



Cooledge

Cool 400

Acoustic Lighting: One Solution for 2 Design Problems

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Course Description

Acoustic lighting is a real thing, delivering real value. Learn why acoustic lighting is suddenly an important component of designing modern spaces. Topics include the trends driving the need for acoustic lighting, in particular the intersection of open concept spaces with designing for wellness. Also, basic acoustic design factors that influence the effectiveness of acoustic lighting, and different approaches to combining acoustics and lighting.



Learning Objectives

At the end of this course, participants will be able to:

1. Understand the trends driving the need for acoustic lighting
2. Understand different approaches to combining acoustics and lighting and the benefits of using acoustic lighting for open concept designs
3. Understand the most important characteristics of acoustic lighting that contribute to sound absorption and meaningful noise reduction
4. Understand the critical role architects have in implementing acoustic lighting



A Nightmare of Noise



Speaker Notes:

- There is a nightmare of noise taking place in many public spaces - from open offices, to healthcare settings and hospitality suites. The recent advancements in acoustic lighting offer a new way to address this nightmare, one that is getting worse as more and more projects adopt the trend toward open concept designs.
- In this course we are going to explore why solving the nightmare of noise is no longer an option, but a necessity, how acoustic lighting addresses not just one but two design challenges, and the role architects need to play to take advantage of all that true acoustic lighting has to offer.

Acoustic Lighting is a REAL THING!

What was once a
difficult design
(*and budget*)
problem is solved!

THE BENEFITS OF ACOUSTIC LIGHTING

Reducing Workplace Noise With Integrated Acoustic
Ceiling And Lighting Systems

Light Meets Sound: Acoustic
Lighting Keeps Noise in Check

Acoustic Lighting Is Fast Becoming the Cornerstone
of a Happy and Healthy Workplace

Acoustic Lighting
Offers Defense Against
Noise Pollution

Sound-absorbing
lighting put into
practice

Speaker Notes:

- Perhaps you have heard of acoustic lighting previously.
- It has been around in some form for a while, but it is only in the past few years that the intersection of open concept design and an increased focus on designing for wellness have brought acoustic lighting into the mainstream.
- What was once a bit of novelty and almost certainly a custom solution is now offered as a standard product from several manufacturers.
- In other words, acoustic lighting is a real thing.

Addressing Human Needs

This section will cover:

1. New Building Standards are Driving the Need for Better Solutions
2. Lighting and Sound are Key Factors in Designing for Human Needs



Speaker Notes:

- And so if acoustic lighting is suddenly a real thing, why now?
- One of the drivers is the increased focus on designing spaces for wellness and subsequently the emerging standards being used to judge how well this is being done. Both lighting and noise control are significant aspects of designing for wellness and therefore are ripe for new approaches and new technologies.

Designing For The Needs Of People Is Mandatory For Success



Source: 1. PwC CEO Survey 2019

"Wellness in the workplace has emerged as a critical issue because it is simply **too fundamental** to be ignored."

"Bodies of evidence from all parts of the globe prove that **well designed workplaces are critical** for the health and wellbeing of society. The message to the real estate and built environment sector is clear: prioritise health and wellbeing by making spaces human again"

"...More than a 'fad' this is a global socio-political shift – **rue the industry that is not moving to address it.**"

- Cushman Wakefield, Well Work Place: Making Spaces Human Again

"**Wellness** continues to be **a key consideration** for companies and landlords when building or redeveloping office spaces."

- CBRE Online Article 2019

"The workplace is the physical manifestation of your company's culture and core values. By better understanding **the deep connection between the human experience and real estate**, organizations can create more innovative workplaces that drive productivity, experience and business value."

- Ed Nolanm, JLL Workplace Strategy

Speaker Notes:

- And it is your clients who recognize the value of designing for wellness, driving changes, and supporting new standards.
- Here we show examples of large property management firms' thoughts prior to 2020. The pandemic has added urgency and created an environment where designing for the needs of workers is no longer an option for companies hoping to attract workers back to the office. It is a mandatory requirement.
- But offices aren't the only places where a wellness focus is at the forefront. Greater awareness by the general public can affect almost any public space.
- Healthcare has always had a focus on the patient experience but struggled to overcome traditional construction practices. The industry will be forced to adopt new ways to address new design requirements
- Hospitality and institutional buildings will also need to cater to people who have gained a sudden awareness and appreciation for spaces that address more than merely functional needs.

New Building Standards Are The Mark Of Success

The impact of buildings

Buildings have a substantial impact on the health and wellbeing of people and the planet. Buildings use resources, generate waste and are costly to maintain and operate. Green building is the practice of designing, constructing and operating buildings to maximize occupant health and productivity, use fewer resources, reduce waste and negative environmental impacts, and decrease life cycle costs.



Why use LEED?

Instant recognition for your building

Faster lease up rates

Higher resale value

Healthier indoor space

Lower use of energy, water and other resources

Better for building occupants, the community and the environment

Enhances your brand and establishes you as a leader in green building



BUILDINGS LIVING BUILDING CHALLENGE

You can create buildings that generate more energy than they use, capture and treat all water on site, and are made using healthy materials. The Living Building Challenge framework will help you to create spaces that reconnect occupants with nature.

