

Facade and  
interior



In very close collaboration, MICAM and TMP & S have designed and manufactured wall and facade cladding solutions to meet the demands of today's public spaces, airports and other busy environments.

# Your partners in protection

Working together to create  
a sustainable and safer future

*By TMP & S*

**MICAM**



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## Proven to protect

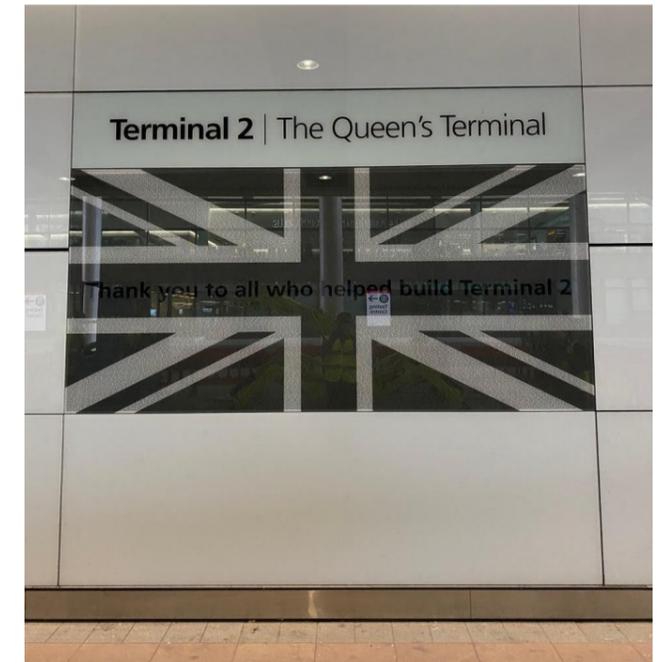
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Cover photo reference:

Terminal 2 LHR

TMP & S expertise: Airport Security & Anti-terrorist implementations  
MICAM expertise: Composite wall lining system & Blast proof Glass

It should be noted that the details, illustrations, general technical information, and drawings contained in this brochure are only general proposals and details which merely describe basic functions schematically. They are not dimensionally accurate. The applicator/customer is independently responsible for determining the suitability and completeness for the construction project in question. Neighbouring works are described only schematically. All specifications and information must be adjusted or agreed in the light of local conditions and do not constitute work, detail, or installation plans. The technical specifications and product information included in the Technical Data Sheets and system descriptions/ approvals must be observed.



