

Interior Design
Prof. Smriti Saraswat
Department of Architecture and Technology,
Indian Institute of Technology Roorkee

Lecture - 27
Interior Design: Interior Design Technology: Experimental Finishes and
Materials; Joinery

Namaste. Hello, everyone. Welcome again to my NPTEL course on interior design. We are at lecture number 27 today, and we are talking about interior design technology, especially focusing on experimental finishes, materials, and some interesting joinery types. So this is the broad content for today.

Let's start with experimental finishes and materials. Very few are put over here, keeping in mind the time constraint. Of course, there is a lot of information, you know, on more finishes and materials, and you could just have a look or write to me. Experimental finishes and materials in interior design technology refer to innovative and unconventional options that push the boundaries of traditional design aesthetics.

I would say also the functionality. These finishes and materials often incorporate advanced technologies, sustainable practices, or unique characteristics to create visually stunning and functional interior spaces. So a lot of interesting experimental finishes, material palettes, details, and all facilitated through advanced technologies. They are, you know, right now a buzz and also quite functional, not just aesthetic. Some examples of experimental finishes and materials used in interior design.

So, you know, we're talking about smart materials. Smart materials are designed to respond to environmental stimuli such as temperature, light, or pressure. They can change color, shape, or texture, adding dynamic elements to interior spaces. So they are no longer static properties, but dynamic elements. For instance, thermochromic paint changes color with temperature variations.

While electrochromic glass can alter its transparency level. So these are all smart materials, and we can see gradation, variation, change in color, temperature, shape, or form. You know, as we use these over time—whether for a certain interval, throughout the day, or across seasons. So these are all very experimental and quite in vogue right now and in times to come. Biophilic Materials

Biophilic design emphasizes a connection between nature and the built environment. Materials like moss walls, living greenery, and natural fibers bring the outdoors inside, promoting well-being and improving air quality. So, the overall ambiance improves; indoor air quality and environmental quality enhance, positively impacting well-being and user experience. 3D-printed elements. 3D printing technology enables the creation of intricate and customized interior elements, such as furniture, lighting fixtures, and decorative objects.

It allows designers to experiment with unique shapes, textures, and structures that were previously challenging to achieve. So, very interesting structural details and designs can also be achieved with the help of 3D-printed elements. Sustainable Materials As environmental concerns become more prevalent, interior designers are exploring sustainable options, and we talk about concerns for sustainability in almost every lecture, focusing on one or another aspect. These materials reduce the environmental impact of interior design projects.

So, whether it's reclaimed wood, a recycled material palette, or something eco-friendly like fabric, paper, or reclaimed items. All of these materials are getting more and more utilized and demonstrated through interior design practices. Examples include reclaimed wood, recycled plastic, bamboo, eco-friendly textiles made from organic or recycled fibers, and interesting applications of cotton, and so on. Transparent solar panels are also being used. Transparent solar panels are a cutting-edge technology that can be integrated into windows or glass surfaces.

They allow natural light to enter while generating electricity from sunlight, providing energy-efficient solutions for buildings. So, we are always focusing on energy-efficient solutions. We are talking about green interiors. We are talking about sustainable practices. And we have discussed these during different lectures.

Then, interactive surfaces. Interactive surfaces create engaging and dynamic environments. For instance, interactive wallpapers or LED panels can display changing patterns, images, or videos, adding a layer of interactivity and personalization to interior spaces. Concrete and Cement Composites Traditional concrete is being reinvented with innovative additives and manufacturing techniques.

This results in lightweight concrete panels, translucent concrete, or self-healing concrete that can repair cracks autonomously. So, these are very interesting elements, materials, design features—you know, technological advancements—that we are exploring in interior design projects, interior architecture projects. Nanotechnology coatings. Nanotechnology offers advanced surface coatings that provide properties like self-cleaning, antimicrobial, or anti-fingerprint capabilities. So, these are important capabilities or attributes that can be achieved through these different materials and coatings.

These coatings can be applied to various materials, including glass, metal, or textiles, enhancing durability and reducing maintenance requirements. So, that's very interesting. By applying these coatings over the base materials, we could enhance durability and reduce maintenance hassles, costs, and requirements. Biomimicry. Biomimicry draws inspiration from nature's design principles to develop functional and aesthetically pleasing interior finishes.

So that's quite in trend and very interesting and fascinating in fact. For instance, fabrics that imitate the water-repellent properties of lotus leaves or wall coverings that mimic the structure of honeycombs are some of the examples of biomimetic design. Experimental finishes and materials in interior design technology offer exciting possibilities for creating unique and sustainable environments. As technology advances, designers will continue to explore new frontiers, pushing the boundaries of what is possible in interior design. And that is made possible through experimental finishes, alternate materials, unconventional design practices, fascinating details, advanced technology, all of these put together and more.

