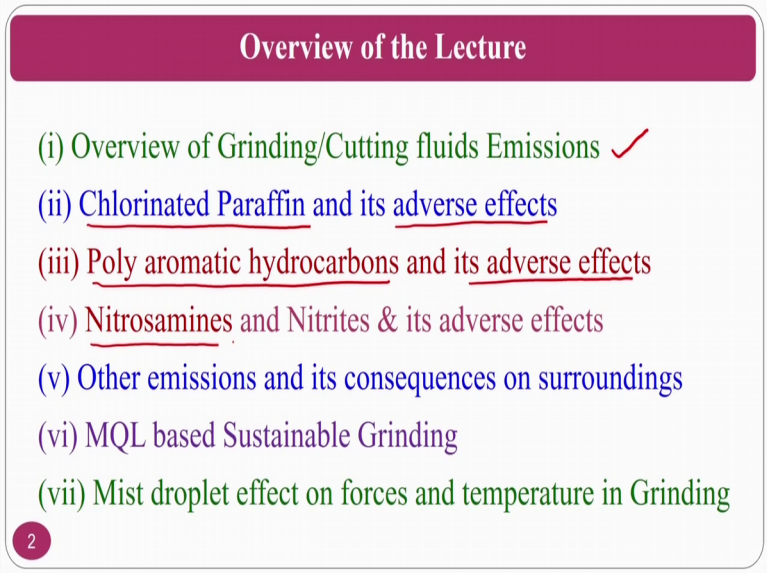

So, welcome to the class. Now, we are going to discuss about the grinding or the cutting fluids, which I have discussed in the previous class that the grinding fluids and cutting fluids both are same. If you are using the cutting fluids in a grinding application, normally it is called as a grinding fluid. If you are using the cutting fluid in a machining operation like a lathe, milling, it is called machining fluid or cutting fluid ok. What we are going to see in this particular class is the grinding fluid emissions, basically and sustainable grinding process.

In the previous class, we also saw thus glimpse of negative effects. How it is going to affect the operator, how it is going to affect the soil, how it is going to affect the water bodies, and many more. So, elaboratively we will see in this particular class, and what is a solution for it ok. If there is a problem, we are here as an engineer to show some solution for it ok. In this particular class, we will see what are the emissions that are takes place, that are comes out from the machining or the grinding zone, and how to overcome this type of problems.

So, overview of this lecture, overview of grinding, cutting fluid emissions, what are the emissions and possible consequences. Some of the important chemicals or the emissions that are is chlorinated paraffins and its adverse effects. The other one is poly aromatic hydrocarbons and what are these adverse effects. The third one is nitrosamines and nitrites and what are these adverse effects.

The other emissions and its consequences on system as well as surroundings, we will also see and MQL based sustainable grinding. How the droplets are generated, what is a contact area, how this mist is going to take out by forcefully the temperature in the grinding region it is called forced convection. What mean by free convection, and other things. What is the mist droplet effect on the cutting forces as well as temperature in the grinding process that all, we will see in this particular class.

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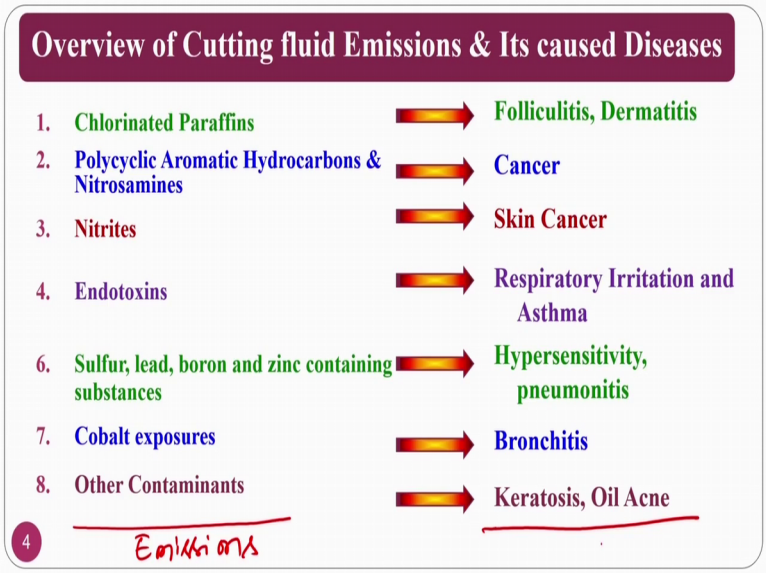

The cutting fluid emissions. The overview of cutting fluid emissions, if you see, as I said the first and foremost one is chlorinated paraffins, this is the one of the highest emission that is taking place in the machining arena or the grinding arena. Second one is poly aromatic hydrocarbons and nitrosamines, nitrites, endotoxins, sulphur, lead, boron zinc containing substances, cobalt exposures. Normally cobalt exposures are confined to the metal cutting, where tungsten carbide based tools are used. If the similar things are normally tool and cutter grinders, whenever you use the grinding process for cutting or giving some angles to the tungsten carbide cutting tools this will come.

And other contaminants ok. So, what are the consequences if you see the consequences or the diseases that it, it is causes chlorinated paraffins causes folliculitis, dermatitis. Poly aromatic hydrocarbons and nitrosamines causes cancer. Nitrites will causes skin cancer. Endotoxins causes respiratory irritation and asthma, which is one of the highest in terms of work force.

And the sulphur, lead, boron zinc containing substances causes hypersensitivity, pneumatics. Cobalt exposure normally leads to the bronchitis. And other contaminants, which will see will causes keratosis and oil acne. These are the diseases or the consequences that are because of these emissions. These are the emissions. These are the possible diseases ok. Consequences are possible diseases ok.

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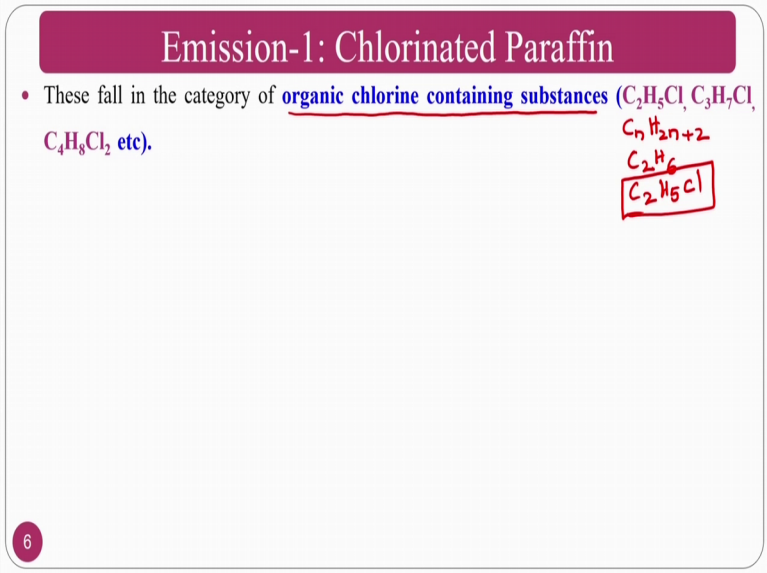

The first one chlorinated paraffin. The chlorinated paraffin first you should understand, what is a chlorinated paraffin. Then we will go ahead with what are these consequences ok. In that circumstances these chlorinated paraffins fall in the category of organic chlorine containing substances. Normally people you might have studied, you know your intermediate or 10th class or in the early stages of your bachelors, alkanes alkenes and alkynes carbon and its compounds, where alkanes refers to C n H 2 n plus 2. Alkenes represent to C n H 2 n. And alkynes represent to C n H 2 n minus 2.