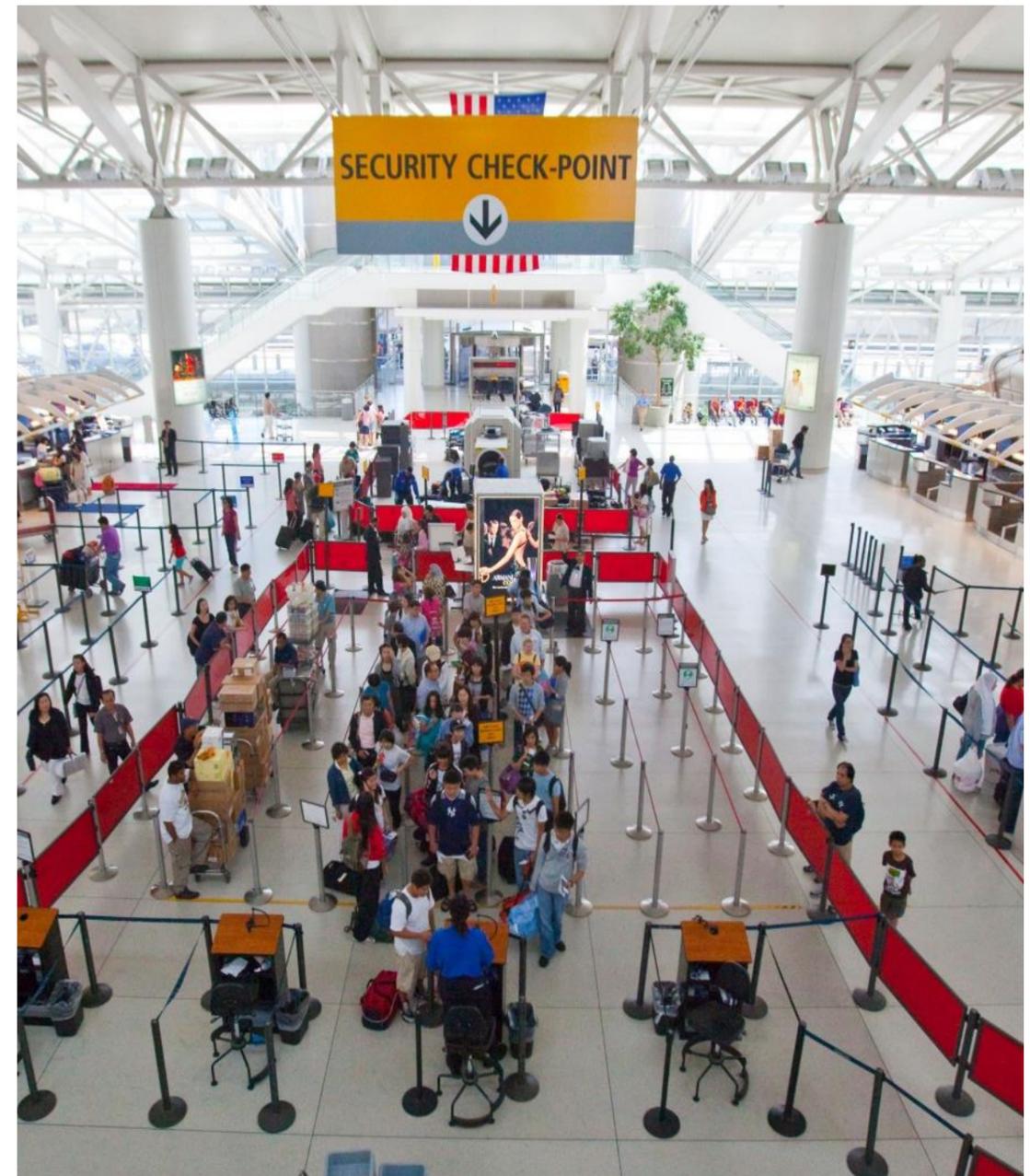
# Why protection needs to be your primary consideration

The world is going through turbulent times. In attempts to disrupt daily lives, public infrastructure are often a target – putting the lives of ordinary people at risk as they go about their daily business. That's why, when designing and constructing new transportation hubs, leisure complexes, shopping malls, entertainment venues and other public spaces, it's vital to do all we can to protect the lives of the people who use them.

Fortunately, today's advances in technology and engineering have led to the development and validation of structural glass and cladding systems that can ultimately mitigate the risk from the

impact of blasts, as well as offering many other benefits besides. This has been successfully demonstrated in the recent collaboration between TMP & S and MICAM at Manchester Airport's Terminal 2, a major construction project which had to be designed, manufactured and installed to meet strict ASIAD (Aviation Security In Airport Developments) requirements.

This brochure highlights the capabilities of both systems, how they've been used to great effect in the T2 project, and – most importantly – how they could work for you.





# Public safety first

Going about our daily lives shouldn't be a risk. However, the general public is always potentially vulnerable, whether from accidental catastrophe or premeditated terrorism. But much more can be done to protect them – especially when designing new structures for public spaces and general infrastructure.

Fire performance and safety is always a primary consideration, and essential for any public infrastructure project; and while vandalism and graffiti tend to be less life-threatening, mitigating them is vital to maintain the functionality of the structure. In recent times though, protection against terrorism and explosion has become necessary – but is much more difficult to achieve.

