Building Materials II

Lecture 11

Protective Coatings

When we talked about protective coatings or paint plot of techniques or jargons are thrown around like paints, varnishes varnish, primer, distemper, and enamel. What are all these? All these are type of protective coats. While we saw pains in the earlier lecture, paint are non-transparent and colored coating. While varnishes are transparent and do not have any color, they might give a little bit of a dark reddish or brownish or a yellowish thin skin to the final product. But then they don't have any color on their own. Primer is the first coating applied to the surface in Order to enhance the adhesion of the final paint or top coat and to seal the substrate surface. Primer may be formulated to import additional protection to the substrate. While enamel is a hard protective coating with glossy finish. We can use enamel for metals woods and even walls. When using woods, since enamel uses a solid color you won't be able to see the natural grains of the wood while in varnish you can see that. Distemper is a paint again, it is usually available in powdered form, and it is most widely used type of wall paint nowadays. Let's see primer. What is primer? Primer or under coat is a preparatory coating put on materials before painting. Primer not only prepared the surface to be painted on, it also increases the absorption of the surface, so that it absorbs the coating, so the subsequent coating is properly maintained, the final painted product has good durability and strength. Now why do we need primer? Primer ensures better adhesion to the paint off the surface it increases the paint durability, provides additional protection for the material to be painted, usually primers composition areas. Follows it has 20 to 30% synthetic resin. It has 60 to 80% solvent and 2 to 5% of additive agent. Some primer contains polyethylene plastic for better durability. Do not underestimate the importance of primer. A primer prepares the surface for the finish coat. It is sometimes impossible to achieve satisfactory results without first priming. Primers do not need to be engineered to have durable finished surfaces because they are instead engineer to have crude filling and binding properties with materials underneath. We should always use primer on these types of surfaces. The following types of surfaces. Raw wood the primer seals the best resins you should definitely use primers on rod drywall, drywall means gypsum board drywall, primer seeps into the paper and provides a smooth paint surface. A better adhesion for final coat. You should use primer for patch walls, raw metals, rough surfaces the primer will help make face smooth so that pain can be easily be apply on two surfaces. Finally primers must be used for stained surfaces. It sort of mask the stains to certain extent. Let's focus on primer for Woods:

It is very porous and it will observe the solvent from paint drying the paint prematurely. Several layers of paint can be necessary to completely obscured the wood grain and ensure even color.Wood is exposed to Moisture a thin layer of paint will still be water permeable, the end result will be defected parts.Primer adds to the waterproofing effect of the paint. For this reason primer is very important when you are painting giving a protective coat to the paint. Quality primers are often incomparable in price to finish paint their cost influenced by the quality of binders that they use. For Natural wood grains: Primers or not necessary for a wood stain treatment that is designed to show the wood grain. Because you have warmish and varnish

itself will act as a primer. The first coat of varnish you will put, itself will act as a primer. On soft woods a wood conditioner, thinned shellac or varnish allows for more even coloring of stain. Now this Promote uniform finishes. They are designed with qualities that promote quick drying. You saw for wood in case you are using varnishes, you don't need Paints, you need a stain tree and you do not need a primer. When you are using opaque protective coating for which you definitely need a primer before you coat it with a final coat.

Primer for metals: why do we need primer for metal? Again it is for better adhesion an additional reason for using a primer on metal could be the poor condition of the surface. Metal surfaces may not be having a plane surface or may have some kind of corrosion and just, dirt and top which should be cleared.Metal primer may contain additional materials to protect against corruption such as sacrificial zinc.

Where is primer given for metal? Not all metal surface require primer.Primer highly recommended for parts exposed to moisture only a Steel part can be rusty. For example of course the best solution is to the Aravali clean the metal blasting but when this is not a viable option. Special kinds of primers can be used that chemically convert rust to the solid metal salt. And even though search surface is still lacking in comparison to the shiny clean metal, it is it much better than weak porous rust.

Now let us see about varnish:

Varnish is a transparent hard protective finish or film that is primarily used in wood finishing but also for other materials.

Characteristics of varnish:

It should dry rapidly.

The drying and curing time of all vanishes maybe speed up by exposure to an energy source such as sunlight ultraviolet light or heat

It should form a hard film on drying.

It should not crack on drying.

It should be durable and weather resistant

It should give uniform and pleasing appearance.

It should not hide the natural grains of the wood. Varnish is not an opaque protective coating it should not hide the natural grains of the wood. That is the main purpose of using varnish. The varnishes are glossy but you may design special type of semi-gloss matte Finish varnish by adding flattening agents.

Varnish has little or No color is transparent and has no added pigment. Can be applied over wood stains as a final step to achieve a film for gloss and protection. Some products are marketed as a combined Satin and varnish.Now varnish is a traditional combination of drying oil, resin, and a thinner or a solvent. So basically varnish contains three major

components. Drying oil, resin Binder, and lastly a thinner or solvent. It is not contain any pigment. You can add additives to the varnish to increase its certain characteristics like, you can increase the surface gloss or you can have a Matte finish varnish for that you can add additives. But majorly only three components are there.