TAKE ON THE CHALLENGE

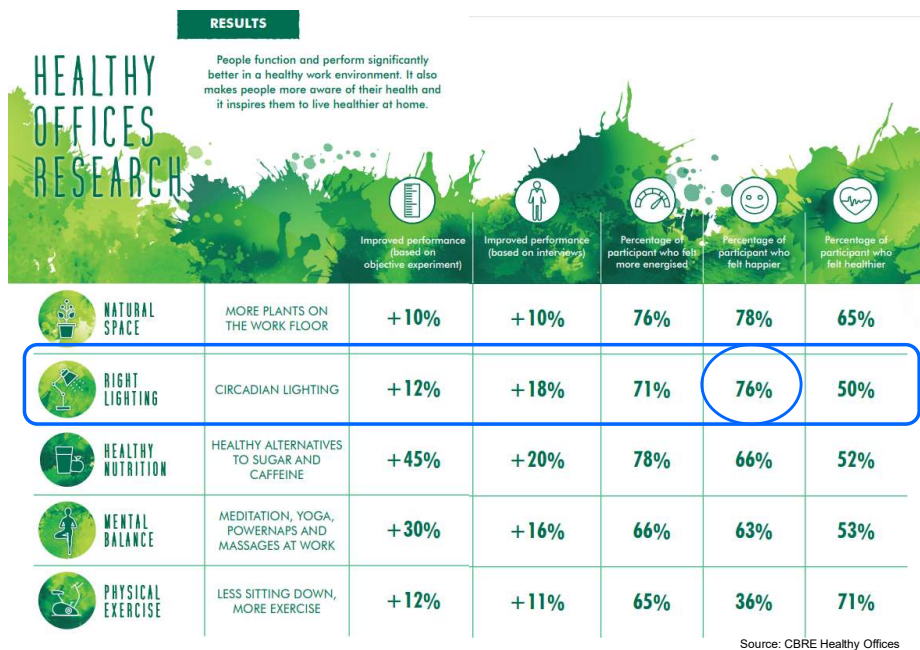


New standards for health and well-being mean that good design is no longer an option...it's a mandatory requirement

Speaker Notes:

- In order to quantify and certify that buildings have been designed to meet the wellness needs of users, new standards, guidelines, and rating systems have been developed
- Some of these programs are more oriented toward energy efficiency such as LEED or sustainability like BREEAM, but one of the principals common to all is a requirement to address health and wellbeing in the certification process

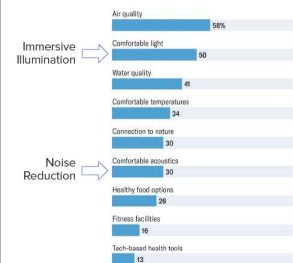
Good Quality Lighting Is A Critical Component Of Well-being



Studies of what matters most to people consistently rank "lighting" and "sound" at or near the top of their list

WORKPLACE WELLNESS PERKS THAT MATTER TO EMPLOYEES

A survey of 1,600 workers reveals that air and light matter much more than tech-based health tools.



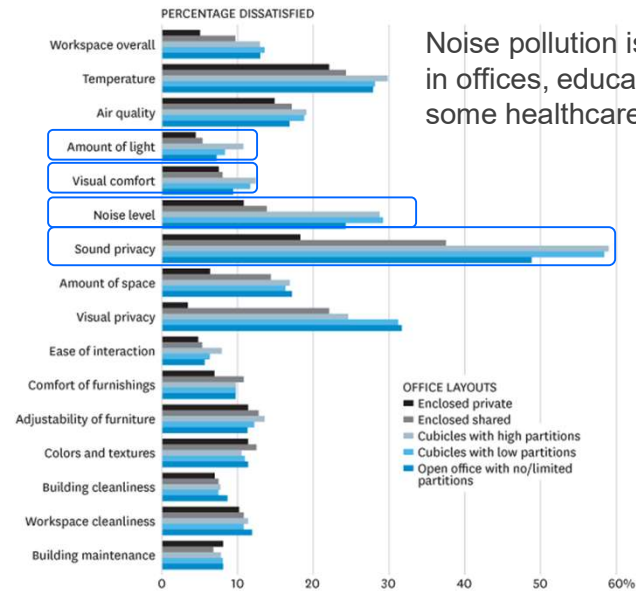
Speaker Notes:

- And lighting plays a critical role in determining how people perceive their environment.
- When people are asked to identify what makes them feel better or happier, "lighting" consistently shows up near the top of the list.
- In this study done by a commercial property company about what makes a healthy office, 76% of the participants indicated they felt happier because of changes made to the lighting during the study
- Another academic study found that good lighting was ranked 2nd and comfortable acoustics 6th on a survey of what really matters to people. Both ranking significantly higher than the type of perks we all hear about such as juice bars, games areas, and techy gadgets.
- If you think about it, that makes sense given the impact lighting has not only on vision but also our emotions and, as we are learning... our physiology.

And So Is Noise Control

EVERYONE CAN HEAR YOU, NOW

Lack of sound privacy is the biggest frustration we have with our cubicles.



"Studies indicate that approximately **80 percent of office workers** believe that their productivity would increase if their working environment was more acoustically private."

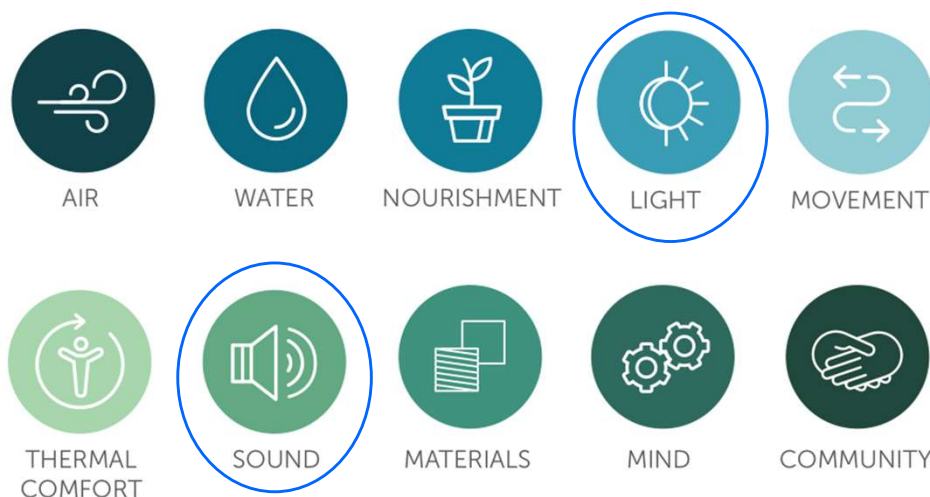
"A **300 percent increase in perceived 'worker satisfaction'** was reported as a result of the reduction in noise levels from conversational noise. In addition a measured **20% increase in sales productivity** was recorded at the end of the six months following the refurbishment."

American Society of Interior Designers; Armstrong World Industries, Inc.; DynaSound, Inc.; Milliken and Co.; Steelcase, Inc. 2005.

Speaker Notes:

- Yet another study done in conjunction with association of interior designers found that sound issues were ranked as THE most important sources of dissatisfaction and was able to demonstrate increases in satisfaction and productivity when the noise levels were reduced.