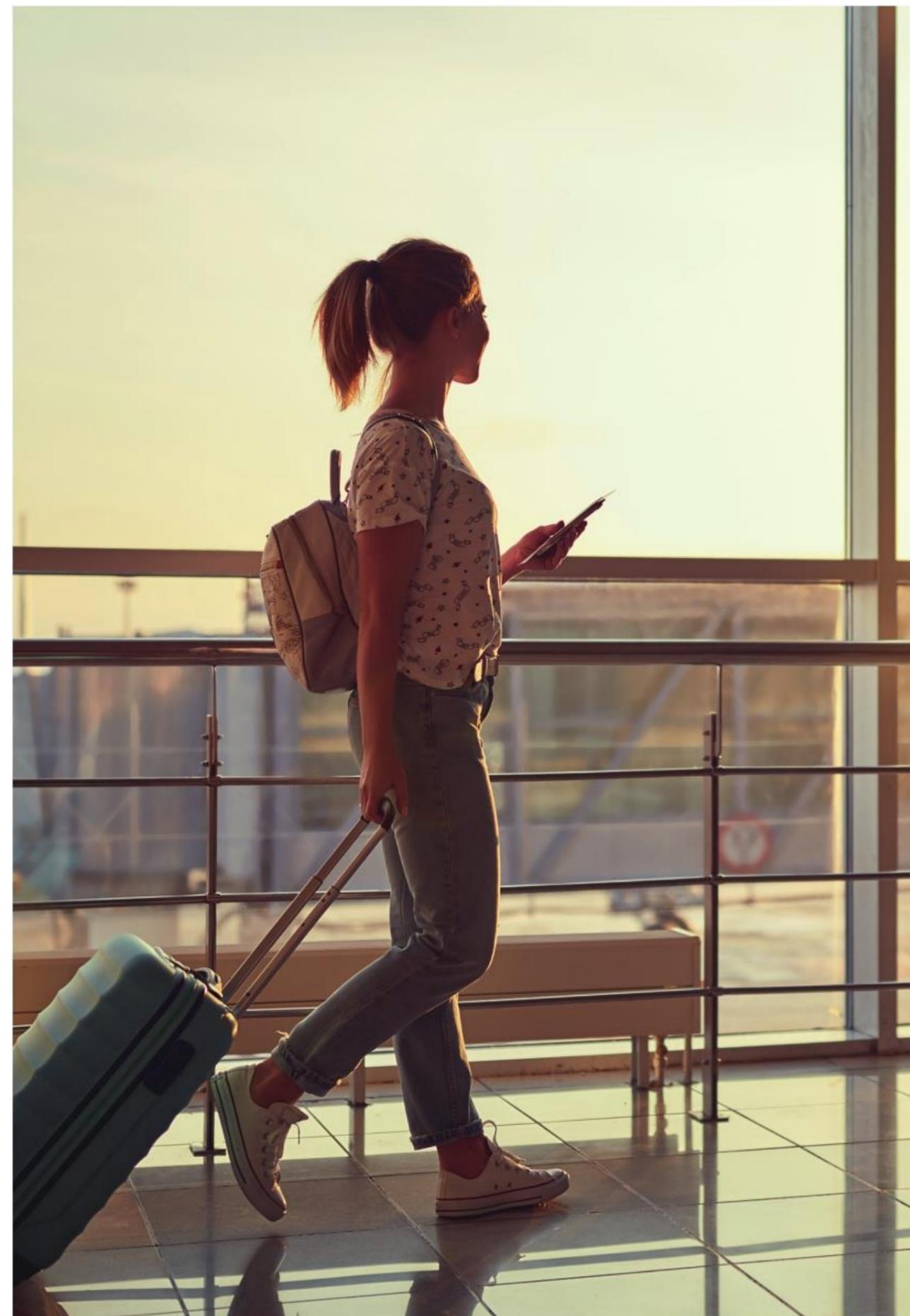
There are four basic physical protection strategies to consider in buildings to resist explosive threats: establishing a secure perimeter; mitigating debris hazards resulting from the damaged façade; preventing progressive collapse; and isolating internal threats from occupied spaces. The effectiveness of each depends on the magnitude of the explosive threat, which can range from small, hand-carried devices to vehicles packed with explosives.

