Glass in Architecture

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PILKINGTON

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Introduction,

Of all available building materials, glass is the only one that has the unique property of light transmission. Greater light transmission creates a more comfortable working and living environment – one of the most important demands of contemporary architecture, but not possible without the development of glass.

While this light transmitting quality remains of primary importance, nowadays glass is used in ways that go well beyond the simple window. Thanks to substantial technological developments in production, processing and design, glass offers many additional functions. It can now fulfil not only aesthetic but also thermal, solar control, safety and even self-cleaning functions. It enables architects to achieve their artistic vision as well as other client requirements.

Glass plays a vital role in improving energy efficiency. It can help to reduce buildings' capital outlay, running costs and associated CO_2 emissions. As a result, it makes a positive contribution to their sustainability and allows them to meet the requirements of international multi-criteria accreditation systems, such as LEED or BREEAM, that confirm that a building is environmentally friendly.

In this second edition we present some of the latest and most impressive office and public building projects, where architects have combined functionality and sustainability with interesting design using modern glass solutions. We hope to give you some inspiration and a better understanding of one of the most fascinating materials used in 21st Century architecture.

Dr Kevin Sanderson

ITALY

Cantina Antinori Winery, 2012

Pilkington **Optiwhite**™ T

Pilkington **Optilam**™ OW

Pilkington **Optilam**™ Therm S3 OW

arch. Studio Archea Associati

photo: © Pietro Savorelli

Antinori Winery located in Bargino, Tuscany one of the most beautiful regions of Italy, is a unique example of how a building can merge harmoniously with the surrounding rural scenery. The multi-layered roof, covered with soil and vines, was designed to blend into the undulating landscape. Only two rows of glass, extending horizontally along the slope, suggest the presence of any underground structures.
To showcase the panoramic views of the surrounding countryside, designers chose Pilkington **Optiwhite**™, a true low-iron glass, for the façade and skylights, allowing the picturesque landscape to blend seamlessly with the vineyard.

Floor-to-ceiling glazing, used on both levels of the building, allows the connection to be made between the winemaking traditions inside and the vines in the vineyard beyond.

The use of natural materials such as glass and wood allows the winery to blend seamlessly with the stunning Tuscan landscape.

Extra clear Pilkington **Optiwhite**™*, a true low-iron glass, enhances the spectacular views of the beautiful surroundings.*

Subtle underground lighting creates a mystical ambience.

The interior of the winery is divided into two main storeys. The upper level hosts visitor facilities and a wine tasting area.

The architects used extra clear Pilkington **Optiwhite**™ *glass for both the interior and the exterior to create a pleasing illusion of boundless space.*

Glazing in the office area allows light to fill the room creating a bright and spacious working environment.

Despite its height and breadth, the glass façade constructed of laminated Pilkington **Optilam**™ OW*, offers high light transmission as well as protection from wind and accidental damage.*

USA

The Department of Computing and Information Science, Cornell University, 2014

Pilkington **Optiwhite**™

arch. Morphosis Architects

photo: © Roland Halbe Fotografiie

The Department of Computing and Information Science located in Ithaca, New York, known as Bill and Melinda Gates Hall, incorporates a sleek design of stainless steel panels together with an innovative twist on digitally printed glass to create a building complete with outstanding visual clarity and views. The new hall has a two layer façade specifically designed to meet particular aesthetic and performance purposes, which were easily obtained through the use of Pilkington **Optiwhite**™, a low-iron glass with excellent light transmittance.

The main façade of the university is made of glass partially covered by steel panels giving the impression of movement.

A four-floor-high atrium with a full-height glass façade, provides the interiors with outstanding light, encouraging people to have constructive meetings and relaxing get-togethers.

The building is designed to inspire creative thinking by information technology students.

Pilkington **Optiwhite**™ *extra clear low-iron float glass was chosen by the architect for its clean and colourless qualities, and its versatility.*

NORWAY

Community Church Knarvik, 2014

Pilkington **Optilam**™ Therm S3

Pilkington **Optitherm**™ S3

arch. Reiulf Ramstad Arkitekter

photo: © Hundven-Clements Photography

The Community Church in Knarvik stands on a hilltop located on the scenic west coast of Norway. Designed by architects from Reiulf Ramstad Arkitekter, it is an outstanding example of a contemporary sacred building. The glazing consists of laminated Pilkington **Optilam**™ Therm S3 and Pilkington **Optitherm**™ S3, a low-e coated glass, which helped designers to meet the specific safety, lighting and thermal insulation requirements.

Sharp geometric shape of the church resembling a star was inspired by the surrounding landscape.

