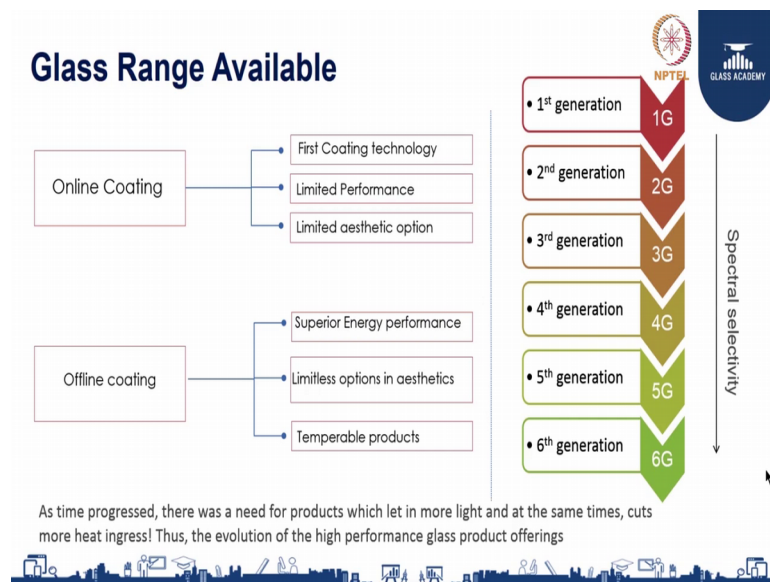


Glass in buildings: Design and Application
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Lecture - 45
Glazing Choices for Project Segments

Welcome to today session, on the topic that we are going to talk about is Glazing Choices for Project Segments. Thank you for being a part of this session, I hope you are going to enjoy the short session that we are going to have on how to choose products and solutions for your segmental needs when you are designing buildings. Good evening and welcome, I am Sowmya, I have been associated with Saint Gobain for the past 3 years as their Marketing Manager, I come with a background of an Architecture training and management practice therefore, I think I have sufficient ability to be able to talk to you on this subject. For today's segment today's presentation the way I have structured this talk to you, is to talk to you on the series of product ranges followed by the segment applications in which this product ranges are suggested.

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Let us begin. What are the glass ranges available to us in the market today? It is important to know there are two kinds of glass ranges when you talk about high performance glasses. Well of course, there are the common clear glass that you see in the market, the tinted glasses which have color and today a variety of high performance

glasses. The most basic segment of high performance glass is what we refer to as online coated glass. What you see on your screen is the functionalities of these basic coating of glass. The online coating was the first technology, it did give performance, but very limited and it also had very limited aesthetic options, because this was a product meant to reach out to the masses.

The second kind of glass and today the product that is stay is really in the market and can actually cater to every single need of yours is the offline coating products. The offline coating products can give you superior and when I say superior far superior energy performance, it can give you limitless options in aesthetics; you can make a green, a blue. a golden rose anything that you think and it can also be products that are more suitable for value addition and processing. Do you want your glass to be tempered, do you wanted to be laminated; all these glasses yield better to such services.

The way the glasses have been developed is on the basis of what I would like to call a series of generations. So, let us just say the number of generations of glasses are 6 and I am going to call them first second third fourth fifth and sixth generation products, which has been developed on the basis of their increasing spectral selectivity. What is spectral selectivity you may ask? If the ratio of the amount of light that a glass can let in, the amount of heat that it can let out. It is that ratio that really captures the high performance of glass because if you know the performance of the glass is determined by how much light it can let in and how much heat it can cut out right.

So, as time progressed, there needed to be a much better selectivity possible in the glass and whereas; say high performance coatings when I say a online and offline coating what are these coatings? Just imagine a piece of glass that you have and if you can imagine nano meter thick metallic coatings; when I say nano meter its actually several times thinner than even the thickness of your hair, that level of metallic coatings are applied on the glass to give you the superior performance and its these metals that allow light and simultaneously cutoff heat to give you high performance class ranging from the first generation to the sixth generation.

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1st Generation

Need: Aesthetics

Basic solar protection glass

Online coated

Chemical Vapour Deposition (CVD) Technology

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So, talking about the first generation product, it was fundamentally developed because we just needed aesthetics; we needed color we needed reflection. So, the glasses had very basic solar protection properties, they were coated on the line with in basically to cater to the mass market and this is also called chemical vapour deposition technology. This particular solution was ideal for the mass market, but really did not yield to lot of the other advantages that people were looking for it did not yield well to the processing requirements if glasses had to be value added if it had to be tempered and laminated and if the glasses had to be more settle coloured well it was not possible because they were very limited options that were possible with CVD technology.

From the second generation onwards, we moved on to a much more superior technology which was giving products of a wide range and variety which we will talk about.

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2nd Generation

Need: Form & function

High performance magnetron coated products

Offline coating

Physical Vapour Deposition (PVD) Technology

Products:

20 products in shades of neutral, green, blue and bronze, with varying amount of light transmission

The slide features a woman on the right side, a photograph of a modern building with blue-tinted glass windows in the center, and logos for NPTEL and GLASS ACADEMY in the top right corner. A decorative blue bar with white icons is at the bottom.

The second generation of products was primarily determined because of form and function. When you see the first generation had aesthetics, which means it was just determined by colour, whereas, the second generation it was more for how much light it could let in the forms of the building were getting larger. So, can I make a more reflective surface; people were looking at other applications of glass and therefore, the glazing industry went ahead and decided to give glass that would just give function can it let in with the certain window to wall ratio with a certain amount of concrete in certain amount of glazing, can it let in the optimum amount of light for a person inside to work comfortably.