The hazard potential of any blast changes according to its distance from a structure. A charge extremely close to the target structure gives a high intensity pressure load in a localized area, tending to shatter or shear through structural materials. At a greater distance, the intensity of the pressure is greatly reduced, but the surface area it affects is much greater – increasing the hazard potential over a larger section of the structure.

A building's response to explosive loading is highly dynamic and interactive, and by controlling the flexibility and resulting deformations, the structural facade and internal systems can be designed to dissipate huge amounts of blast energy, maintaining the building's integrity and reducing damage and casualties.

TMP & S and MICAM systems have been designed and validated to deliver and often exceed the required performance in this vital area of building design.

By *TMP & S*  
**MICAM**





# A partnership proven to protect

TMP & S and MICAM are both innovators unique in their domain. While both companies offer products and services covering a wide range of structural applications, two of their systems have led to the formation of this close working partnership.

The MICAM Air Glass system offers superb design flexibility combined with outstanding framework, impact and blast resistance, ideal for areas where aesthetics are as important as safety.

MICAM's advanced Composite Wall Lining systems, including MICAM Horizon™, MICAM Secure™ and MICAM FragShield™, have unrivalled blast, anti-ballistic and impact performance.

The intention is to be able to provide architects and designers with the materials and systems they require in order to develop and deliver safer environments whilst maintaining the desired aesthetic.

Both systems provide functional design with the benefit of a shared common structural making them time and cost-efficient to install, when specified together. Most importantly, both systems have been rigorously tested to offer proven protection in terms of impact, reaction to fire and blast, and meeting the highest requirements of public spaces.

The systems are graffiti-resistant and easy to maintain, integrating seamlessly into modern architectural design.

## System

1. Substrate wall.
2. Substructure
3. MICAM Composite & MICAM Air Glass Panel



1 2 3

Design



Structural/blast verification

In-house manufacture to internationally recognised standards



Installation expertise

Certification



Product Warranty

TMP & S together with MICAM Air Glass & Composite Wall Lining Systems offering YOUR complete ... ONE STOP SOLUTION.

### Design

The Project Team has over 25 years' experience of delivering compliant installations in airports and other public spaces, combining an unrivalled understanding of products and applications with full design support.

**Structural/blast verification**  
We produce compliant arena-tested systems, with a commitment to on-going product R&D.

**In-house manufacture to internationally recognized standards**

Both MICAM Air Glass and MICAM Horizon™ composite systems are manufactured in-house, allowing more control over product quality and the production process, streamlining logistics and controlling costs.

### Installation expertise

In-house installation ensures the architectural design aesthetic, and the regulatory performance and safety requirements are delivered cost effectively and guaranteed for the service life of the installation

### Certification

We're able to provide access to independent, expert validation of all systems.

### Product Warranty

MICAM systems offer long-term warranties on both materials and installations.

Legacy support for installations is available, ensuring the systems continue to provide the design intent throughout the service life of the building.



# Aesthetics engineered for safety

MICAM Air Glass is a ventilated rainscreen cladding system which can be used externally or internally.

It consists of a glass-faced composite panel, thermal insulation and sub-construction, with tempered safety glass adhered to a carrier board to produce an inseparable, composite panel. This protects the stainless steel or aluminium sub-construction from rain.

Used as such, the system makes a building thermally-efficient and keeps its underlying structural frame warm and dry. But where MICAM Air Glass really comes into its own is with its aesthetic potential – the façade can have many different panel sizes, colours and finishes, to create a truly individual look.

The system uses tailor-made panels manufactured individually, offering a wide range of shapes and an even more impressive array of colours. Each colour is fused to the back of the glass before the toughening process to give a permanent colour that won't wear, scratch, fade or be damaged by water.

Panels can be matched to almost any colour, or can even be screen printed to give even more design possibilities using patterns, illustrations, photos or corporate logos – the possibilities are truly endless.

Glass offers exceptional design flexibility in terms of form too, and panels can be supplied in square, rectangular, trapezium and parallelogram shapes, as well as being cut to incorporate lighting or control panels.