New Standards Recognize the Need for Better Lighting and Noise Control



Speaker Notes:

- And so, clearly delivering good quality illumination and addressing noise pollution are critical components of designing for wellness.
- I expect that most of you are familiar with the WELL v2 standard developed by the International Well Building Institute. Both light and sound figure prominently in this standard used specifically for rating the wellness aspect of building design.
- To summarize then:
 - Awareness of wellness in design is increasingly becoming a mandatory requirement of building design and the standards used to determine success.
 - But as you can see here, even newer standards treat sound control and lighting as separate issues.
 - By taking advantage of acoustic lighting, you have the opportunity to address, or score points in two design areas with one solution.

So...What's the Problem?

This section will cover:

1. Design Trends are Driving the Need for Acoustic Lighting



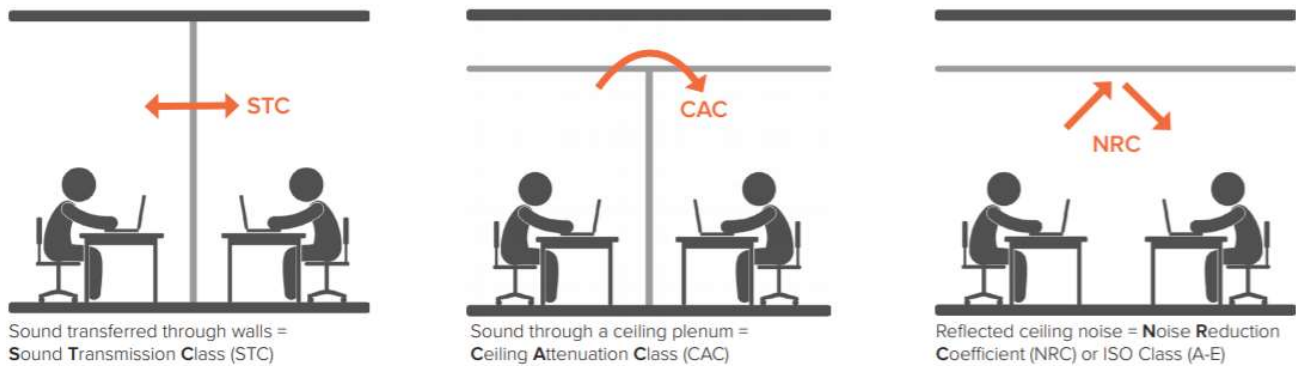
Speaker Notes:

- I mentioned at the beginning that the rise of acoustic lighting is at the intersection of designing for wellness and what is likely a more significant factor: the trend toward open concept spaces for almost any application
- If you are watching any of the design shows on HGTV, what is the one thing that everyone wants?... An open design
- While those shows are typically about single family homes, that desire for openness remains a constant for almost any place
- Another constant for open public spaces is noise and specifically the challenge of reducing noise

3 Types of Noise Problems

There are 3 types of noise problems:

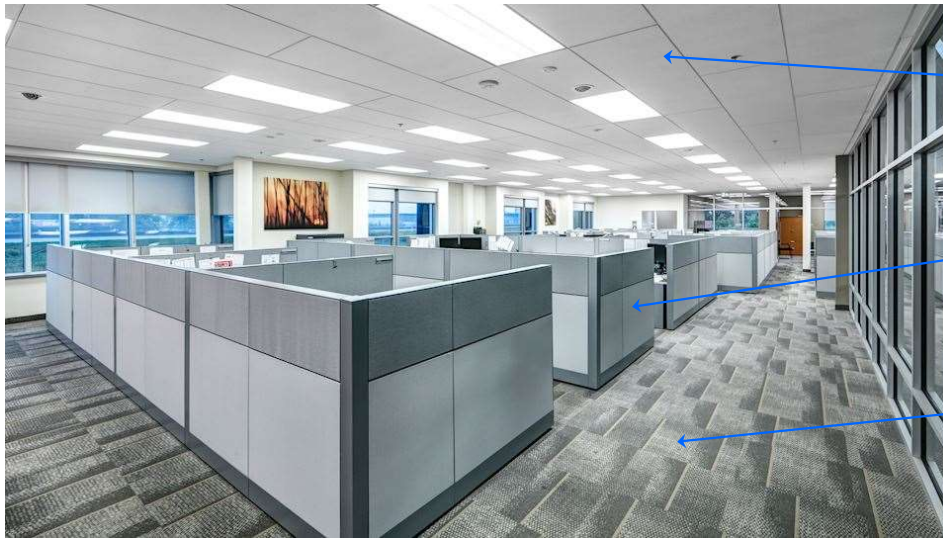
1. Sound that is transferred through walls/barriers
2. Sound that travels from one room to the next through the ceiling plenum
3. Sound that bounces off the ceiling and reflects back into the space



Speaker Notes:

- There are three ways that sound may be propagated to increase noise:
 - Through the walls
 - Through a ceiling plenum that acts as a sound conduit
 - Or by reflections off of the ceiling
- All three of these modes tend to appear in traditional designs that incorporate either cubicles or offices and drop ceilings.
- In more open spaces, solving the problem of reflected ceiling noise is the most critical

Older Design Approaches Managed Light & Sound Separately



Ceiling:

- Typically most of the area is covered with Acoustic Ceiling Tiles (ACT)

Partitions:

- Some sound is absorbed at the work area

Carpet Floors:

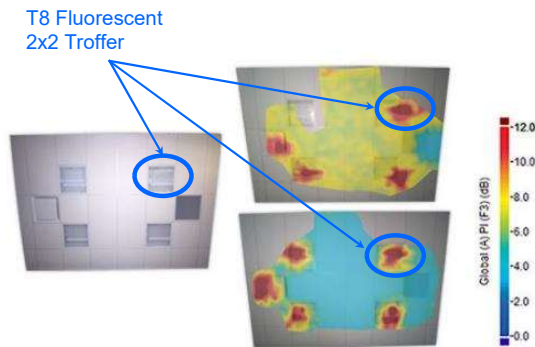
- NRC = 0.20
- Some sound is absorbed

Noise reduction capability is provided by non-lighting components

Speaker Notes:

- Traditional designs also involve traditional methods of addressing noise control that are independent of lighting.
- Ceiling tiles take care of reflected noise
- Partitions or walls are generally designed to absorb some sound and carpets are often used to reduce sound reflection off of the floors.