In this category alkanes C n H 2 n plus 2, where C n assume that C n H 2 n plus 2 ok. So, it will like C 2 H 6 ok, instead of these what will happen C 2 H 5 1 hydrogen is replaced

by chlorine. These are nothing but the organic chlorine containing substances ok. So, these are the alkanes type of things, where one of the hydrogen is replaced by the chlorine.

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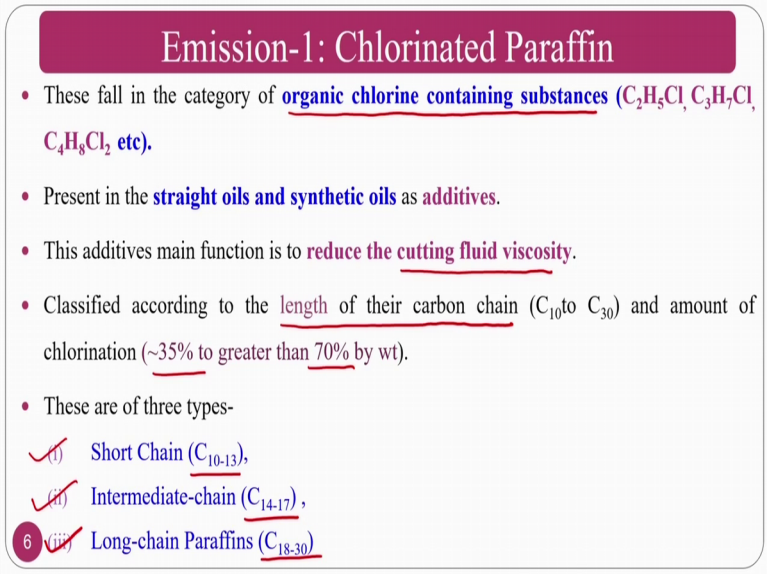

The present in straight oils and synthetic oils straight oil means have a big chain, where the branches are very less. And in these type of things additives main function is to reduce the cutting fluid viscosity. Normally if the cutting fluid viscosity is less, what will happen? If a grinding wheel is there, assume that grinding wheel is rotating. And I have a microns gap, assume that the depth of cut is given is two microns or five microns. Depth of cut is very very less.

If my cutting fluid is like honey, it cannot penetrate. If I cutting fluid is like water, it can penetrate, because why, because the cutting fluid is low viscous in terms of water, but in terms of honey, it is not low viscous. That is why you need to use certain additives where the viscosity of your cutting fluid will goes down, that means that it can freely flow by the virtue of capillary action or some other action. That is why, this whenever you add some additives to reduce the viscosity of cutting fluid; this will emit the chlorinated paraffins.

The classified according to the length of their carbon chain, basically this chlorinated paraffins ranges from C 10 to C 30 ok. And the amount of chlorination is 35 percent to 75 percent by weight. These are three types basically. One is a short chain, another one is

intermediate-chain, and long-chain. Simply you can see there if it is the chain or the carbon chain is between 10 to 13, it calls as a short chain. 14 to 17 it is intermediate. And above 17 that is 18 to 30 normally these are all long- chain paraffins.

This is about the chlorinated paraffin as such. How it is come into picture, whenever you add a low viscous additive or if I all I want to make a cutting fluid low viscous, you have to add some additive. This additive indirectly enhances the mechanical performance from the point of tribological action that is a positive factor from the negative factor. What is its going to do is, it is going to give the emissions like chlorinated paraffins ok. These chlorinated paraffins, how these are going to affect the human or the operator.

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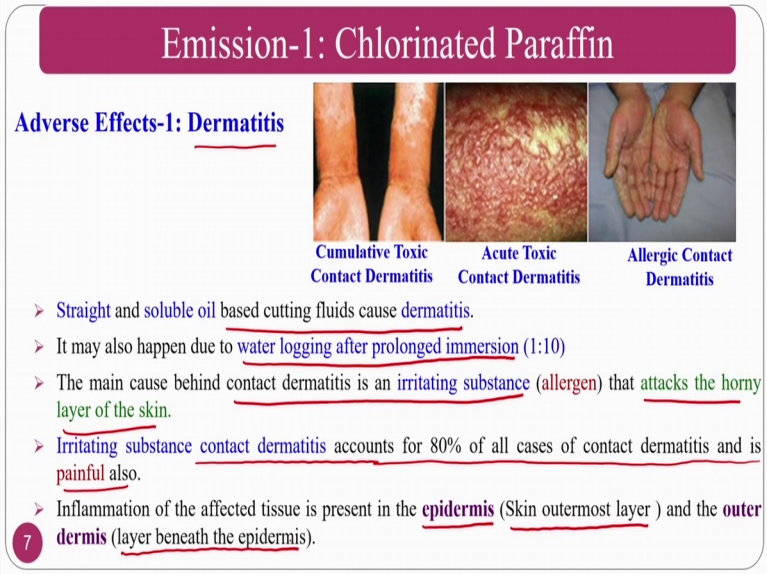

The first effect is dermatitis, this is called contact dermatitis. Whenever the grinding process is going on, what will happen this cutting fluid or when the cutting fluid falls on the grinding region, where the work piece and grinding wheel is contacting, temperature is very high, thermal cracking will takes place at the same time this fluid will flash, because of the grinding action on to the operator ok.

In that circumstances the dermatitis will come. Straight and soluble oil based cutting fluid fluids causes the dermatitis. And this also happen due to water logging after prolonged immersion. Normally your cutting fluids whenever you use, you will use one litre of cutting fluid with respect to ten litres of water. So, you have water in it in a major amount in that circumstances if you are keeping, these particular normally, if you see

some of the laboratories, what they people will do is just the cutting fluid tank will be filled.

This week they have experiment, next week they have experiment so on, because it is not regularly operating. In that circumstances what will happen semester, they may operate ten times the next semester. So, it is staying for a prolong time, which causes this problem ok.

The main cause behind contact dermatitis is irritating substance, which is called allergen. Normally you people will get oh that person got allergy, this person got allergy. What will happen, whenever you have allergy, you will get pain at the same time, you will get other things also. The changes on your skin will takes place that attacks the horny layer of the skin. You can see the horny layer of the skin in the three pictures.

The irritating substance contact dermatitis accounts for 80 percent of all the cases in the contact dermatitis and this also painful. The inflammation affected tissue is present is epidermis, which is nothing but the skin outermost layer, and outer dermis the layer beneath the epidermis. Now, we will come into the pictures that are say. The first one is cumulative toxic contact dermatitis, it is comes as a contact dermatitis. What will happen, this chlorinated paraffins whenever it falls, what will happen it causes allergy that is called acute toxic contact dermatitis, allergic contact dermatitis.

The most of the dermatitis in this particular chlorinated paraffins is contact dermatitis ok. What will happen, whenever it falls on the surface, it causes allergy and it causes the epidermis that is nothing but the outer layer. This is the outer layer, this outer layer causes the allergy and its also causes some allergy to the layer beneath the epidermis that is called outer dermis that means, assume that your skin has six layers of different, different layers.