The wooden uniformity of the building is broken by regularly-spaced vertical glass panes.

Laminated glass was used for extra strength given the building's mountain location and the shape of the high windowpanes that are narrow at the base.

Vertical glazing combined with pine conveys a contemporary feel to the interior of the church.

UNITED KINGDOM

Stonehenge Visitor Centre, 2013

Pilkington **Planar**™ Intrafix

Pilkington **Optiwhite**™

Pilkington **K Glass**™ OW

arch. Denton Corker Marshall

installer: Vitrine Systems Ltd.

photo: © Vitrine Systems Ltd.

Stonehenge Visitor Centre, located near the prehistoric stone circle, a world heritage site, is the embodiment of artistic craftsmanship combined with the mystical atmosphere of Stonehenge. Supported on irregularly spaced columns, it blends inconspicuously with the historic surroundings. Integration is enhanced by the glass façade made of Pilkington **Planar**™ Intrafix, a structural glazing system, using an extra clear Pilkington **Optiwhite**™ glass and a low-e glass, Pilkington **K Glass**™ OW.

The glass façade creates a seamless connection between the inside of the Visitor Centre and the world outside.

The centre is designed to blend into its surroundings by using narrow columns to evoke a copse of trees.

The façades have been installed using a frameless structural glazing system, Pilkington **Planar**™ Intrafix*, where the external glass is not penetrated with fittings, which ensures an overall uncluttered, clean aesthetic appearance.*

To withstand the frequent high winds on Salisbury Plain as well as offering excellent thermal performance that maintains a comfortable environment for visitors, the double glazing is made of Pilkington **K Glass**™ OW *as the outer pane, combined with extra clear* Pilkington **Optiwhite**™ *as the inner pane.*

At night, the surrounding area is illuminated by internally lit windows creating a spectacular visual display.

The concept behind the glazed pavilion – which contains a café, a gift shop and an educational area – was to connect the interior of the building with the striking landscape that surrounds it on all sides. The structure allows uninterrupted views and keeps visitors in close contact with the landscape even when inside.

The modern visitor centre works harmoniously with the mystical surroundings of the historic stone circle.

FRANCE

The glass platform "Le Pas dans le Vide", 2013

Pilkington **Optiwhite**™

arch. ER2i INGENIERIE, IMPLICITE

photo: © Bertrand Delapierre

The viewing platform "Le Pas dans le Vide" is located at the top of the Aiguille du Midi in the French Alps. The glass-box, suspended at an altitude of almost 3,842 meters above sea level, is constructed from Pilkington **Optiwhite**™, an extra clear, true low-iron glass with very high light transmission and superb visual clarity. The frameless glazing of the glass box ensures that nothing distracts the viewer from the breathtaking landscape.

Stepping onto the viewing platform, visitors are surrounded by a virtually invisible ceiling, floor and walls, creating an extraordinary sensation of floating above the 1,000-metre precipice.

Highly transparent extra clear Pilkington **Optiwhite**™ *glass allows viewers to experience the true majesty of the Mont Blanc massif.*

Proven glass processing and installation techniques were essential for the construction of the Alpine viewing platform to ensure that the whole structure can withstand wind speeds of up to 220 km/h.

Each of the three walls, ceiling and floor of the glass-box is made of three panes of 12 mm toughened Pilkington **Optiwhite**™ *laminated with two* SentryGlas® *interlayers.*

Suspended at the top of the Aiguille du Midi sheer rocky spire, the glass platform provides awe-inspiring views that both impress and thrill at the same time.


OASIS OF SCIENCE
OASIS OF SCIENCE

FINLAND

Helsinki University
Main Library Kaisa-talo, 2012

Pilkington **Suncool Optilam**™ 70/35 OW

Pilkington **Suncool**™ 66/33 OW

Pilkington **Optiphon**™ OW

arch. Anttinen Oiva Arkkitehdit Oy

photo: © Mika Huisman

The new building of the Helsinki University Main Library Kaisa-talo is located in the historic area of the city. The curved brick façade is integrated with the surroundings by its height, materials used and design. A large area of arched glazing meets the highest requirements of modern "green" architecture and energy efficiency with sun and noise protection providing users with a real gateway to the new information age.

The brick façade with evenly spaced small square windows blends perfectly with neighbouring buildings. The array of windows is broken by a large area of curved glazing that is several floors high.

A properly selected acoustic laminated glass, Pilkington **Optiphon**™ OW*, provides excellent noise reduction and a peaceful environment that allows readers to work and study in comfortable conditions.*

The concept of the façade is reflected in the interior architecture of the building, which is based on arches.