Opposite page from top, clockwise:

London Heathrow Terminal 2

Manchester Airport Terminal 2





# MICAM Air Glass: proven performance

MICAM Air Glass is certified for all standard applications, including assessment of wind loads, safety and durability.

It's environmentally-friendly too (made from 96% recycled glass), graffiti and vandal-resistant and with a reaction to fire of A2, s1-d0. Rigorous testing under extreme conditions has shown that it also meets NHBC standards and UK Building Regulations – including fire spread – and has a minimum certified expected life of 30 years. The system is also fully guaranteed.

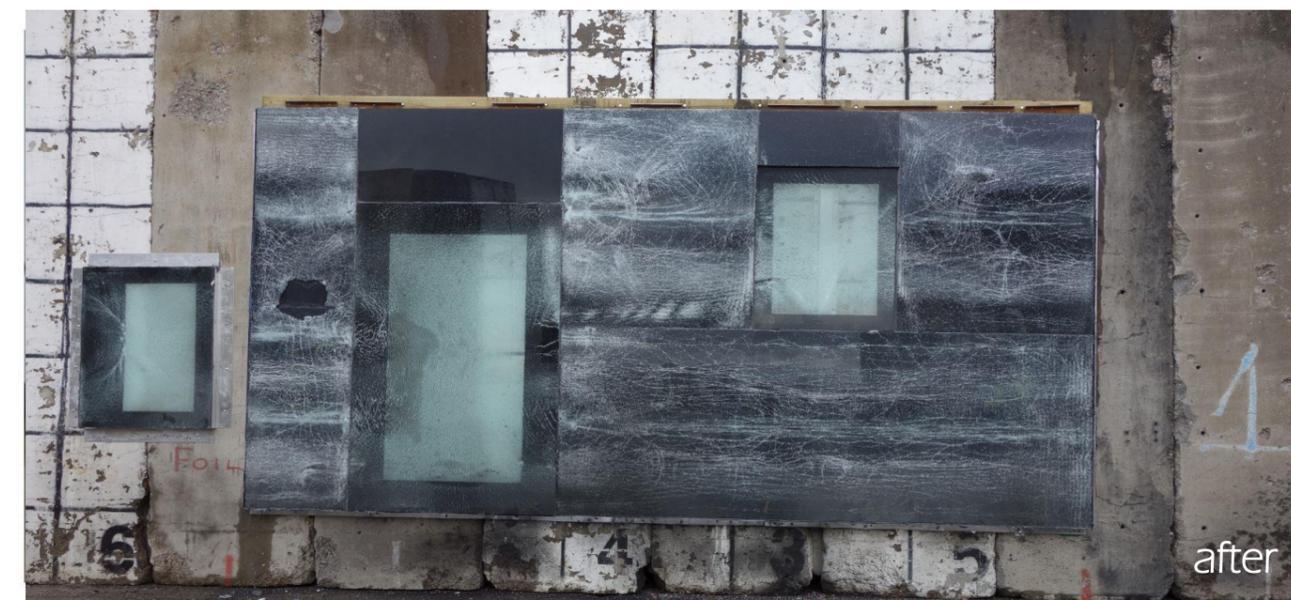
Should a toughened glass panel be broken from physical impact, the composite construction means the shattered fragments remain bonded to the backing board, thus mitigating any risk from flying fragments of glass – and enabling it to meet the toughest impact and blast testing standards.

Opposite page from top, clockwise:  
Impact, bomb blast and seismic testing of MICAM Air Glass