Lighting Was Not Expected to Reduce Noise



High definition acoustic camera shows noise reflecting off a low NRC 0.60 acoustic ceiling (yellow) and being absorbed by a high NRC 0.95 stone wool acoustic ceiling (blue).

Source: Rockfon White Paper - "Look ~ do you see the noise leaking through that ceiling?"

- Blue means sound is being effectively absorbed
- Red means no sound is being absorbed

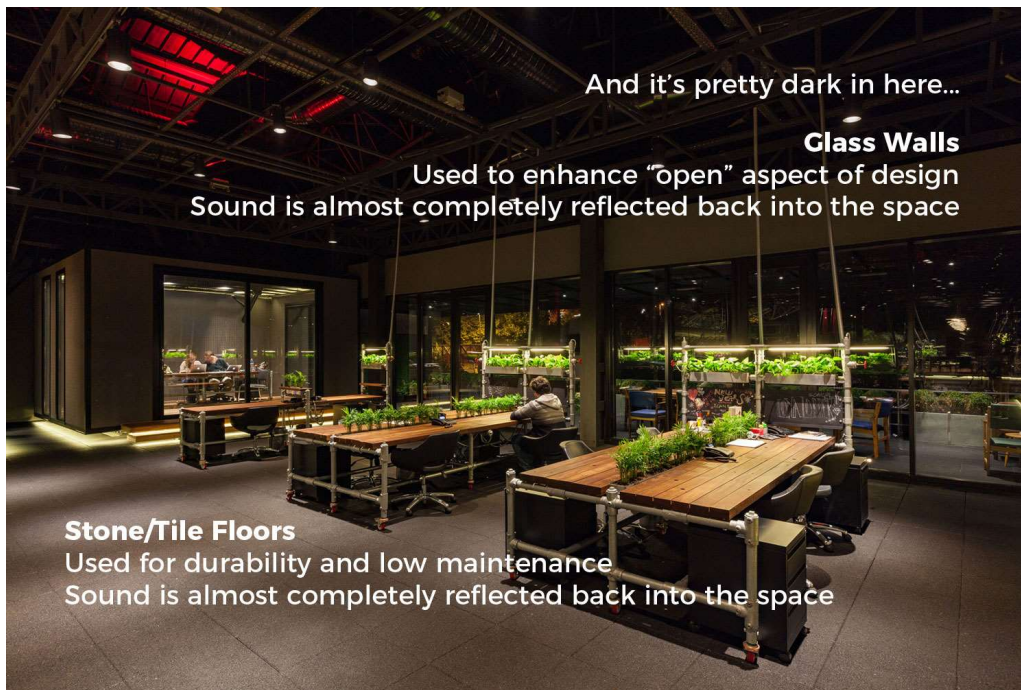


Traditional luminaires have no noise reduction capability

Speaker Notes:

- By incorporating several means of absorbing sound, there was no expectation placed on lighting to do so
- You can see this clearly in the images shown on the left generated by an “acoustic camera” – a device that as you would expect maps acoustic performance.
- The goal here was to show how much better highly sound absorbent ceiling tiles are compared to the regular variety.
- But an interesting aspect is how well these images also show how useless traditional light fixtures are at absorbing sound. The dark red displayed means that the 2x2 troffers in this ceiling contributed no acoustic benefit

But the World Wants “Open Concept” Spaces

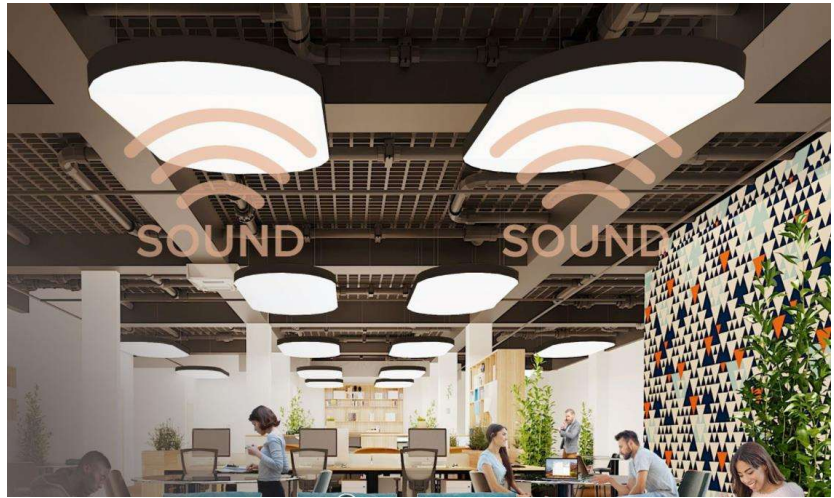


In open spaces the only location for sound absorbing materials is the ceiling

Speaker Notes:

- So what happens when you don't have a drop ceiling...or carpets...or possibly even walls
- Open concept spaces typically feature floors that reflect sound, walls that can be mostly glass...or virtually non-existent, and the ceilings are full of ducts - often made from hard materials.
- The best and often the only solution to reduce noise is to incorporate sound absorbing materials in the ceiling

Acoustic Lighting Helps Solve the Reflected Ceiling Noise Problem



General illumination sources are located in the ceiling...

Why not use those luminaires to absorb sound and reduce the noise?

Speaker Notes:

- And there is something already located in the ceiling that can help: the lighting!

A Dive Into the Details of Acoustics

This section will cover:

1. Noise Reduction Coefficient
2. Sound Frequencies and Human Response
3. Acoustic Test Reports
4. Size Matters



Speaker Notes:

- Before we consider the merits of different approaches to acoustic lighting, it is important that we dive into a few of the details of acoustic design that will help you differentiate between the new products and new methods offered by acoustic lighting.
- Not all of these approaches are equal, so knowing some of the key requirements of acoustic design will help you evaluate which solutions are better – and more cost effective – than others.

Noise Reduction Coefficient (NRC): A Simple Metric



NRC=0

At 0 NRC, there is no sound absorption. The sound bounces off of a smooth surface and back into the room, as shown by the red waves.



NRC=0.5

At 0.5 NRC, only 50% of the sound is being absorbed by the acoustic product, while the other 50% is being reflected back into the room.



NRC=1.0

At 1 NRC, 100% of the sound is being absorbed by the acoustic product, and no sound is being reflected back into the room.