All the glazing was designed with extraordinary attention to detail in order to maximise access to natural light. With this aim in mind the architects chose the extra clear low-iron glass Pilkington **Optiwhite**™ *as a substrate.*


MUSIIKKI
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The large amount of glass provides maximum transparency from the outside making this monumental structure look less dominant than one might expect from a building on this scale.


McDonald's

THE NETHERLANDS

McDonald's pavilion, 2015

Pilkington **Optilam**™ OW

Pilkington **Optiwhite**™

arch. Mei architects and planners

photo: © Jeroen Musch

The McDonald's pavilion located in the heart of Rotterdam is an excellent example of modern glass architecture. The glazed façade opens up views of the monumental historical building located behind it. A fully transparent façade, designed by Mei architects and planners, makes it seem as if the life of the city flows through the building.

The building blends well with the historic area of Coolsingel.

Extra clear low-iron Pilkington **Optiwhite**™ *allows passers-by to admire the clean functional interior featuring a white spiral staircase leading from the lobby to the seating area on the first floor.*

Large glass panels provide visitors with a beautiful panoramic view overlooking Coolsingel.

The interior wall decoration consists of gilded anodized, perforated aluminum sheets representing a group of Rotterdam residents.

At night the spectacular pavilion shines, arousing curiosity and delight.

For additional security, the designers opted to use the laminated safety glass Pilkington **Optilam**™ OW. *If broken, this glass will remain in place, avoiding injury and making the glass façade vandal proof.*

ITALY

Museo Egizio of Turin, 2015

Pilkington **OptiView**™ Protect OW

arch. Isolarchitetti

photo: © Pino & Nicola Dell'Aquila

The Museo Egizio of Turin houses the world's second largest collection of Egyptian antiquities after Cairo. More than 30 thousand exhibits are showcased in almost 200 purpose-built exhibition display cases designed by Isolarchitetti. They were made from the extra clear anti-reflective laminated glass, Pilkington **OptiView**™ Protect OW, which emphasises the beauty and splendor of the ancient collection and preserves it for future generations.

Due to the anti-reflection coating placed on both surfaces of the glass, ancient artefacts are clearly visible, giving visitors the uninterrupted attention the exhibits deserve.

Ancient artefacts are placed in tall display cases that are up to four meters wide.

To protect Egyptian antiquities against theft or damage, the architects from Isolarchitetti chose laminated safety glass.

Pilkington **OptiView**™ Protect OW, *used for the display cases fully protects the valuable collection from the harmful effects of UV radiation, which over a long period, may accelerate the harmful processes of colour-fading, fabric destruction and paper yellowing.*

Display case glazing consists of an extra clear substrate providing perfect visibility and allowing visitors to observe the colours and details of the exhibits as they really are.

POLAND

Academy of Fine Arts in Warsaw, 2014

Pilkington **Optilam**™ Therm S3

Pilkington **Optifloat**™ Clear T

arch. JEMS Architekci

photo: Wojciech Kryński

The Academy of Fine Arts in Warsaw is a result of the recent expansion of the historic university building, which was built more than 100 years ago. The open courtyard combined with a large area of full-height glazing harmoniously blends historic architecture with the modern form of an artistic institution. Appropriately selected glass, Pilkington **Optilam**™ Therm S3 and Pilkington **Optifloat**™ Clear T, allowed the architects to achieve the desired visual effect, while meeting the functional requirements of energy standards, safety and noise protection.

From the vantage point of the courtyard, reflections of the historic façade of the building are visible on the uniform glass wall.

The building façade consistently follows the line of the surrounding buildings. The street frontage is interrupted by the courtyard that is formed between the historic university building and its new wing.

In order to meet the highest safety requirements toughened glass with increased resistance to mechanical and thermal stresses was used, as well as laminated glass, which doesn't fragment upon impact thus reducing the risk of injury.

Simple, monochrome interiors provide a suitable background for the dynamic, varied artistic creations. The floor-to-ceiling glazing fills the space with natural light providing a pleasing environment for visitors.

The role of the glazing was to achieve an unimpeded view of the Vistula River and the greenery of the boulevards.

The old building and the new structure are separated by a narrow gap leading to the courtyard of the building, which in turn opens out into the Powiśle district.

Light reflections appearing on the courtyard façades create an intimate space with blurred borders.

FINLAND

City Library in Seinäjoki, 2012

Pilkington **Planar**™ Triple

Pilkington **Optiwhite**™

Pilkington **Optitherm**™ S3

arch. JKMM Architects

photo: © Tuomas Uusheimo

The City Library in Seinäjoki, Finland is designed by the world famous architect Alvar Aalto. After almost five decades, it has recently been expanded to meet current demands. JKMM Architects' key aim was to initiate a dialogue between the old and the new part of the building as well as to maximise both the environmental and aesthetic requirements.
The library consists of three sculptured units that comprise a variety of shapes orientated in different directions. Pilkington **Planar**™ Triple structural glazing system was used for the large area of glazing to display boarded-formwork concrete interiors.