The outside layer is epidermis this will also affect, at the same time second layer from the top is outer dermis that will also affect, that is why this is called as contact dermatitis, because directly the chlorinated paraffins comes and contact to the surface of your skin.

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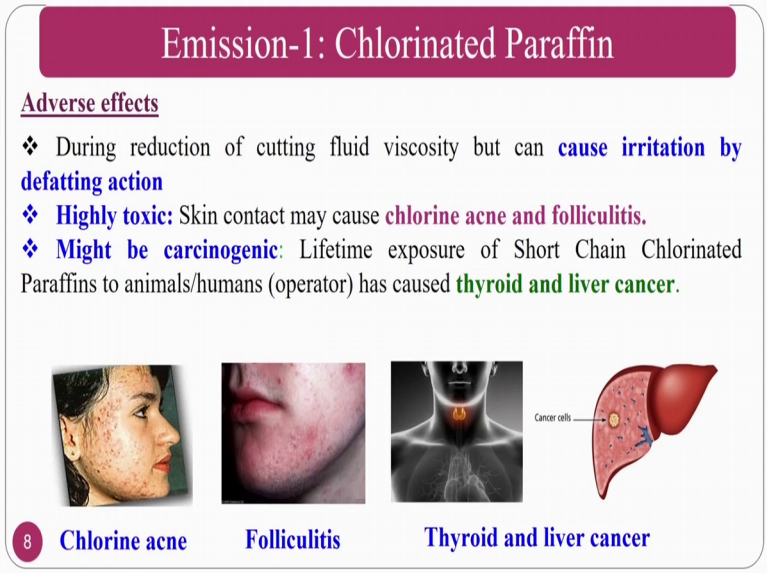

The adverse effects follows like this the chlorinated paraffins also causes other adverse effects. During the reduction of cutting fluid viscosity, but also cause irritation by defatting action so, defatting action means, what will happen dehydration is a common word people will oh this is some are people are going out, and you will get dehydrated that means, that water is going off defatting.

The defatting action means it is breaking the fat. Whenever that the cutting fluid falls in a high temperature region because of the temperature or because of the other things. What will happen, it breaks the bonding, so that is how the fats. There are unsaturated hydrocarbons, double bond, triple bond these are unsaturated one. These are ready to break if there is a some external energy, it will try to break. In that circumstances, the defatting will takes place.

Highly toxic: skin contact may be, so these are chlorinated paraffins are highly toxic to the skin, which may causes the chlorine acne and folliculitis ok. The what you mean by the chlorine acne, the picture you can see here, this lady on the face it is chlorine acne. The picture is not taken from the cutting fluid emissions, but to explain you what is chlorine acne, we have taken this is also adverse effect from the point of swimming pools also. If the chlorine is not maintained properly in that circumstances, chlorine acne will come ok.

The folliculitis, is nothing but if the cutting fluid falls on the face or the hair of a operator, this cutting fluid by the virtue of gravity may enter into the pores, and it will cause the folliculitis. Wherever it goes there the hair would not grow that is improper growth of the hair on a human body is called folliculitis, might also be the carcinogenic that is life time exposure of short chain chlorinated paraffins to animals or the humans cause thyroid and lever cancers.

These are the thyroid and lever cancers will also come in to the picture. If small chain chlorinated paraffins are exposed for the long time, normally an operator operates in its government life or a life. Assume that a operator got the job at the age of 23 or 24. And is going to retire in the age of 60 or 65 that means that he is going to operate more than 30 years, which is a huge time. If he is not going to take the proper precautions, he may be experiences to the long time this emissions, which may causes lot of problems.

So, as an engineer, you have your responsibility to explain your staff that this is the right procedure, where the apron, where the gloves, where the mask, and you should protect your staff. It is not that a staff dies or something, whenever because of this emissions. It is the family that comes on road. So, you should be very careful about your staff's health and other things. The main motto of mine to explain you is this should be taken at most care ok. So, as an engineers, it is our primary responsibility not only give the profit to the company at the same time, it is our responsibility to take care about our staff.

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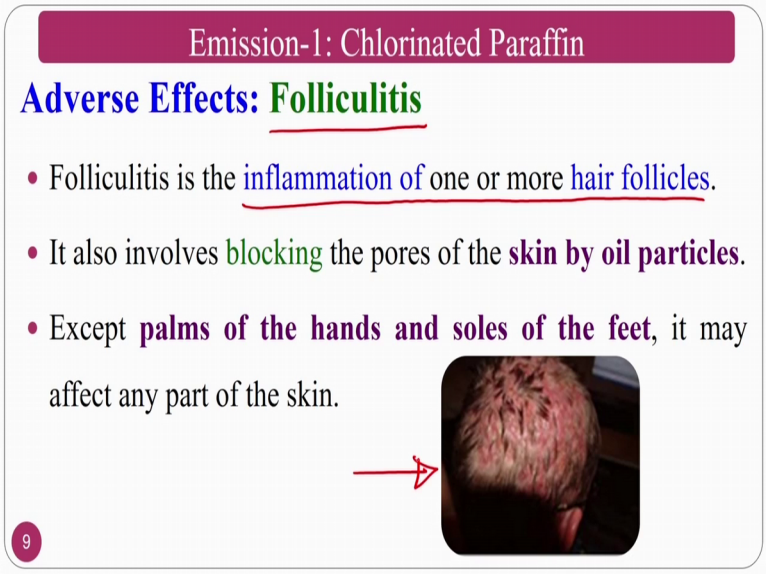

So, the adverse effect folliculitis chlorinated paraffins as I explained you, the folliculitis is nothing but the inflammation of one or more hair follicles whenever the operator is standing in front of the experiment. If there is a splashing of the cutting fluid at the grinding fluid because of the high speed of grinding wheel, what will happen it may fall on its skin, it may fall on his hair, and other things, what will happen wherever it falls, assume that operator is like this it fall on his head.

After sometime, you will stand like this because of the by virtue of the gravity goes to the pores. And wherever the pores are occupied by this cutting fluid their hair would not come. You can see here, on the head some places hair is there, some places hair is not there this is called as folliculitis. So, wherever the cutting fluid fall and occupied the wholes or the pores of the skin or head skin their hair would not grows.

This involves blocking of the pores of the skin by oil particles. So, this blocks the pores of the skin, so that hair would not grow. This in turn causes improper growth or irregular locational growth of hair that is called as folliculitis. Apart from palms of the hands at the same time soles of the feet, it may affect most of the skin. Even though, it may occur on your hands also, so that the hair would not grow at that locations.