NRC value (0-1):

- Average of absorption at 4 frequencies > 250, 500, 1000 & 2000 Hz
- Chosen frequencies approximate sound from human speech but not necessarily music or other sources
- Useful for comparison and indicator of acoustic properties
- Not used for acoustic design

The NRC value provides a good way to quickly understand the average sound absorption properties of materials for comparison with others.

Speaker Notes:

- One of the first things to note is the use of a metric called the Noise Reduction Coefficient or “NRC”.
- As we just saw in the example a few slides ago, NRC was used to differentiate regular ceiling tiles from the best performing ones.
- NRC is a simple and useful metric to provide a quick comparison of the average absorption properties of different materials.
- Those with values near zero are going to mostly reflect sound back into the space while those with values closer to one will, on average, do a good job of absorbing any sound waves that bump into them

Noise Reduction Coefficient (NRC): Common Building Materials

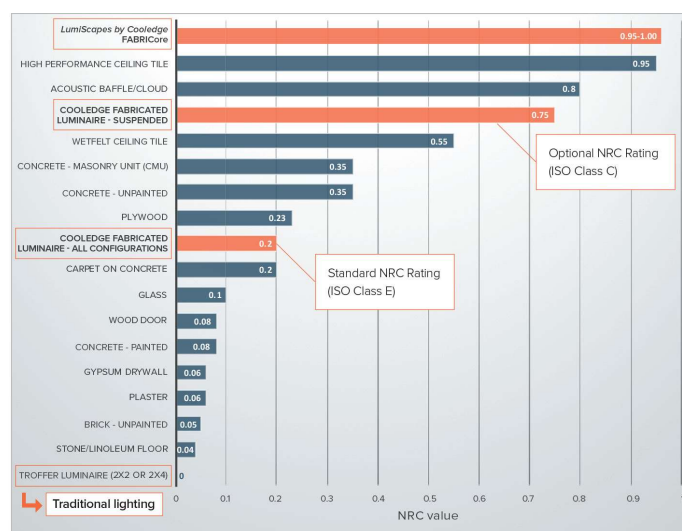
Open Concepts Designs Mean Low NRC Values

- **Flooring:** stone and tile used because of high durability and attractive design options feature NRC values close to zero.
- **Walls:** traditional materials (e.g. drywall) and more modern materials (e.g. glass) both have relatively low absorption properties.
- **Traditional light fixtures** are also typically assigned an NRC value = 0

Typical materials used in traditional designs

Decreasing sound absorption capability

Typical materials used in open concept designs

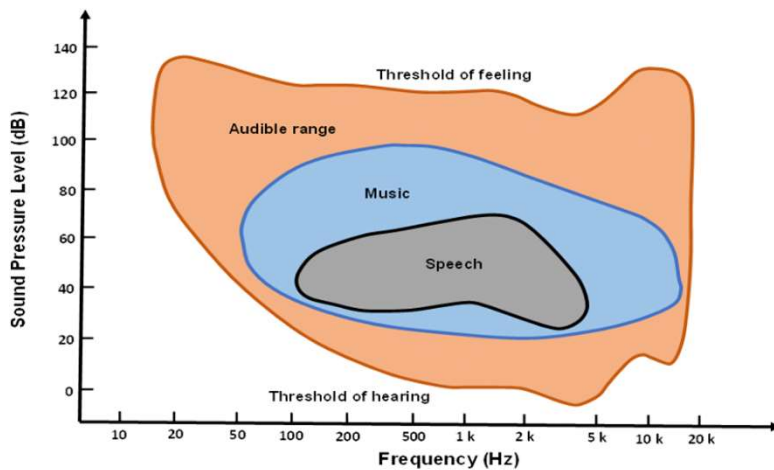


Typical NRC Values for Common Building Materials (compiled by Cooledge)

Speaker Notes:

- To see how this might useful, have a look at this chart.
- One of the things you will notice is that materials typically used in traditional designs tend to have higher NRC values than those incorporated into modern open designs.
- For example stone and tile that is used for floors because of its durability, maintenance, and aesthetics typically has an NRC value near zero, meaning that it reflects almost all of the sound waves back into the space, hence increasing the potential for noise problems
- Similarly other materials used in open designs generally exhibit poor acoustic properties
- Note again that traditional light fixtures are generally assigned an NRC value of zero

Why the Frequency of Absorption is Important



Source: International Commission for Acoustics

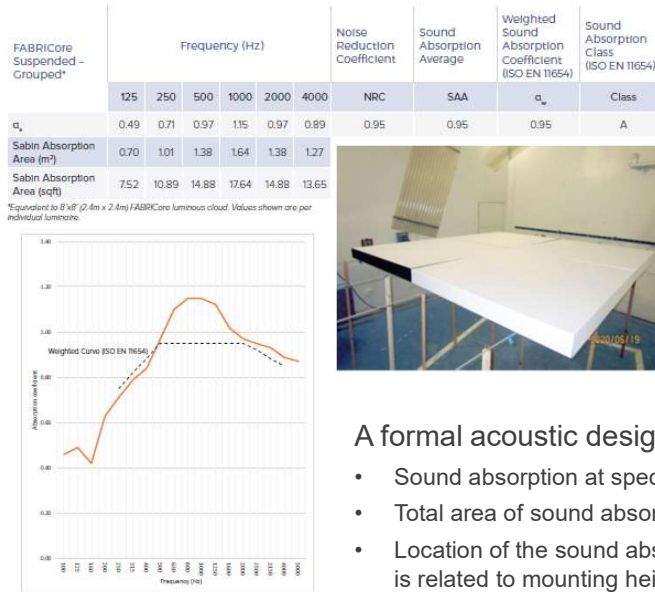
Acoustic Design Requires a Detailed Understanding of Absorption at Different Sound Frequencies

- Different materials absorb sound at different frequencies
- Two materials could have the same NRC value but absorb sound very differently
- Most architectural spaces are concerned with the ability to hear speech – e.g. “speech intelligibility”
- As shown, the frequencies of interest are those between ~100Hz – 4000Hz

Speaker Notes:

- So NRC values can give you an idea about the average material properties, but they are not used by acoustic designers who are more interested in the absorption characteristics across a range of sound frequencies.
- For architectural acoustic design, the frequencies most of interest are those associated with human speech - which determines the speech intelligibility of a space. Or in other words, how clearly you can hear someone speaking to you against a background of noise that is most often the sound of other people speaking.
- For these applications, it is the ability of materials to absorb sound in the range of 100Hz to 4000Hz that is of interest.