Like I always say, the details are not the details, they make the design. So, God is in the details. You must have heard me quite often talk about it. And this is also being endorsed by Charles Eames. The details are not the details, they make the design.

So they are very, very crucial. So when we talk about experimental finishes, materials, specifications, and now we will also see joinery details, they are all very, very important and crucial aspects when we focus on design of interior spaces. Let's see some of the details of the joinery. They are not all experimental or new, but quite popular and much used during interior design project execution and conceptualization. So joinery in interior design.

It refers to the skilled craft of creating and installing wooden elements that enhance the functionality and aesthetics of interior spaces. We are focusing on wooden elements here, you know, with some examples and visuals, but it's also true for other kinds of materials. And, you know, some kinds of joinery details are, of course, common to different material palettes. Joinery involves the art of connecting or joining pieces of wood together to construct furniture, cabinetry, architectural features, and also some custom-made elements. One of the joinery techniques explored over here.

It plays a crucial role in interior design by providing both structural support and decorative detailing. Some key aspects of joinery in interior design, what we can see over here through some of the examples. So, when we talk about custom furniture, joinery techniques are employed to create custom-made furniture pieces tailored to the specific needs and design vision of a space. I'm a big admirer of Japanese joinery, and I love the works of architect Bijoy Jain, and you know the kind of joinery details and the kind of approaches that we see in the works of Mr. Jain. They are very in-depth, detailed, beautiful, functional, and quite interesting and experimental.

Skilled joiners use techniques like mortise and tenon joints, dovetail joints, and finger joints to ensure the strength and longevity of the furniture. So, there are different kinds of joints that we use. Now, since this course is also for beginners or for people who want to explore interior design for the first time and are learning through these modules and lectures. So, A lot of us may already know about these joinery details, but for the benefit of a larger group, I try to include details that are relevant for all of us at different levels of our understanding and knowledge base, focusing on interior design.

So, the mortise and tenon joint is quite popular and it's used very extensively, specifically in furniture. A joinery technique where the cut end, which is the tenon from one board, fits into the matching opening, the mortise of another. So, we can see these drawings and how these two pieces are fixed. And this is the popular and commonly used joint, the mortise and tenon joint. There is a dovetail joint.

Personally, one of my favorite joints is the dovetail joint, the joinery that we see over here. Joining two boards in which alternating slots, or tails as they are called, and protrusions, or pins as they are called, each resembling in shape the V-shaped outline of a bird's tail, are snugly fitted together. Thus, increasing the gluing area. This is also a very beautiful piece of joinery, not just functional. It produces a joint that, even

without glue, can be difficult to pull apart because we are just fixing the pieces with so much strength.

It is regarded as one of the strongest and most reliable forms of wood joinery. So, this is the Dovetail joint here. Finger joint. This is another very interesting, strong, and beautiful joinery. A joinery technique used mostly in industry where small fingers are cut into corresponding pieces that are joined together.

Finger joints are used to make whiteboards by extending the length of dimensional lumber and in laminated construction. Therefore, they are used extensively in industry. Cabinetry and storage solutions. Joinery is commonly used in the construction of cabinets, shelves, and storage units. Precise joinery techniques, such as dado, rabbet joints, tongue-and-groove joints, are utilized to achieve seamless connections and sturdy constructions.

This is the dado joint that we see here. A joint where one piece is grooved to receive the piece that forms the other part of the joint. A groove is cut across the grain to receive the butt end or edge of a second piece. So this is the groove here. The rabbet joint.

We must have observed old doors and the way one shutter and the other are fixed together. And there is this joint over there that we see. That's also like a rabbet joint. A joinery technique where an L-shaped groove is cut across the end or edge of one piece of wood. It fits into an edge or end of another board with an L-shaped groove.

A rectangular stepped recessed cut along the edge of a section of wood is what we call a rabbet, and we just saw the joinery. Now, the tongue and groove joint. When joining two boards square to one another along a long edge, one can simply butt the joint together and hold it with fasteners. So, the tongue and groove joint is also a strong joint and is sometimes mistaken or used similarly to the mortise and tenon joint. But there are subtle differences between the two, and both are strong joints, though the mortise and tenon is considered even stronger.