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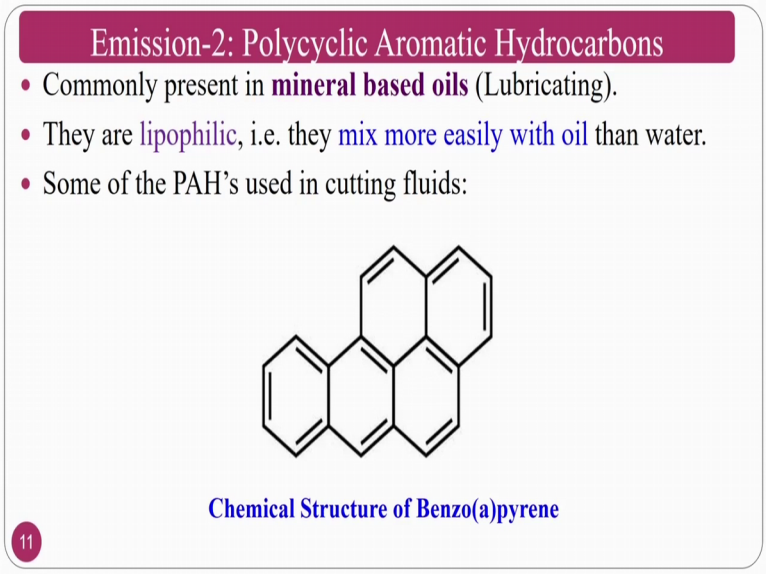

The second important emission is polycyclic aromatic hydrocarbons. The commonly present in the mineral oil based. This is a lubricating that means that it is a major component in the cutting fluid itself ok. These are lipophilic that means, that they are

mix easily with oil rather than water. Some of the PAH that is polycyclic aromatic hydrocarbons or Benzo a pyrene. You can whatever the structure that you are seeing here is a Benzo a pyrene. This is the one of the common example of PAH, whenever I use PAH, this stands for polycyclic aromatic hydrocarbons.

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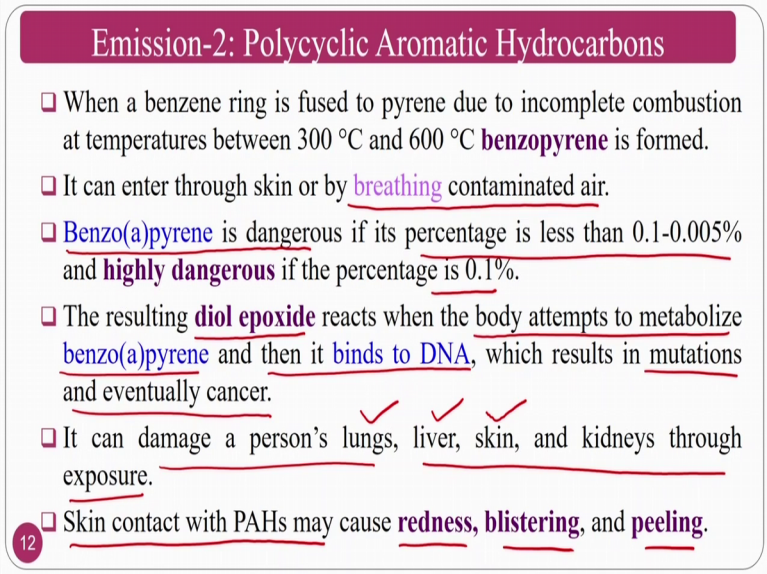

So, whatever you have seen the benzene rings in a previous one. What will happen here is, when the benzene ring fused to the pyrene due to incomplete combustion at temperatures below 300 to 600 the benzoapyrene is formed. What will happen is pyrene and benzene these are fused together you might ok. when this fuses, whenever there is a improper combustion.

If you see from the (Refer Time: 20:21) point of view, you also see there improper combustion leads to lot of smoke and other things. Why, the same thing will happen in the metal cutting also, because whenever you are going to do the cutting or the grinding the temperatures that you are going to expect is not that much high. At the same time the cutting fluid cannot penetrated to the deeper zone or the see (Refer Time: 20:45) zones of your cutting also.

In that circumstances, what will happen is the temperature is much much low from the contact region from the away from the contact region. In that circumstances, the basic problem is improper combustion if this improper combustion is taking place in the

grinding operation, and when the benzene thing and pyrene is fused together forms benzoapyrene.

This can enter through the breathing in the contaminated air. What will happen once a benzoapyrene is formed, because of the temperature that is in the grinding zone it will evaporate. This evaporation contains a benzoapyrene ring. This may directly go to the by falling on a skin, it will directly go through the skin. At the same time, it can also go through the respiratory system, when whenever it enters through the skin or through the breathing. What will happen, benzoapyrene is dangerous if the percentage is less than 0.1 to 0.005 and highly dangerous if the percentage is 0.1 ok.

So, this results in diol epoxide that reacts the body attempts to metabolize Benzo a pyrene and then binds to DNA, which results in mutations and eventually cancer that means, whenever this Benzo a pyrene enters into the body, what will happen, it will go and occupy the DNA. DNA is a most important part of your cells ok. So, if it covers that particular DNA of that particular cell, the controlling of the growth of that particular cell, which is originally controlled by the DNA. Now, it loses it capacity.

And releases or grows uncontrollable cells that is nothing but by action of mutations, and eventually you can call it as a cancer. Hope you might have understood this one ok. So, what I mean to say is the resulting diol epoxide, when reacts with when the body attempts to metabolize the Benzo a pyrene. What will happen, this chemical will go and binds the DNA as a cell. Assume that you have a cell. DNA is at the centre; it will goes and occupies the DNA.

DNA is the person. DNA is the thing, which is most important to control the cell growth. If this particular benzoapyrene goes and occupies that position, what will happen now cell do not have a control of the DNA. Now, the benzoapyrene will decide the cell growth. If benzoapyrene decide the cell growth how many it want, it can grow, grow, so that uncontrollable growth of cells is nothing but the cancer.

It can cause the damage to a person's lungs, liver, skin, kidneys through the exposure. If it is exposure through the breathing causes the lungs cancer, liver cancer. If it is exposures to the skin, it may causes the skin cancer. And if it can enter into the kidney, may damage the kidneys also, because it is a chemical. Once it enters into the body, it may go to the locations through the through the blood. The contact with PAH may causes

the redness, blistering, and peeling. Normally this also another effects, which causes redness that means, it becomes red blistering and other things peeling of the skin also will causes.

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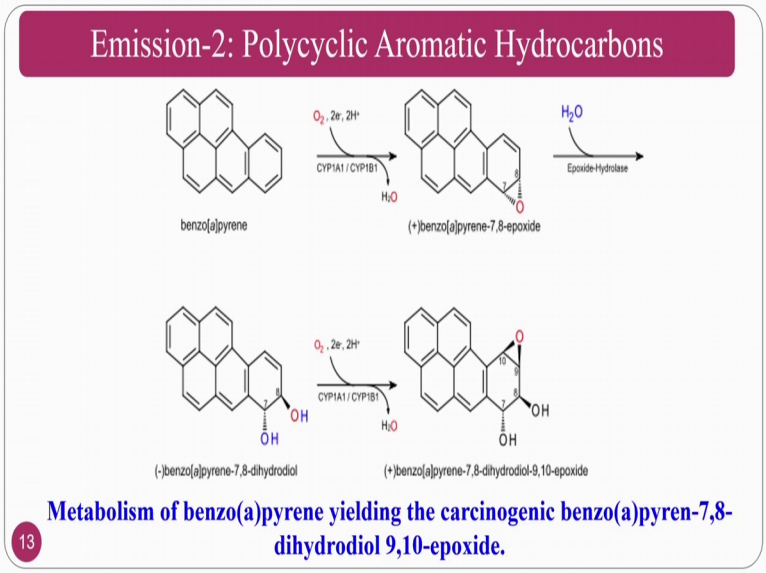

Poly aromatic hydrocarbons whatever you have seen in the previous one that the same thing is explained here in a schematic way that is benzoapyrene, whenever it will try enter into the body, what will happen, you have oxygen and water your body. If you see the advertisements or acquaguard or something acquaguard kent other water purifying systems you say, they will say that you are 73 percent of your body is water that means, that you have abundant oxygen, you have abundant water.