Acoustic Test Reports: What Acoustic Experts Use



Acoustic Test Reports

- Provide sound absorption data at specific frequencies
- Help acoustic designers understand the impact of a product on overall performance of a space
- Are an important indicator of a product suppliers knowledge of acoustic requirements

A formal acoustic design requires more information:

- Sound absorption at specific frequencies
- Total area of sound absorbing materials in the space
- Location of the sound absorbing materials – for suspended luminaires this is related to mounting height
- Location of the source of noise

Speaker Notes:

- Since this course is not an acoustic design course, we won't go deeper into details but one way important way to evaluate acoustic lighting products is to determine if they offer acoustic test reports.
- These reports include the frequency-specific data acoustic designers require to model a space and determine the acoustic performance overall.
- Even if you don't have an acoustic designer on your team, access to 3rd party test reports is a good indicator of how well the supplier understands the acoustic performance of their lighting products.

SIZE Matters

Acoustic engineers use a metric called a “sabin” to quantify sound absorption. A higher sabin value means more sound absorption... equals less noise.

$$\text{Sabin} = \text{Absorption} \times \text{Area}$$

The noise reduction capability of a luminaire is dependent on TWO equally important characteristics:

1. Absorption (approximated by NRC)

AND

2. Luminaire (fixture) Size

SIZE MATTERS		
	Linear Pendant	Large Area Luminaire
Length	8' (2.4m)	8' (2.4m)
Absorbing Height/Width	h = 1' (0.3m)/w	w = 6' (1.8m)
Sound Absorbing Area	8 sqft (0.72m ²)	48 sqft (4.46m ²)
NRC	1.0	0.75
Sabin	8 (0.7)	36 (3.35)
	Equivalent to 1 Acoustic Ceiling Tile	Equivalent to 4.5 Acoustic Ceiling Tiles

This is what matters!

Noise reduction requires high sound absorption and large scale

Speaker Notes:

- So far we've only talked about the absorption properties of products and materials...which is important...but misses half of the equation.
- A second and equally important factor in determining whether an acoustic lighting product will successfully reduce noise is size.
- In traditional designs where almost the entire ceiling is covered with ceiling tiles, the amount of noise reduction is determined mostly by the absorption properties of the tiles. This is why comparing NRC values works as a crude comparison method
- In an exposed ceiling where the ducts and beams and whatever else is present probably won't contribute to noise reduction, the amount of sound absorbing area exposed to the sound waves becomes critical.
- The implication for acoustic lighting is that no matter how well a fixture absorbs sound, its impact on solving the noise problem will only be meaningful if the fixture has a large surface area or if there are lots of them.
- In the example on the right, even though the large area luminaire shown on the right has a lower average absorption, or NRC value, than the linear pendant, the overall noise reduction capability is about 4.5 times better because of its size.
- Think of it like sopping up a puddle of water. No matter how good its absorbing capability, ten pieces of paper towel will do a much better job than one piece.

In Summary

- NRC is a simple but valuable metric to understand general acoustic characteristics
- Most building materials used in open concept spaces have low NRC values = poor absorption characteristics
- Acoustic design requires knowledge of the sound absorption properties of materials at different frequencies
- For most designs, the frequencies of interest are those related to human speech
- Acoustic lighting products should include acoustic reports that provide the relevant data
- Acoustic properties are only half of the equation: SIZE matters!

Acoustic Design Considers a Number of Factors

- Sound absorption at specific frequencies
- Total area of sound absorbing materials in the space
- Location of the sound absorbing materials – for suspended luminaires this is related to mounting height
- Location of the source of noise

Speaker Notes:

- In summary then:
- A lot of acoustic lighting products will have an NRC value on their data sheets but to understand how well they will reduce noise created by human speech requires detailed test reports.
- Of equal importance to noise reduction in open ceilings is the amount of absorption area available. Size matters!

Approaches to Acoustic Lighting

This section will cover:

1. Adding Lighting to Acoustic Materials
2. Adding Acoustic Materials to Conventional Lighting
3. Stretch Ceiling
4. True Acoustic Lighting



Speaker Notes:

- We've looked at how acoustic lighting delivers unique value by solving two design issues with a single solution - and why doing so is important.
- We've also reviewed some of the basics of acoustic design to help provide context for evaluating different approaches to acoustic lighting
- Now it's finally time to identify those approaches and compare

Starting Point: Not Using Acoustic Lighting...

The problem of noise reduction in open spaces has typically been addressed by trying to combine passive sound absorption materials such as baffles or clouds with luminaires – often of a type not intended for general illumination



Dozens of bright point sources are used to provide general illumination to make room for acoustic panels



Credit: Acoustical Solutions

Lighting and acoustic clouds battle for space, making for a lot of clutter in the ceiling



Credit: Dox Acoustics

A creative approach to acoustics limits the options available to provide general illumination within a space

The results...

- Inappropriate choice of luminaire type
- Cluttered ceilings
- Mismatched aesthetics
- Poor quality illumination

Combining lighting and sound absorption usually results in compromising the quality of the lighting

Speaker Notes:

- In the absence of mainstream acoustic lighting solutions for open ceilings, one way to resolve noise and lighting has been to do so separately.
- This inherently involves making compromises that potentially have disastrous results.
- To make room for enough passive acoustic material, it is often the case that the choice of lighting to provide general illumination is inappropriate.
- In the upper left photo dozens of point sources are used in place of proper area lighting
- And similarly in the upper right photo, some decorative looking pendant spots are wedged in between some pretty interesting acoustic panels.
- The middle image shows another way to combine them- which was to clutter the ceiling with both light fixtures and acoustic panels. While possibly more effective, this approach is certainly not aesthetically pleasing and likely not very cost effective.

Adding Lighting to Acoustic Materials Products

Acoustic materials suppliers are adding lights to their baffles and clouds



- Effective acoustic materials of appropriate size are fitted with luminaires
- The combination provides the desired effect on noise reduction
- BUT what about the lighting???