So, this is the first generation of products among the offline coating technology and the second generation of products overall in the high performance glazing technologies. This was produced on what is called a magnetron coater, which is used to coat the glasses using metallic coatings of the line. This is different from the previous technology of the first generation product, because this is called a PVD process or a physical vapour deposition process as compared to a chemical vapour deposition process. In this generation you have over 20 varieties of colours and products, because they can be coated on green blue bronze whatever base glass that you have to get more and more better performances.

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3rd Generation

Need: High performance

Advanced solar control and thermal insulation glass for single glazing application

Provides optimum light transmission

Minimum visual glare

Low internal reflection

Products:
several products in shades of neutral, green, blue and bronze with varying amount of light transmission

NPTEL GLASS ACADEMY

Moving on to the third generation of products, the third generation of products was at this time and age when people were happy with the appearance aesthetics, were happy with the performance slight and the form the function that was giving, but really started asking for more. When the initial performance really catered to the solar control properties of the direct radiation from the sun, people started getting conscious of the indirect radiation or the requirement for insulation. And therefore, the third generation of products was born the third generation of products actually gives every user the benefit of both solar control and thermal insulation in a single glazed glass, at a price that can be competitive to be utilized in multiple applications.

This glass also provides optimum light inside the building provide sufficient reflections outside to guarantee privacy and this glass was also available in a wide range of colours. This series of glass was ideal for what we will see today at the end of the presentation the residential segment and you will know why.

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The slide features a white background with a blue header area. On the left, the text '4th Generation' is displayed in a bold, blue font. To the right of the title are two logos: the NPTEL logo (a circular emblem with a gear and a sun) and the GLASS ACADEMY logo (a blue shield with a white building icon). Below the title, a list of bullet points describes the 'Need: Thermal insulation' and lists properties of 'Advanced Thermal insulation glass (low-e)'. To the right of the text is a photograph of a modern skyscraper with a distinctive blue-tinted glass facade. In the center-right of the slide, a woman with long dark hair and glasses, wearing a blue patterned top, stands as if presenting. At the bottom of the slide, there is a decorative blue silhouette of a city skyline with various icons representing different building types and infrastructure.

4th Generation

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Need: Thermal insulation

- Advanced Thermal insulation glass (low-e)
- Reflects long wave infra-red radiation
- Excellent light transmittance
- Neutral appearance due to very low reflection



Introducing to you the next generation of products; the fourth generation of products was primarily introduced for thermal insulation properties. With more and more people asking for thermal insulation properties in the building, because there was an increase awareness to calculate the insulation properties of the entire building envelope.

When you calculating the entire insulation properties of the entire building envelope, the standard metric that you would use is U value and a U value is available for a brick wall or a concrete wall and therefore, they needed to be a glass which has amplifying the true value performance and therefore, building an envelope that was sound that was good that was giving sufficient insulation for the people residing inside the building and therefore, the fourth generation of products were born. The way the fourth generation of products is significantly different from its previous generation is apart from the feature that it gives a significantly better U value is that this kind of coatings contain a precious metal called silver.

The first the fourth generation product has one layer of silver, which amplifies this performance significantly from the third generation and gives a strong solar insulation thermal insulation property. This glass also improve significantly on the spectral selectivity like I was talking to you and of course, what spectral selectivity means is that it can let in way more light and cut out more amount of heat. This glass also has slightly neutral appearance. So, if you did not want a highly reflective glass or you did not want a

very significantly strong colour like a blue or a green, you could choose the range of glass which generally comes in very neutral and shuttle shades of grey.

And that is what the fourth generation of products are about.

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The slide features a white background with a blue header area. On the left, the text '5th Generation' is written in a bold, blue font. Below this, a list of bullet points describes the product's features: 'Need: Selectivity', 'State-of-the-art solar control and thermal insulation glass', 'Double silvered low-e glass', 'High spectral selectivity', and 'High light transmission'. To the right of the text is a photograph of a modern building with a glass facade that reflects the sky. In the bottom right corner of the slide, a woman with long dark hair and glasses, wearing a blue patterned top, stands as if presenting. The slide also includes logos for NPTEL and Glass Academy in the top right corner and a decorative blue silhouette of a city skyline at the bottom.



Going on to the next generation, the fifth generation of products. Well the fifth generation of product was really state of the art, because it went out from the fourth generation where you had one layer of silver to moving onto depositing two layers of silver in that nano meter thick coating that you would you were having on the glass. When we were able to deposit two layers of silver as compared to the first layer of silver, the performance of the product improve significantly, what it also gave is very high spectral selectivity. We were able to let in so, much more light and cut out so, much more heat with the same base glass.

Of course, this glass is also available in a wide range of colors and also bose of quite low reflections, therefore, making your building much more regal and much more sophisticated.


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6th Generation

Need: Higher selectivity
Best-in-class solar control and thermal insulation glass
Triple silvered low-e glass
Very high spectral selectivity
Excellent light transmission



NPTEL
GLASS ACADEMY



The next generation of products is the sixth generation of products. The sixth generation of products has very high selectivity it is the most recent development in the glazing industry. This is what is unheard of as the triple silver product. Well of course, triple silver as the name that goes, it has three layers of silver coating within that nano meter thickness of coating that you have on your glass therefore, giving the performance which is unheard of in the market today.

This class can give you up to 70 percent light transmission at 2.3 solar factor therefore, changing the way that you would design for such therefore, allowing you to design more glaze glazing and why the opening, giving you access to the outside world bring in more natural light. So, that the occupants of your building enjoy the best possible comfortable situations.

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Summary:

By the end of this video, you have learnt about:

- The glass ranges available in the market
- The classification of glasses based on spectral selectivity
- The need and specifications of the 6-generations of glasses