Whenever benzoapyrene will react with oxygen, and releases water and forms benzoapyrene 7, 8 epoxide. Whenever it reacts with a water content in your body, what will happen benzoapyrene 7, 8 diol. And whenever again it will react with the oxygen that is available inside the body, it will form a benzoapyrene 7, 8, dihydrodiol 9, 8 epoxide.

This is a thing that causes the cancer ok. What it is doing is, it is doing the metabolism inside by reacting the water, by reacting the with the oxygen. And it binds to the DNA and takes a control of the cell growth in to the hands of this benzoapyrene, which is converted into Benzo a pyrene 7, 8 dihydrodiol, 9, 10 epoxide. Then it will enormous growth of cells will takes place and causes the cancer.

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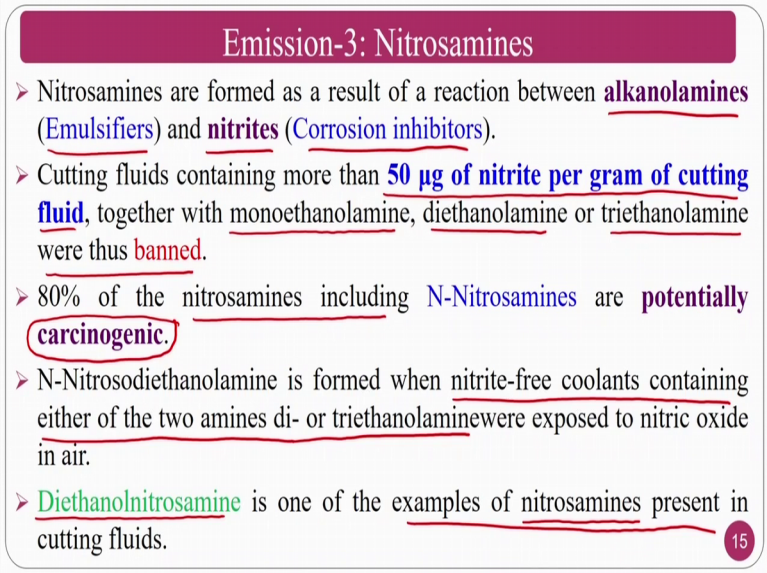

The third one is nitrosamines. The nitrosamines are formed as a result of reaction between alkanolamines as well as which are nothing but the emulsifiers and surfactants and nitrites, which are corrosion inhibitors. So, from the positive point of view, you required corrosion inhibitors or rust inhibitors, which we have seen in the previous class. At the same time emulsifiers are required to make a uniform emulsions.

The cutting fluid containing more than 50 micrograms of nitrite per gram of the cutting fluid, together with monoethanolamine, diethanolamine or triethanolamine were banned ok. The 80 percent of nitrosamines including N-nitrosamines are potentially carcinogenic that means, that these are very dangerous from the point of causing the cancer. N-nitrosodiethanolamine is formed when the nitrite-free coolant containing either of the two amines that is di or triethanolamine were exposed to the nitric oxide in the air.

diethanolnitrosamine is one of the examples of nitrosamines present in the cutting fluid ok. This is carcinogenic that means, that if it enters into the human body that is operators body, it creates the cancer, that is means this are carcinogenic that means, it causes the cancer.

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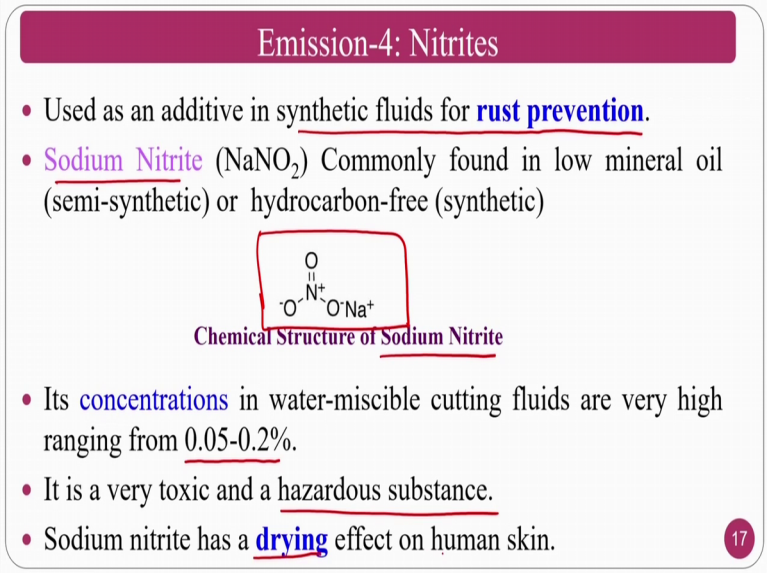

The nitrites is the another one example of the emissions. This is used as say in synthetic cutting fluids as a rust prevention, at this rust inhibitor or corrosion inhibitor. The sodium nitrite is commonly found in low mineral oil or the hydrocarbon-free synthetic oils. Chemical structure of sodium nitrite is shown here; in this picture you can clearly see that. And it concentration in water-miscible cutting fluids are very high ranging from 0.05 to 0.2 percentage.

And it is very toxic and hazardous substance. And the sodium nitrite is drying effect on a human skin. Whenever it falls because of the rotation of the grinding wheel, if the splashing occur, and it falls on the skin of a hand, and something. What will happen, it will make the skin dry. You might have seen in the advertisement, what is a drying effect, if it is dry, but there will be a problem of cracking, bleeding, and other things will come.

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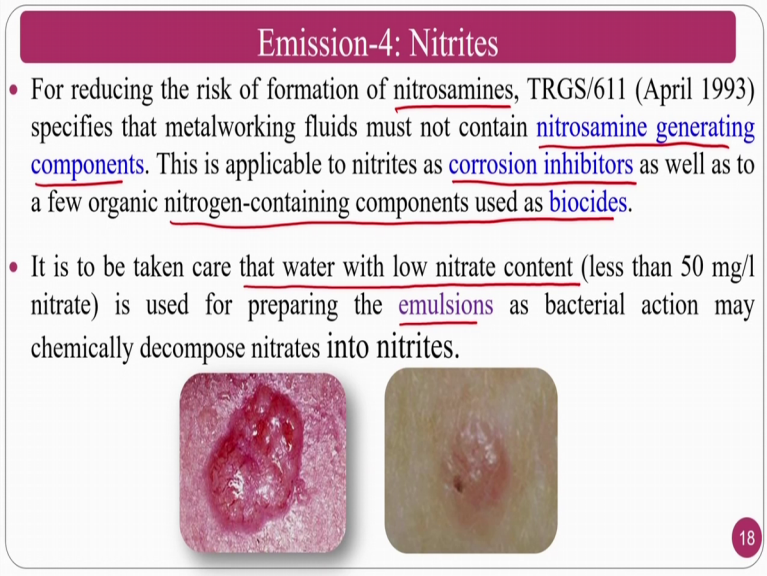

So, nitrites for reducing the risk of formation of nitrosamines the specifically metalworking fluid must not contain nitrosamine generating components. This applicable to nitrites as a corrosion inhibitors as well as to few organic nitrogen-containing components are nothing but the biocides. These are all in terms of this these will be there in terms of the rust inhibitors as well as biocides. Whenever you are adding this type of additives to the cutting fluid, you should choose that there should not be any nitrites generation ok. If you can take care that means, that it would not releases the nitrites.