Minimising the energy consumption and maximising both the environmental and aesthetic requirements were the architect's main priorities.

The use of Pilkington **Planar**™ Triple *in combination with a glass mullion system – the last word in transparency.*

The interior lighting floods through the large glazed surfaces allowing passers-by to admire the concrete interiors that feature a ceiling with an unusual, up and down zigzag decoration.

The structural glazing system allowed the architects to create bright and highly attractive library interiors, with more light and a greater feeling of space.

POLAND

LW Bogdanka S.A. Head office, 2011

Pilkington **Activ**™ Blue

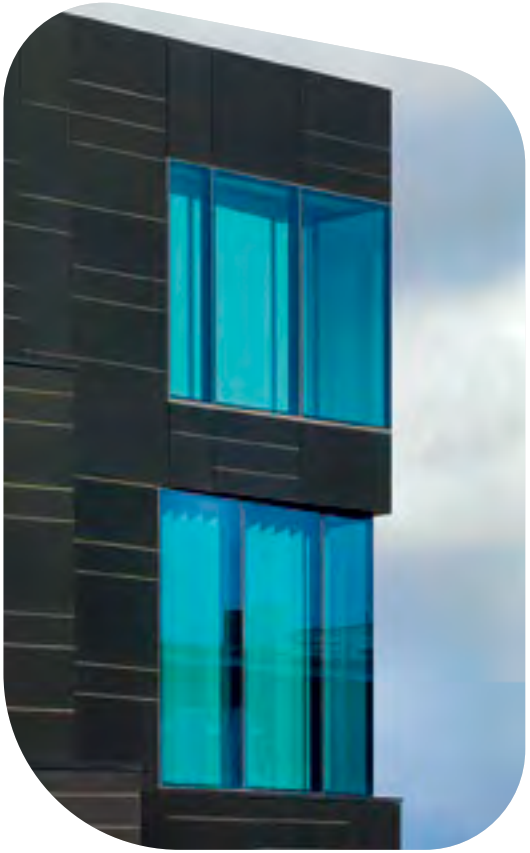
arch. Biuro Usług Architektonicznych PROFIL Sp. z o.o.

photo: Wojciech Kryński

The architectural concept envisioned by the management board of the Bogdanka coal mine office building, was the natural appearance of blocks of coal. The aim was realised through the use of black matt structural panels in combination with glazing made of Pilkington **Activ**™ Blue, self-cleaning body-tinted solar control glass in a unique blue colour. Delicate light reflections contrasting with the material used in the façade, remind the visitor of coal in its natural state.

The architects chose Pilkington **Activ**™ Blue *because of the original colour, which enhances the effect of the reflected blue sky with clouds shifting through it.*

The façade of the building is a direct reference to the main architectural idea, which was to represent a "coal block" with all its complexity and uneven surface similar to formations in natural rock.



Self-cleaning properties make the glass an ideal choice for use in hard-to-reach places.

The unique blue tinted glass helps to keep internal temperatures cool while still maintaining excellent light transmittance, low light reflection and high energy absorption, which is necessary especially on the front elevation of the building that is exposed to the sun.