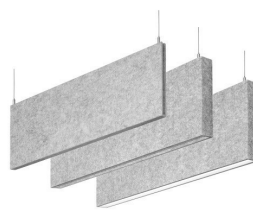
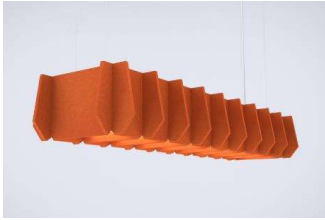
Adding luminaires to passive acoustic materials does not guarantee proper illumination

Speaker Notes:

- One evolutionary step exhibits a similar compromise: adding light fixtures to known acoustic materials likely results in good acoustic performance but almost certainly does not provide the best illumination design for the space.

Adding Acoustic Materials to Lighting Products

Lighting manufacturers are wrapping their fixtures with sound absorbing materials



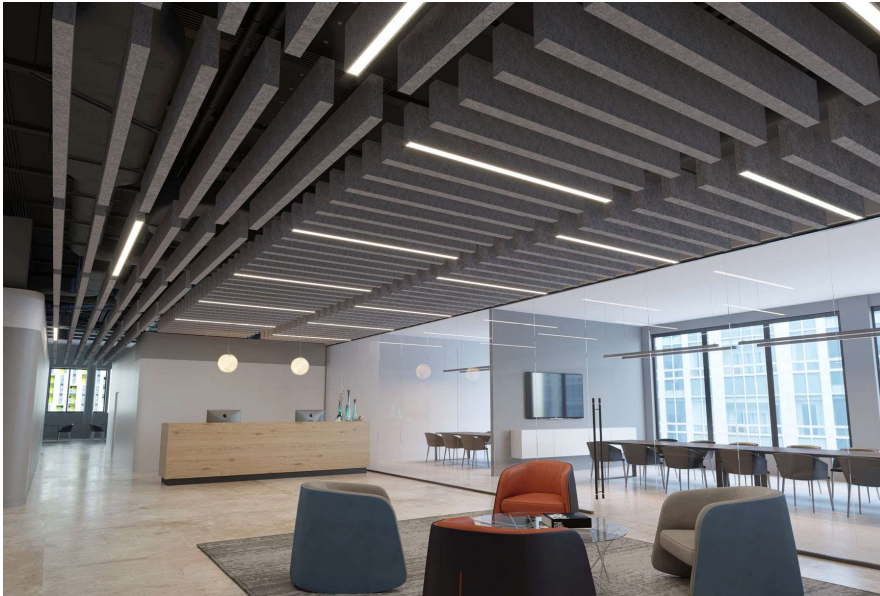
- Pendant luminaires are extended in height and wrapped in acoustic material
- Illumination may be of suitable quantity and quality
- BUT what about the acoustic performance?

Acoustic luminaires generally require additional passive sound absorbing products to provide suitable noise reduction

Speaker Notes:

- There are getting to be a substantial number of decorative light fixtures available in the market that incorporate acoustic materials, and these can be of interest for some applications where the amount of illumination required is small - such as in personal spaces. Above a restaurant table or a reading chair for example.
- For larger areas with minimum illumination level requirements, the approach often taken by light fixture manufacturers is to add sound absorbing material to linear pendant luminaires. To increase the exposed area, this also usually involves increasing the height of the housing – resulting in a tall, skinny profile similar to passive baffles.
- This similarity is fortunate because the catch to this approach is that in order to get meaningful noise reduction, a substantial number of passive baffle is required in addition to the light fixtures.
- The good news is that the lighting and the acoustics are probably both suitable for the space and it's possible to ensure they match aesthetically, but the cost is not optimized because you're paying for two solutions.
- This approach also requires that you accept having a very busy looking ceiling.

Is This Really Acoustic *Lighting*?



In this photo you will see..

Number of luminaires = 14

Number of passive baffles = 119!!

Using acoustic linear pendants may help with aesthetics but are there cost savings to be had?

Speaker Notes:

- Here is an example. To properly illuminate this space required only 14 light fixtures. To properly address noise required an additional 119 passive baffles.
- It's debatable whether the acoustic lighting in this case truly contributed any acoustic value.

True Acoustic Lighting



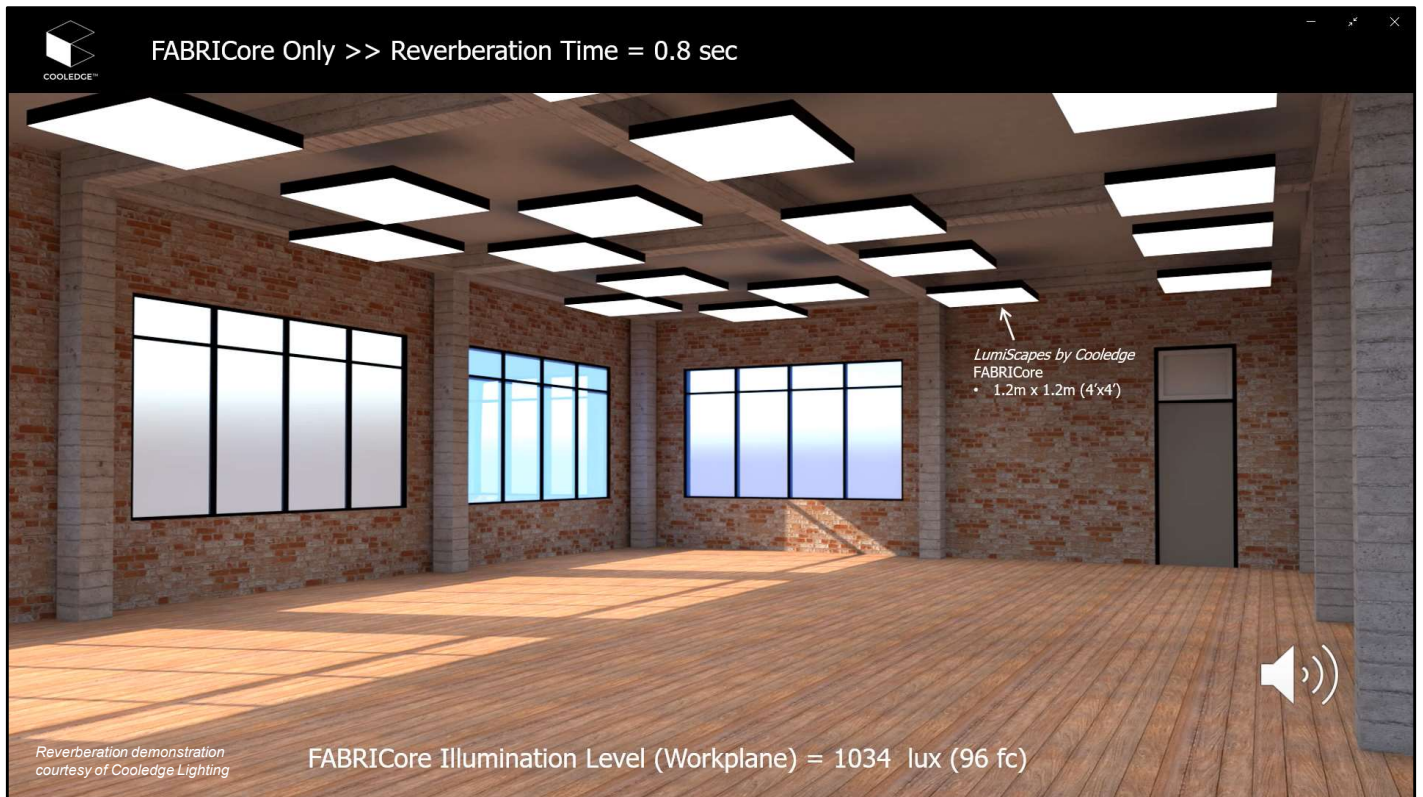
Combining passive acoustic materials with traditional general lighting fixtures results in a cluttered ceiling