Whenever you are applying to the machine regime, this will be taken care that the water with low nitrate content that is less than 50 milligram per litre nitrite is used for preparing the emulsions as a bacterial action may be chemically decompose nitrites nitrates into nitrites ok. The as I said this is carcinogenic, it causes the skin cancer mostly whenever it falls on to the skin of an operator.

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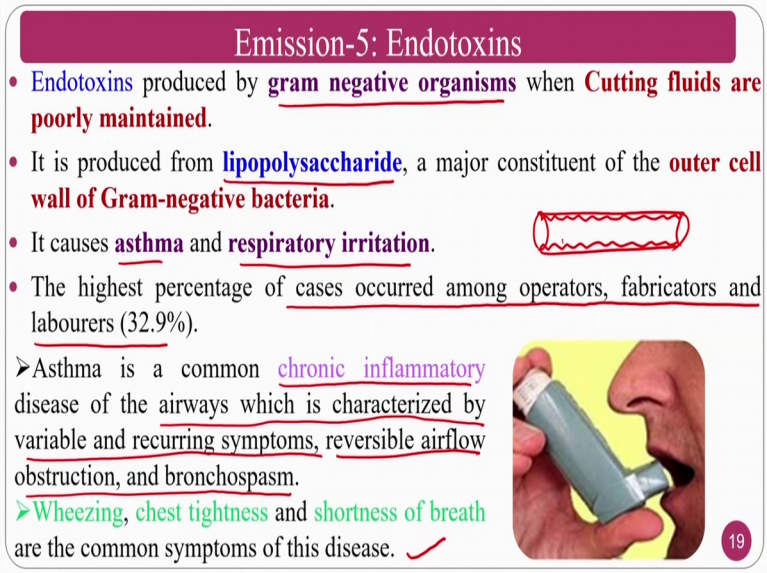

Endotoxins, endotoxins are produced by the gram negative organisms when the cutting fluids are purely maintained that means, that as I said in the laboratories, where if you are not using frequently the cutting fluids, what will happen is that this cutting fluids are used for a semester or a two semester that means, that if you are not replacing or you are not changing the cutting fluid. This gram negative organisms like bacteria, fungus these are all things will grow.

It is produced from lipopolysaccharide, a major constituent of outer cell of wall gram-negative bacteria. And this causes asthma and a respiratory irritation. Asthma and respiratory irritations are the common problems that you can come across in the most of the manufacturing workers in the industries ok. The highest percentage of cases occurred among the operators, and fabricators in the laboratory people that is approximately 32.9 people. You can see this type of respiratory problems majorly in the staff because of endotoxins.

Asthma is a common chronic inflammatory disease that airways which are characterised by the variable, recurring symptoms, reversible airflow obstruction, and bronchospasm. So, wheezing and chest tightness and shortness of the breath are common symptoms of this disease, as I said it is one of the breathing problem. Asthma and other breathing problems will occur, whenever there is a emission of endotoxin in the machining region

or a grinding region. If it is breath, what will happen your air passages, assume that I have a cylinder.

This is where if there is the diameter is going to reduce, what will happen is going to takes place, this is what the is going to takes place, it will narrow down and causes the wheezing action lot of sound, short breath. You cannot breath more ok. And these are the common problem, and this is the biggest problem among the fraternity of the manufacturing staff. So, as a manufacturing engineer you should provide them the mask, so that the endotoxins cannot enter or you can reduce the possibility of endotoxins entering through the mouth or through the nose.

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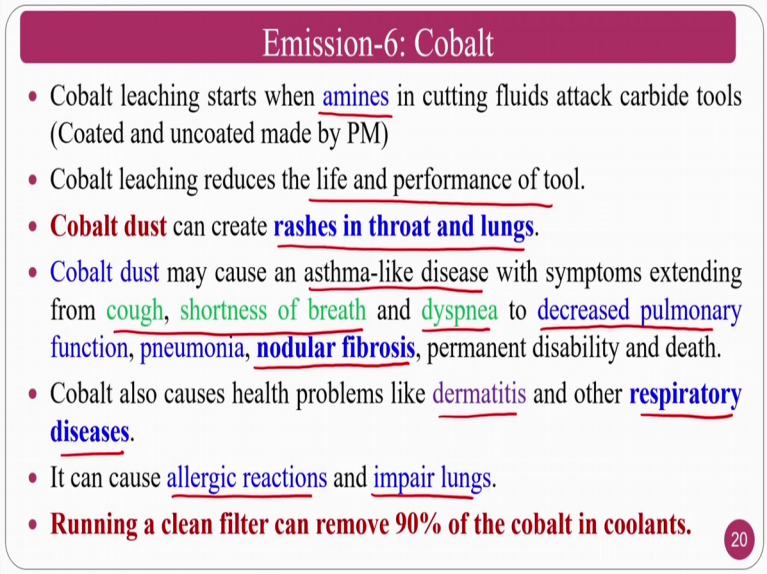

The cobalt as I said cobalt in a single point cutting tool, you will use as a tool that is tungsten carbide tools, where tungsten will be there, and cobalt will be there. In a tool and cutter grinder as per the abrasive process concern, whenever you are using the grinding wheel for the tool and cutter grinder in that circumstances, when the amines of the cutting fluid attacks the tungsten carbide work pieces, where you are grinding to provide certain angles this cobalt leaching will takes place.

So, you know the tungsten carbide or some other powder metallurgical root manufactured tools will have cobalt. You have a cobalt as a binder, you have a tungsten carbide or tantalum carbide what are the things tools, if at all you want to manufacture,

you manufacture mostly by the powder metallurgy tool. And if at all I want to generate some angles, you have to go for tool and cutter grinder.

Whenever you do it, what will happen, if you use a cutting fluid, which contains amine groups. In that circumstances, the cobalt will leach whenever the cobalt will leach, the basic problem is mechanically, it loses. It performance at the same time, it will leach and causes lot of problems to the operator.

Cobalt leaching reduces the life and performance of the tool. If you are making a tungsten carbide single point cutting tool, the cobalt dust creates a rashes in throat; throat and lungs. And cobalt dust may cause asthma-like disease and symptoms extending from cough, shortness of the breath decreased pulmonary function, pneumonia, nodular fibrosis, these are all the things that will causes.

Cobalt also causes health problems like dermatitis and a respiratory diseases. It can cause allergic reactions and impair lungs because of the respiratory problems you may get lot of problems. Running the clean filter can avoid the 90 percent of cobalt contaminants ok. You have to run the filter, so that these particles or the micron size particles will be filtered out, so that it would not come in the next go of the cutting fluid action.