THE NETHERLANDS

Fire Station in Doetinchem, 2014

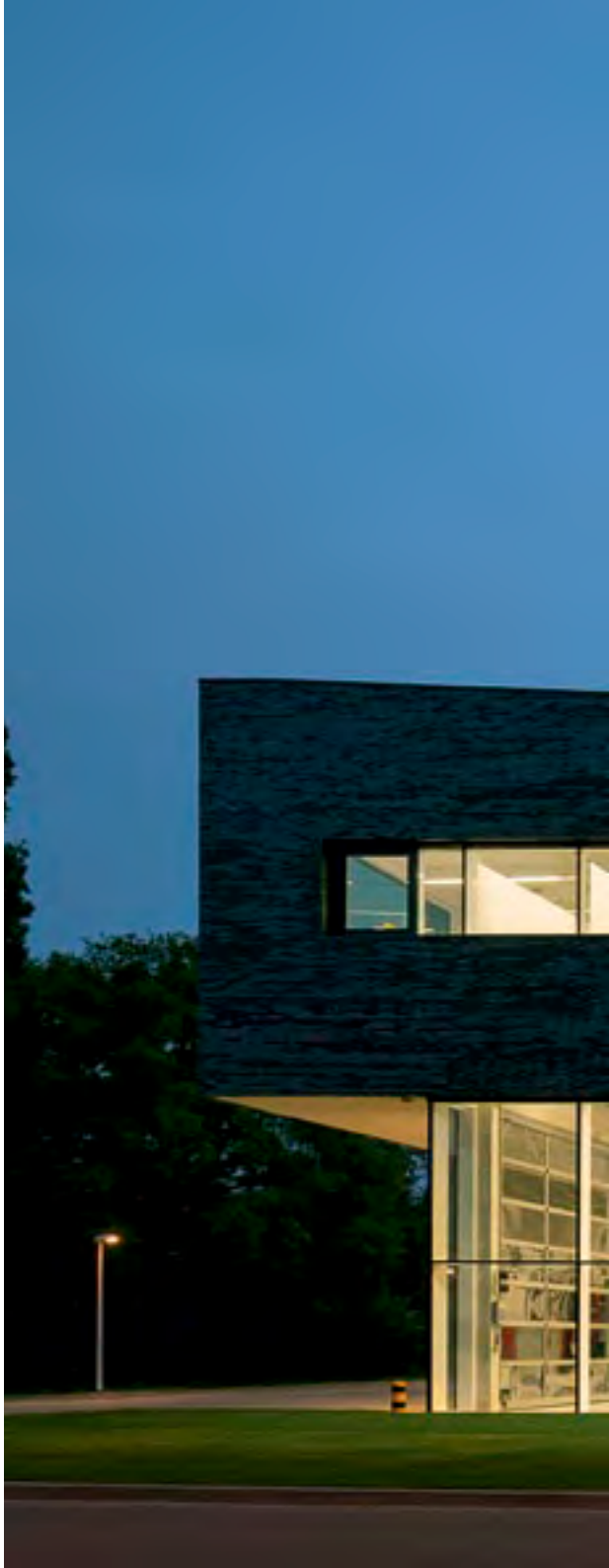
Pilkington **Suncool**™ 70/35

Pilkington **Pyrodur®**

arch. Bekkering Adams Architecten

photo: © Ossip van Duivenbode

The fire station located by a major avenue in Doetinchem is embedded in green surroundings. It was designed as a villa with offices, meeting rooms, training facilities, living and sleeping areas, as well as a sheltered area for the fire engines. The building is dominated, inside and out, by transparency obtained through the huge area of glazing. Due to safety regulations some parts of the glazing were made of laminated fire-protection glass, Pilkington **Pyrodur®**.



Glazing reveals the dynamic environment of the fire station, operational 24 hours a day.

A spacious staircase located in the centre of the fire station connects all floors and functional areas.

The building features solar control glass Pilkington **Suncool**™ 70/35 *that offers benefits in summer and in winter due to its combined solar control and low-emissivity energy-efficient properties.*

The fully glazed sheltered area for the fire engines stands under huge cantilevers.

The building is located on the main street in Doetinchem, the shady street is lined with trees.

POLAND

International Education Centre, University of Information Technology and Management in Rzeszów, 2010

Pilkington **Profilit**™ Clear

arch. Urszula Pomianek

photo: Wojciech Kryński

The International Education Centre, located in the University of Information Technology and Management campus in Kielnarowa, is a cylindrical building housing an amphitheatre style auditorium and a multi-media library. Pilkington **Profilit**™ Clear, used in the profiled glass, separates vertical narrow windows spaced at equal intervals along the façade. The glass provides excellent interior lighting and a panoramic view of Pogórze Dynowskie.

The profiled glass gives the interior an intriguing look, providing it with a soft, diffused light.

Pilkington **Profilit**™ Clear
has a smooth surface,
without typical ornament.

Pilkington **Profilit**™ Clear *with low-e coating provides good thermal insulation.*

Profiled glass is easy to install and therefore perfect for the arched aluminium sections.

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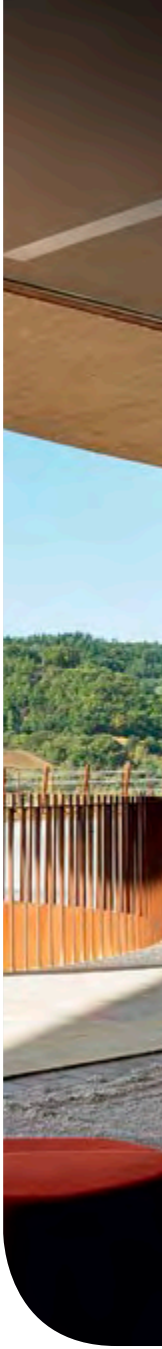

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