Below: Manchester Airport Terminal 2



before

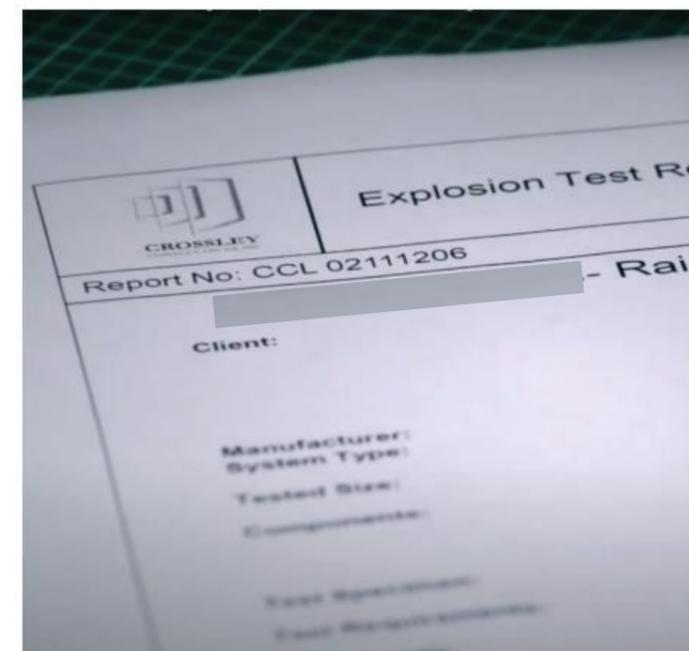


after

## Impact and Blast Testing

MICAM Air Glass is suitable for specification within high traffic areas, as it's passed all industry standard soft-body and hard-body impact tests to CWCT TN76 as well as BS EN 356. In fact, this system currently holds the highest impact test rating of all glass rainscreen cladding systems in the UK and Europe.

It has also passed stringent bomb blast tests, demonstrating its suitability for use in high profile public spaces such as airports and train stations. In accordance with ISO 16933 'Glass in Building – Explosion resistant security glazing', the results were outstanding and non-comparative.