Types of varnish:

Let's see what the different types of varnish available are.

Violin: Violin varnish is a multi-step process involving some or all of the solvents primer, sealer, ground color, coats and cleared top coats. Some system uses a drying iron varnish as described below why others use spirit varnish. Resin, most resin are gum varnishes it consists of a natural plant or insect derived substance dissolved in a solvent called spirit varnish or solvent varnish. The solvent maybe alcohol, turpentine or Petroleum paste. Shellac as a very widely used single component resin or varnish that is alcohol soluble. It is not used for outdoor surfaces whereas, where it will come into repeated contact with water. Such as around sink or barter. Alkyd, modern commercially produced varnishes employees some form of alkyds that produce a protective film. Alkyds are chemically modified vegetables oil which should be applied in a wide range of conditions and can be engineer speedup the cure rate and thus harden faster. They are better and most expensive exterior varnishes employ alkyds made from higher performance oil and continue the observers. Spar varnish called as Marine varnish originally intended for used for ship or boat parts to protect the timber from effects of sea and weather. Spar bends under load of their sails. Drying oils by definition drying oils or linseed or tongue oil or not true varnishes although modern terms day accomplish painting. Drying Oils do exothermic reaction between the polys and unsaturated portion and the oil and oxygen from air. Polyurethane varnishes are typically hard abrasion resistant durable coatings. They are suitable for hardwood floors but are considered by some wood finishes difficult or unsuitable for finishing other Deep detailed pieces. The word lacquer refers to quick solvent-based varnishes, or paints. Although they are the names may be similarly derived, lacquer is not same as Shellac, that is not dissolved in alcohol. Lacquer is typically sprayed on. Acrylic varnish are typically waterborne varnishes with lowest refractive index of all finished and high transparent. They resist yellowing. Acrylic have the advantage of water cleanup and lack of solvent fumes. But they typically do not penetrate into wood as well as oil. Sometimes like the brush ability and levelling qualities of soil based varnishes. Enamel. Enamel paint is a paint drive to hard usually glossy finish for coating surface that are out door or otherwise subject to hard ware or variations in temperature. Enamel. Is quite durable enamel or normally applied by brushing although they can also be sprayed... a drying time for a normal comparatively takes longer time to dry and care must be taken to ensure dust free environment while paint film is drying.2 coats of paint is sufficient in most cases for first time painting. For existing painted surface is a darker shade significantly darker shade than a new enamel paint, then you need a little extra coat to mask the extra color. We saw what primer, enamel varnishes is.

How to Paint?

Now we'll see how to paint. Painting basically consists of the following steps. Preparing the surface: We have to prepare the surface, why? Because a well prepared surface will take the paint in a better way. So preparing the surface majorly means just cleaning the surface of all the Dirt or any grease on top. For a wall, for existing wall the existing paint can be scrapped of, for a metal the rest can be removed, for a good it can be sanded or if there are any nodes or defects it can be filled with the Patti so the final prepared surface should be completely plain. Next is priming. Priming or applying primer is very important step in the preparation. If you do not apply priming, then the surface that has to be painted on might not accept the coat. Or the protective coat or the final Coatis Readily as it is primed. Usually it is recommended to prime or give priming coat to all surface before you start painting it. But some surfaces do not need priming, but when we are talking and focusing mostly on wood painting and varnishes on wood, wood when it is 1 varnishes they do not need to prime because, varnish act as a primer. When you are using enamel paint or any other wood paint which is an Opaque paint then it is best to prime the wood before you apply those varnishes. Applying the coats of paint. The coats can be the minimum Coat required is 2 coats which is first done in direction and the second one is done in opposite direction. Search that in the final product does not have any brush mark. Both the horizontal and vertical brush mark merge with each other and become a plane lain film. If you are not satisfied with the color intensity you get from a primer coat, you keep applying the coat again and again to get the proper color intensity. Finally applying the top coat. So you have the priming which is the, which is the base coat that you have the intermediate coat and finally the top coat. Top coat can be a decorative coat. Usually the top coat is a kind of, acts as a ceiling where it completely seals of the painted surface from external factors top coat should also be off very good quality because it has, it is the coat which is stands maximum wear and tear. Painting on wood. In this lecture we are majorly focusing on wood, painting on wood, how do we Paint on wood, what is the process of painting on wood.

Step 1 you have to prepare the surface. Then you would should be seasoned and dried before painting. If you paint on an unseason wood then it will not work because it has already draped the moisture inside the wood. It will not let the wood will interact with the paint. The surface of the wood should be cleaned. If there are any nails on the top of the surface, of the wood it should be punched in, search that final surface you get is plain

Step 2 is knotting is basically if there are any knots you should be covered with suitable material or if there are any defects on chipping, if there is any dense in the wood , they should be covered with particular material of suitable material such that the whole surface you get is completely plain. Then you should apply the first Coat.