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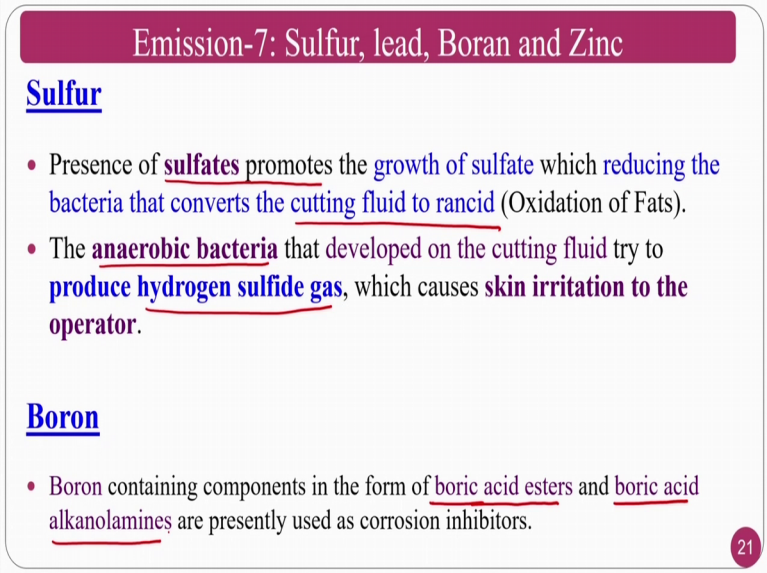

Sulphur, lead, boron and zinc, these are the other emissions. Presence of sulphates promotes the growth of sulphate and reducing bacteria that converts into the cutting fluid

into rancid. Normally these are all biocides. Anaerobic bacteria that developed on the cutting fluid try to produce hydrogen sulfide gas, which results in skin irritation. Normally the sulphur and this things causes the skin irritation to the operator.

The boron, boron containing components in the form of boric acid esters or boric acid alkanolamines, boric acid alkanolamines are presently used as a corrosion inhibitors. And this causes some problems to the operator.

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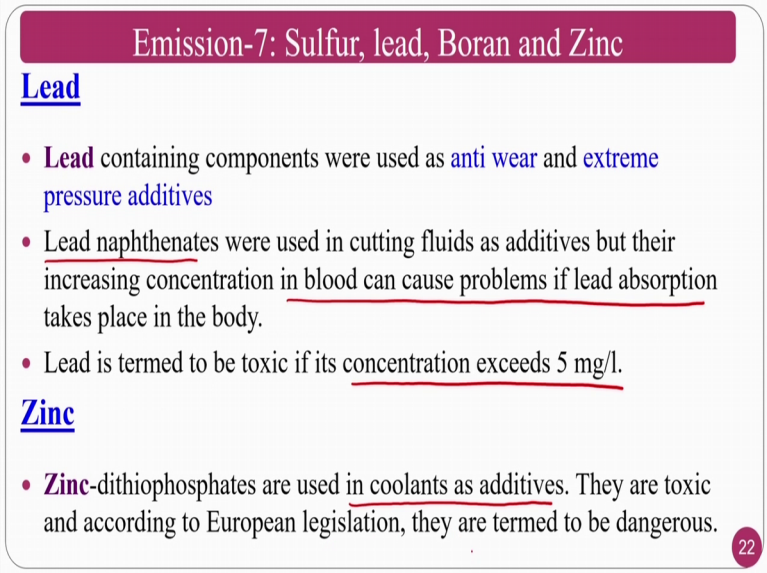

Lead, lead containing components were used as anti wear and extreme pressure additives. Basically lead is a low shear stress material. You can use as a lubricant material. In that circumstances, what will happen, if you use the tool wear, other things will be reduced, but it has a adverse effect. Lead naphthenates were used to in the cutting fluid as a additives but their increasing concentration in the blood can causes a problems. If the lead absorption takes place, then it causes lot of problems of the blood. And it is termed as a toxic its the concentration levels exceed 5 milligrams per litre ok. So, it causes lot of problems to the human or the operator.

Now, the zinc as such it is a good. If it is within the limits in the body of a human, but zinc dithiophosphates are used in coolants as additives. They are toxic and according to European legislation, they are termed as dangerous ok. You should avoid zinc, lead, sulphur containing substances as additives, that is the main motto of these particular slides.

The main motto of this small emissions like lead, zinc, boron, sulphur, you have to avoid these chemicals as much as possible, so that or you should use within the required limit or specified limits by the health organisations, so that you can give you a better life to the operators. This is about do the system, how the system will face a problem ok. Now, system means operator and operator friends who are standing adjacent to him.

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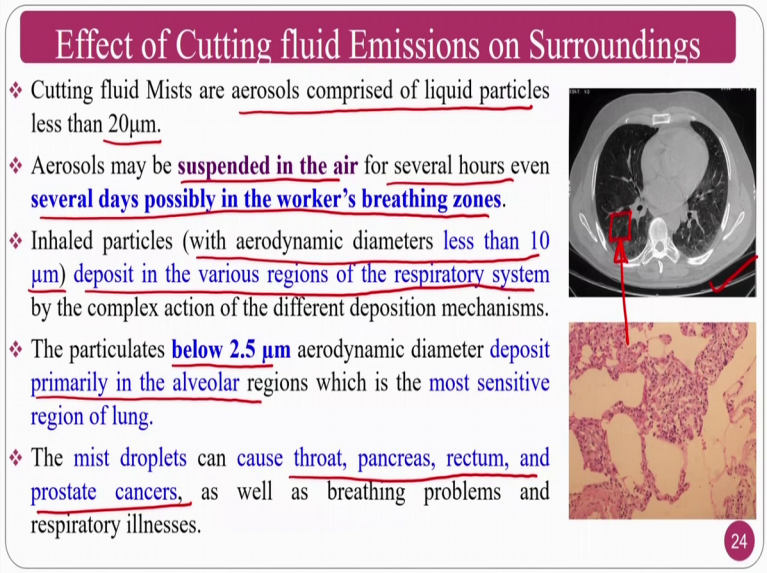

So, now we move to the surroundings. How the cutting fluid emissions will create problem to the surroundings. The cutting fluid emissions to the surroundings, cutting fluid mist are aerosols comprised of liquid particles less than 20 microns. Aerosols may be suspended in the air. Normally these are low density particles, and very very tiny particles. So, these are all will stay in the air several hours and even several days possibly in the breathing zone. If it is breathing inside a human or a operator what will happen, it will stay there itself.

So, inhaled particles. What I mean to say is that whenever this particles goes out through the exact thing, and it will stay in the atmospheric surrounding atmosphere. And the people who are nearby they may breath it ok inhaled particles with aerodynamic diameter less than 10 microns deposit in various regions of the respiratory system by the complex action of deposition mechanisms.

At the same time particles below 2.5 micron aerodynamic diameter deposit with primarily in the alveolar region and most sensitive part of the lungs ok. So, normally a

person can breathe a 10 micron particles in the air. If the aerosols of cutting fluid emissions, if the particle size is 10 microns you your nose can breathe it, but it may not enter into the alveolar region. But, if the particle size is 2.5 microns, it can enter into the alveolar region ok. This is a city scan of the lungs.

And the if you see zoomed version of this one, this is how it will affect the lungs region. The mist droplets can cause the throat, pancreas, rectum, and prostate cancers, as well as breathing problems and respiratory illness.