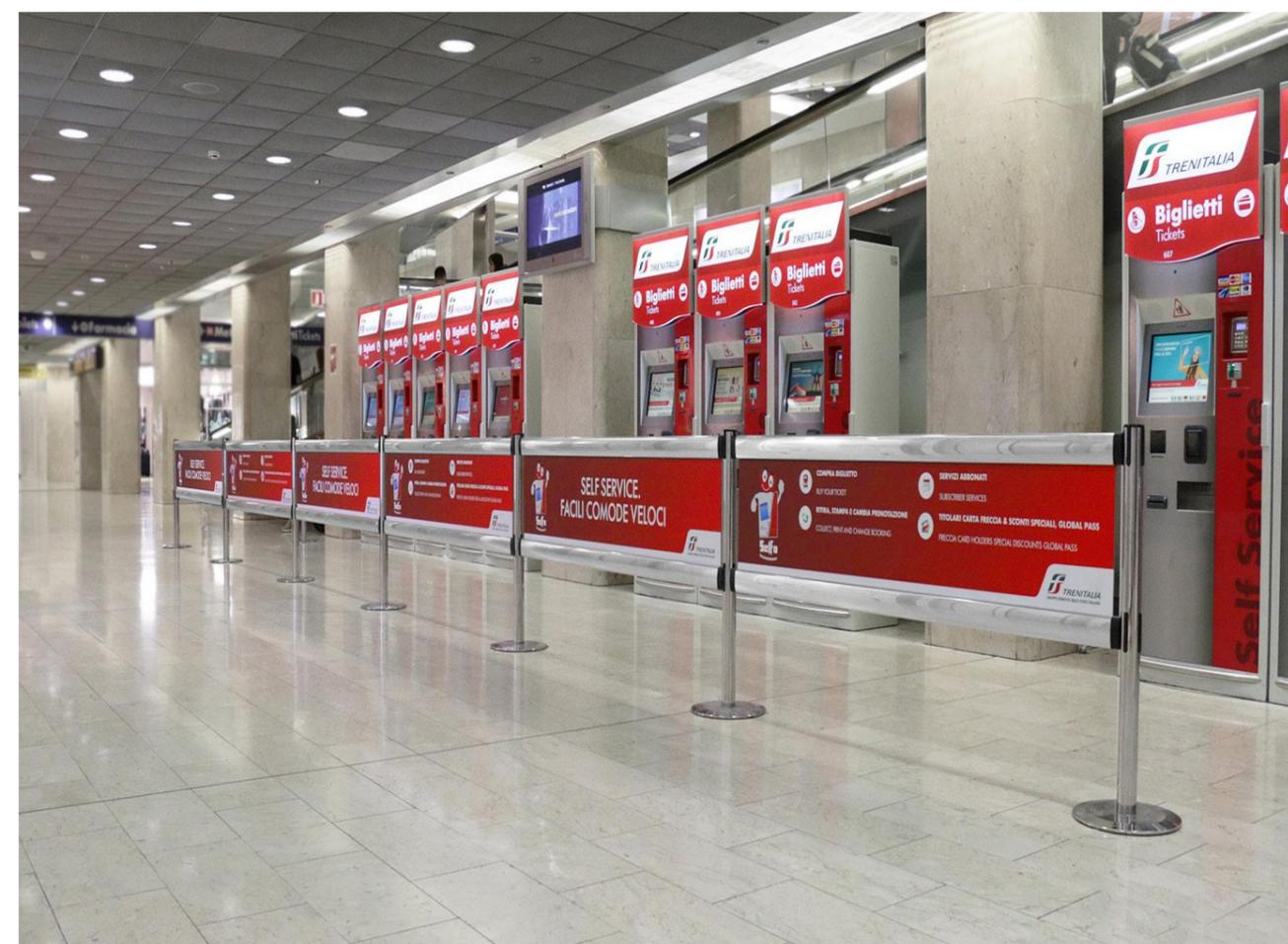
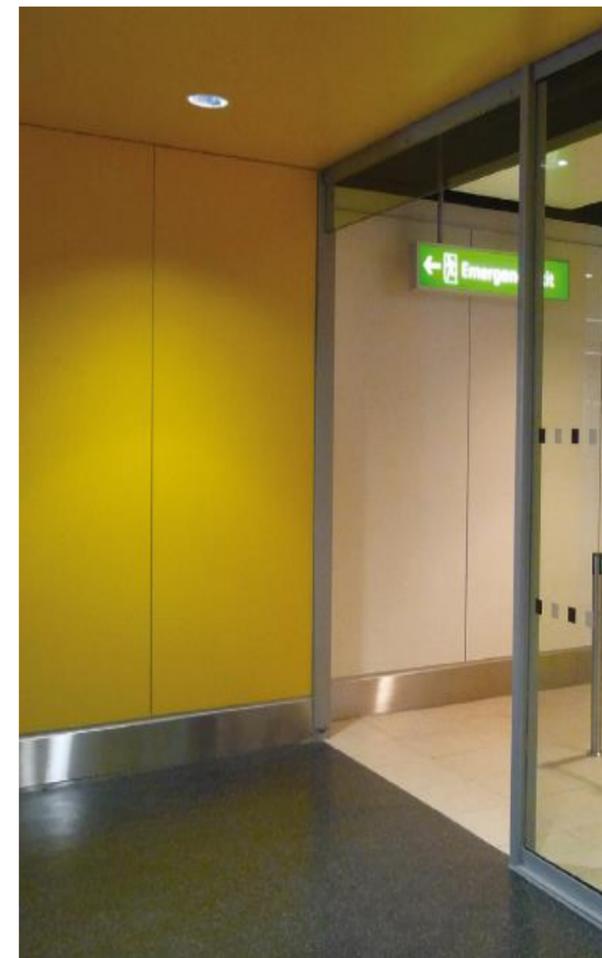
# Proven to protect

MICAM's range of advanced Composite Wall lining systems has been specifically designed to meet the stringent demands of airport building environments and other public spaces.

## Blast Testing

Extensive development and rigorous testing have shown the MICAM panel system does not increase the lethality of a Person-Borne Improvised Explosive Device (PBIED). There's no damaging secondary fragmentation produced, either by interactions with the blast wave or with primary fragments found in a PBIED.

Testing was undertaken in accordance with the test criteria set out in ISO 16933, 'Glass in Building – Explosion resistant security glazing – Test and classification for arena air blast loading'. The trial charge was a 15kg TNT equivalent device at a stand-off range of 6 metres to the front face of the wall panels.