That is step 3. After knotting in the primary Coat is applied on the surface of the wood. Usually this first Coat is applied before the wood work is fixed. Now why should we apply this coat before the wood is fixed? Why can't we just completely finished the woodwork and then Paint on top. Now what happens is, if this is you have an edge you are painting after the wood work is finished, you might miss the edge and the wood might get affected or get attacked by insect are fungi from the edge. You have to protect the edge as well. That is why it is recommended that

you completely paint the wood and then do, before doing the wood work so that all the corners and the edges of the wood are well protected.

Step 4 is to apply the second coat. This Coat is applied after the priming coat. Eachcoated applied longitudinally in this film and crossed so that no brush mark is see on the painted surface. Like I told before if you are applying the first coat vertically then the next coat should be horizontal. Usually the first coat that is applied as is like parallel to the grain of the wood.

Step 5 is the final step that is to apply the final Coat. This Coat is applied over the intermediate coat with no pressure mark. You should be very careful in applying this coat , such that there is no brush mark and you should also be applying enough amount of protective coat on the woodwork if you are if you take very little amount of paint it might dry to fast to find the brush marks on the wood surface. When you are painting a wood with enamel, there is a different procedure that you paint with varnish. What we saw is earlier was varnish when you are painting with enamel. The surface is already painted or varnished. Remove dirt or wax buildup with a household cleaners and rinse. Sand rough areas and wipe away dust with tag cloth. Apply 2 coats of stain blocking primer and allow it to drive between coats. Now that the priming is done now you have to move on applying the enamel. Roll or brush on two coats of enamel paint in the direction of wood grain. Use a brush to finish the surface with smooth strokes. For furniture on cabinetry that will receive heavy use like kitchen cabinets that are opened on daily basis it's a good idea to seal the finish with two coats of polyurethane. So you saw when, with this you have to apply 2 coats of priming with enamel you have to put 2 coats of primer. Now we saw how to prepare a surface for painting, and what are the different types of, the various ways of painting different surfaces. Now let's see the effects in Paints. Now the common defects that are found in Paints are,

Blistering: Blistering like you see in the image is the formation of bubbles like shapes on the painted surface. This primary cause of this defect is water vapor. When water vapor is trapped under the paint layer it creates Bubbles under the film of paint. Because of heat this water vapor, the water which is trapped it becomes vapor and forms these bubbles.

Blooming: Blooming is the formation of dull patches on the painted surface. The primary cause of this defect is poor quality of paint and improper ventilation.

Fading: Fading, when there is a gradual loss of color from the painted surface it is known as fading. The main cause of this defect is the reaction of Sunlight on the pigments of paint. So if the paint is not of a very good quality, and does not have a very good duration, during a long course of time it will start fading.

Flaking: Flaking is a very common type of defect that happens because of improper stacked labor. In this type of defect some portion of the paint film is not stick properly with the surface. Resulting flaking of the paint player. This is due to poor adhesion between the paint and the surface to be painted. So again this is an example of not doing the priming properly. If you are

not doing the priming properly if you do not prepare the surface to be painted properly, then the paint that is to be applied on the surface will not have a good adhesion with the substrate. So it will cause flaking.

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Flashing: The presence of glossy patches on the painted surface is known as flashing. The cause of this defect is mainly due to poor workmanship cheap paint or weather actions.

Next type of paint defects is called grinning: If the thickness of the final coat of paint becomes very thin the background can be seen clearly. This is known as grinning. Obviously the cause of grinning is Poor workmanship and this can be rectified by applying more uniform layer of final coat which is thick than the previously wrongly applied coat

Next Type of defect in Paint is running: This type of defect is seen when the surface to be painted is very smooth. In case of smooth surface the paint runs back and leaves small areas of surface uncovered. So like you see in this image, if you apply Paint on a very smooth surface, you might also see, when you pour water over a very smooth surface, the water gathers at certain places, leaving certain pockets empty. This is what happens with paint also. The paint leaves certain pockets which are not covered with paint. This type of defect is called running.

Sagging: This type of defect is more prominent when a thick layer of paint is applied on a vertical or inclined surface. So like you see in this image. When you apply very thick layer of coat layer of paint, the paint tends to run down or sag and why it is sagging or while it is running down, it dries off. So even if you try to rectify this, defect by painting on top of it by another coat, sometimes the sagged paint is so thick that you cannot rectify it.

Saponification: Saponification is the formation of soap patches on the painted surface. And this is the chemical action of alkalis, is the cost of this defect. If the painted surface, the surface which was supposed to be painted, if it had some trapped salts in it. And when it is painted in, because of the heat, the salt are released to the surface, and it reacts with the paint on the surface and the defect saponification happens.

Wrinkling: This type of defect is more prominent when a thick layer of paint is horizontal surface. This image you see, the paint actually, this happens mainly because of improper and ununiformed drying when some portion of the paint or some pocket of paints dry quicker than the rest, this wrinkling happens. One reason of this is, the quality of the paint is not that good and the second reason is the workmanship is poor because of this wrinkling happens.