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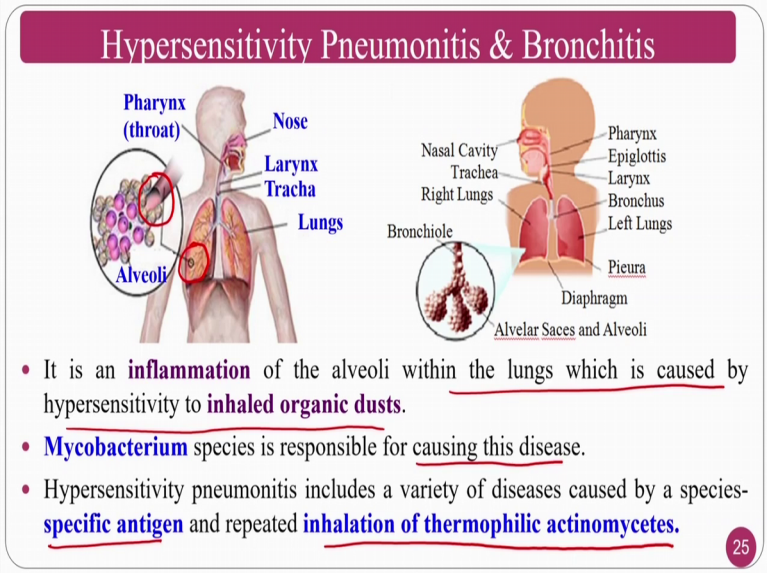

As I said 2.5 microns will enter into the alveolar region the alveolar region is nothing but this region. Where it looks like a nerves and other things, this is a small opening. If your 2.5 microns will go and block this particular portions, then so you will face lot of problems with the breathing. It is an inflammation of alveolar region with the lungs which is caused by the hypersensitivity and inhaled organic dust, which particle size is less than two point micro 2.5 microns.

Mycobacterium species are responsible for causing this diseases. And hypersensitivity pneumatics include variety of diseases caused by the specific allergen and inhale the thermophilic and actinomycetes ok. So, what I mean to say is please provide the mask to the operator, so that 2.5 microns, 10 microns below this should not enter into the lungs. And if it is entered, then it is problem. So, as an engineer, again and again I am

emphasising you should take care about your company, but from the profits point of view. At the same time, you should also give importance to the operators life also.

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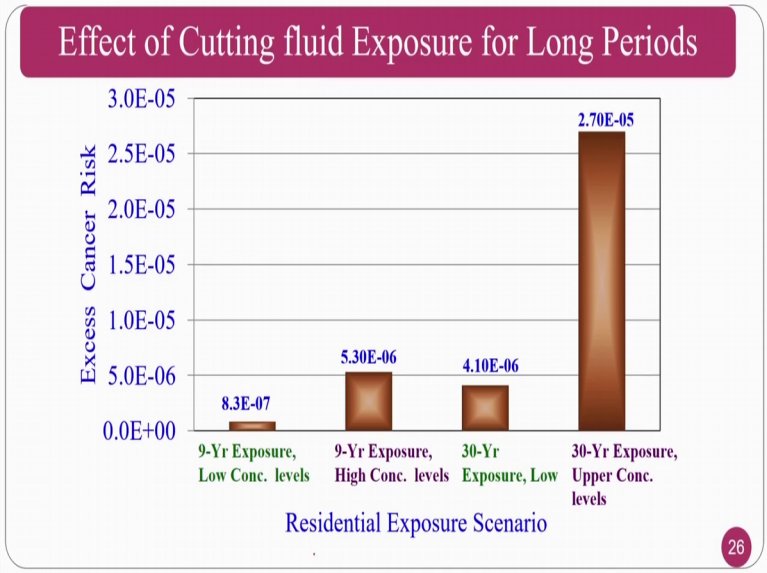

If you see residential exposure scenario all the company, now a days companies are constructing outsides of the cities. In olden days outside cities the people have constructed the companies. Now, the cities are expanding. So, the company adjacent to the locality ok. In this circumstances, what will happen residential exposure scenario. If it is 9 years exposure with low concentration levels of this exposures, what will happen this is the cancer risk.

And if you are high concentrations for 9 years, what will happen this is the risk. And 30 years exposure, normally this is a risk. And if you the person is exposed or the locality is exposed higher concentrations for 30 years, you can see enormous increase of cancer risk ok. So, the people should be aware if you are nearby the industries emissions, what are the emissions, what are the problems, so that you should take care about your locality or if not you should take care about your home ok.

Adjacent to many educational institutions, adjacent to many of the villages, adjacent to many of the cities, there are lot of companies are there. One should the company people should take self responsibility you should clean it, and you emit it. There is no problem; you should be take care about the surrounding people also.

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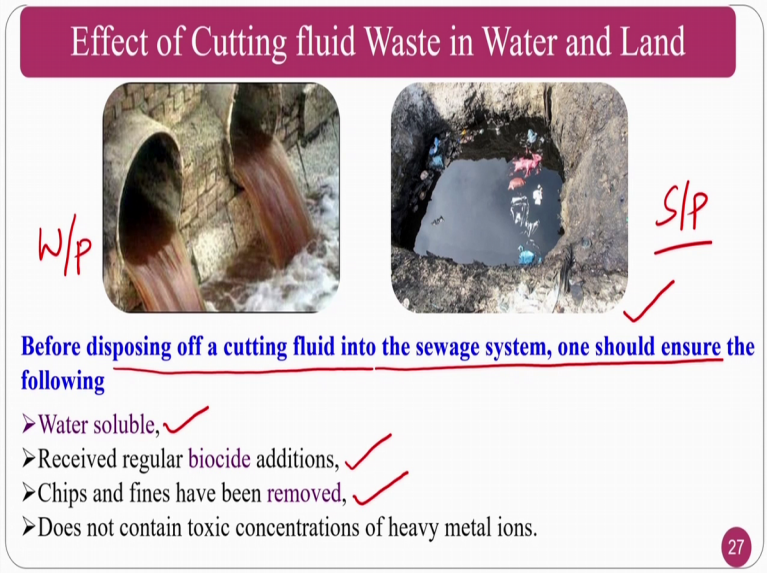

If you use again and again and again, white cutting fluid will become brown. Then it will become black, then what the people will do is the first and foremost thing what they will do is they just connect a pipeline, and throw into the water bodies nearby ok. Many of the people survives on the fishes. Some of the countries the main food will be fishes. So, if the cutting fluid is dumped, what will happen the fishes or the ecological system of the rivers, seas will damage. At the same time other people they will do is just they will dig a hole on the corner of a company. And they will dump into it; this causes the soil pollution ok.

The first one is water pollution. Another one is soil pollution ok. So, this two also not good before you release into the river or a water body you treat the cutting fluid, so that the ecological system should be good ok. So, at the same time, soil pollution also you should take care, because nearby agriculture land will be there, nearby some of the educational institutions will be there, villages will be there, you should be very careful ok.

Before disposing of the cutting fluid into the sewage system, one should ensure the following, whether it is a water soluble or not, whether received regular biocides additions or not, because it will go, if the biocides are not there, there it will generate lot of organisms like bacteria, fungus, and other things.

And you should also check whether chip or fine particles like in a grinding process abrasive particles are embedded on it. Assume that a fishes are there or some living organisms in a river. If it eats chips, what will happen, it will cut the throat and different organs of the fish, and they will die. So, you should be take care you should be given utmost priority, before you release into the system.

Does it contains any toxic concentrations or heavy metal ions, so that the organisms, which are there in the river body or the sea should not die ok. The so this is about the emissions. Emissions occurred equal importance compare to the performance. The people always look at the performance, but they do not look at the ecological aspects. If a operator dies, manager thinks that his son will come, he dies, his grandson will come like that that should trend should go off ok. What I mean to say is please give importance to the operator. Operator, you love the operator, and he will in turn give you a good output, so that the company will go in a positive direction.