A new generation of acoustic lighting fixtures is now available that deliver a clean design, provide high quality illumination, and provide a significant contribution to the overall acoustic comfort in open concept spaces with exposed ceilings

Speaker Notes:

- However, taking the stretch ceiling concept one step further, it is now possible to source large-scale luminaires that create the feeling of a luminous ceiling with fabric diffusers and provide meaningful surface area in combination with high sound absorption materials.
- The result is a clean design without a cluttered ceiling that delivers both high quality illumination and a significant contribution to the acoustic quality of the space.



Speaker Notes:

- Earlier we talked about speech intelligibility, which is essentially the ability to understand what a person is saying to us in any particular environment.
- One of the ways acoustic designers evaluate whether a space will have good speech intelligibility is to calculate the reverberation time.
- Technically, it usually involves a measurement called “RT60” which describes the length of time taken for a sound to decay by 60 dB from its original level.
- The goal of adding acoustic absorbing materials is to reduce the reverberation time which in turn increases speech intelligibility.
- This short demo gives you an idea of how large-scale acoustic lighting fixtures can reduce reverb time and the impact it has on speech intelligibility

A Case Study



Location: Mezzanine Office Space

Luminaires: 8 @ 4'x4'

- Light Output/Flux: 10,000 lm per luminaire
- CCT: 3500K
- CRI: >90

Lighting Results:

- Illuminance (workplane): 776 lux (72 fc)
- Uniformity: Min/Max = 0.65
- Glare: Max. UGR <19

Acoustic Results:

For 500Hz – 1000Hz (most important for speech)

- Avg. Decrease in Reverberation Time: ~0.8s
- % Increase in Sabins (Absorption Area): 79%

Speaker Notes:

- In this example, an open office that was built in an old warehouse space required appropriate levels of illumination for working and to offset the cave effect of the dark ceiling.
- In addition, because of the open architecture, the space needed some way to mitigate noise.
- 4x4 acoustic luminaires were used throughout the office but here we focused on the results for a mezzanine space where 8 fixtures provided a substantial level of illumination and also met criteria for low glare, high color rendering, and good uniformity that would be required if the building was to seek wellness certification.
- On top of providing good quality general illumination, these acoustic luminaires also decreased the reverberation time by 0.8 seconds – a significant amount – by increasing the absorption area in the space by 79%.
- Note that both design objectives were achieved with a single solution and without the addition of passive acoustic materials that would have to be specified through an entirely different aspect of the project.

Divisional Rivalry...

Acoustics is usually managed in Division 09 - Finishes

Lighting is usually managed in Division 26 - Electrical

Architects Are Critical for the Successful Adoption of Acoustic Lighting

- Two budgets and two sets of experts but one client paying the bills
- Acoustic lighting solves problems, saves money, and increases the wellness aspect of design
- Only the architect is in a position to coordinate the efforts of the design team to ensure successful adoption of acoustic lighting

POST-2004 MASTERFORMAT DIVISIONS

Facility Construction Subgroup

- ✖ Division 08 — Openings
- ✖ Division 09 — Finishes
- ✖ Division 10 — Specialties
- ✖ Division 11 — Equipment

POST-2004 MASTERFORMAT DIVISIONS

Facility Services Subgroup:

- ✖ Division 20 — RESERVED FOR FUTURE EXPANSION
- ✖ Division 21 — Fire Suppression
- ✖ Division 22 — Plumbing
- ✖ Division 23 — Heating Ventilating and Air Conditioning
- ✖ Division 24 — RESERVED FOR FUTURE EXPANSION
- ✖ Division 25 — Integrated Automation
- ✖ Division 26 — Electrical
- ✖ Division 27 — Communications
- ✖ Division 28 — Electronic Safety and Security
- ✖ Division 29 — RESERVED FOR FUTURE EXPANSION

Speaker Notes:

- One of the biggest challenges to the full adoption of acoustic lighting is the way construction projects tend to be structured
- Clearly, the use of acoustic lighting solves a significant design problem and in most cases, will save money for the client
- But what happens when the budget for acoustics – if there even is one - is allocated to Division 09 and the details are the responsibility of an interior designer, while lighting is budgeted separately in Division 26 and rests with a lighting designer or electrical engineer?
- How do you combine the budget and design details of two features that are typically treated as entirely different and unique aspects of a project?
- This is where the role of the architect is critical.
- As the overseer of the design effort, it is the architect who will be in a position to see the value of acoustic lighting and coordinate the efforts of the other design disciplines to ensure it correctly implemented.
- In order to do this, you will need a good understanding of what “correct implementation” really looks like.

Acoustic Lighting is the
Solution to the
Nightmare of Noise



Speaker Notes:

- And hopefully, that is what today's session has done for you.



This concludes The American Institute of Architects
Continuing Education Systems Course

Contact: *Presenter Name*