It is mostly used, widely used in the making of furniture and other elements. However, the tongue and groove joint is much stronger and provides more adjoining surface area, which is particularly useful if you are going to glue the joint. So, it is particularly stronger if there is some kind of fastening mechanism utilized for the joint. It could be glue also. Architectural millwork.

Joinery is applied to architectural elements like doors, windows, paneling, moldings, and trim work. So it's not just furniture. It's not just cabinets. It's not just storage. We see the role and importance of joinery in all architectural elements and all interior elements.

So here again, we see, you know, different details of joinery. Over here and here we see the drawings at different points whenever we are decoding an opening be it door or window of course you know at different points at different eye levels we will see a lot of joinery details which helps to put the pieces together. These elements can be designed and crafted to match the overall style and aesthetic of the space adding character and visual interest. Also, staircases and handrails, there also joinery plays a vital role. So, it plays a vital role in constructing staircases and handrails, ensuring structural integrity and safety.

Safety is paramount. Techniques like housed mortise and tenon joints, bridle joints, half-lap joints are commonly used in staircase construction. A bridle joint is a woodworking joint like a mortise and tenon in that a tenon is cut on the end of one member and a mortise is cut into the other to accept it. The distinguishing feature is that the tenon and the mortise are cut to the full width of the tenon member. That's the distinguishing feature starting with the first joint that we saw, the mortise and tenon joint.

In traditional timber framing, the bridle joint is commonly used to join the tops of principal rafters. This is a traditional application. So here we see the details and we see two types of bridle joints over here. There is T-bridle joint and there is a corner bridle joint. So there is this T-formation and this joinery that we see over here.

And we use these wooden dowels. These are like small members which are inserted to give additional strength. In bamboo construction, a lot of bamboo dowels are also used. And this is the corner bridle joint. Here, this portion is the mortise, and this is the tenon.

And this is used for corner detailing. Half-lap joint. As visually explained here, this is how it works. In a half-lap joint or halving joint, the material is removed from both members so that the resulting joint is the thickness of the thickest member. Most commonly in half-lap joints, the members are of the same thickness, and half the thickness of each is removed.

Halving lap joints are used extensively in construction and cabinetry for framing. They are quick and easy to make and provide high strength through good long-grain-to-long-grain gluing surfaces. So they provide strength, and there can be additional fastening and gluing to add to that strength. The shoulders provide some resistance to racking, which is diagonal distortion. So that's also interesting.

So in the lecture where we talk about timber, we discussed the grains, different kinds of wood sections, and the anatomy of wood. Some of the terms you see here can be clarified while attending that lecture. Integrated built-in features. Joinery allows for the integration of built-in features such as window seats, banquettes, and built-in shelving. Joinery is a very important tool at our disposal, and we can use it in unique and custom ways to create interesting designs.

These custom-made elements maximize space utilization, create seamless designs, and provide functional solutions. So, joinery is quite interesting. Decorative detailing can also be achieved through joinery techniques. Intricate inlays, carvings, and mouldings can be incorporated into joinery elements to enhance the aesthetic appeal and visual richness of the design. Restoration and Renovation.

Joinery is often employed in the restoration or renovation of historical or older buildings. Skilled joiners can replicate original joinery details, match existing profiles, and ensure the preservation of architectural and interior heritage. Material Selection. Joinery allows for the use of a wide range of wood species and other materials, but we are specifically focusing on examples, concentrating on wood, each with its unique characteristics and visual qualities. The selection of appropriate wood species contributes to the overall design aesthetic and creates a warm and natural ambience.

Joinery is a specialized craft that requires a high level of skill, precision, and attention to detail. Skilled joiners work closely with interior designers and architects to bring their design concepts to life, ensuring that the joinery elements harmoniously blend with the overall interior design scheme. So, as designers, we must be aware of these joinery mechanisms. It's a part of our training. We must build models.

We must make mock-ups to understand their functionality and the ways the pieces are assembled together. But it is always nice to learn from carpenters, joiners, and other craftsmen and workers and makers, and to work with them in an ecosystem in a very

collaborative manner. To have, you know, a better knowledge base, to have more experience, and to have more variety in our work. Some of the basic joints are put over here, and we have already seen some of these during our discussions. So, some of them are strong, some of them are weak, but the ones that I discuss in particular are quite popular and commonly used.

There is a video that we see over here. So, to talk about joinery in a very conclusive manner at the end of this lecture. Joinery is the heart of woodworking. Without it, our furniture would be piles of wood. And I agree with that and I endorse that.

Some of the references. Some websites that you see over here, and the book—the handbook—also continues to guide us, and you will see that reference quite often in many lectures. Thank you so much.