# The MICAM Composite Wall lining systems

## MICAM Horizon™

The MICAM Horizon™ system is based on MICAM's proprietary fibre-reinforced composite panel (Low Smoke) material LSM21, demonstrating exceptional performance over 15 years of compliant installations.

### Blast Properties

Complies with ASIAD bomb blast requirements; MICAM LSM21 panels offer safe break properties and do not shatter or produce hazardous fragments.

### High Impact Resistance

MICAM LSM21 panels provide outstanding impact resistance, so trolley rail protection is not necessary in most normal and high traffic areas.

### Excellent Fire Performance

LSM21 is a Class O material (England and Wales Building Regulations), and complies with EN 13823 Euro Class B and EN 13501-01 class B-S1-d0

### Removable

Individual panels can be removed for access to services if required.

### Panel Orientation

For greater flexibility and design options, the Horizon™ system's 1200 x 2400 or 1200 x 3000mm panels can be installed either vertically or horizontally.

### Graffiti and UV Resistance

MICAM LSM21 panels are UV-stable and graffiti can be cleaned with water-based cleaning materials.



## Colours and Graphic Overlays

The panels are available in a neutral- white finish as standard. However, virtually any colour and many specialist finishes (such as woodgrain for example) are available, on request.

The panels also provide an ideal substrate for short or long-term graphic overlays.

## MICAM FragShield™

This range of products has been developed to counter the continually evolving nature of the terrorist threat.

Recent PBIED threats have been both blast and fragmentation based. Outside of the relatively small blast zone, primary and secondary fragmentation can add significantly to the lethality of the device.

Much research, testing and validation work on these products has been carried out, including Arena tests based on "USHER" guidelines.

As a result of this work MICAM can offer design and manufacture of both

free standing and fixed structures which are able to both withstand the effects of blast and successfully capture and contain fragmentation.

## MICAM SecureWall™

This variant on MICAM's standard wall lining system incorporates factory fitted modifications that prevent access by a determined attacker, easily surpassing the requirements of Loss Protection Standard (LPS) 1175.

MICAM SecureWall™ is virtually indistinguishable from the standard MICAM Horizon™ wall lining system, offering seamless integration.

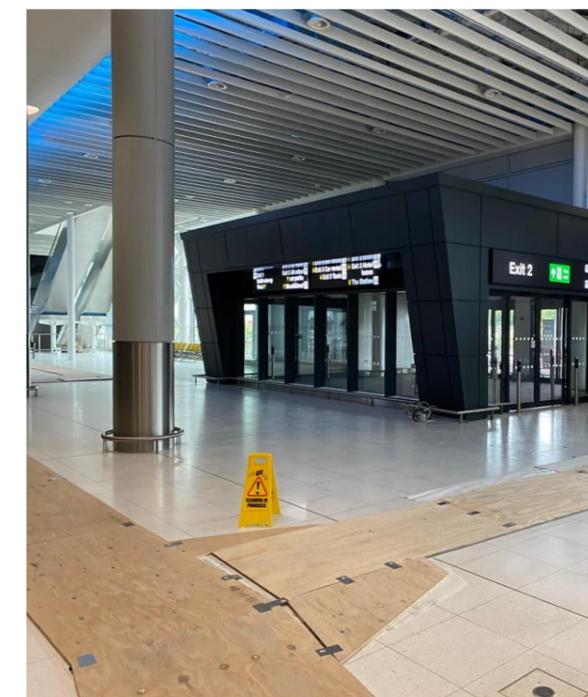
SecureWall™ systems offers a high level of resistance to manual attack and are available in two versions.

SecureWall+™ features anti-fragmentation penetration and an anti-ballistic performance which can be tailored to individual requirements.



# A chronology of world-class protection

- 2008 Original MICAM Slickfit product developed by the British Airports Authority (BAA) to address on-going issues with traditional compact laminate-based systems. Specifically poor fire properties, impact performance in service and insufficient graffiti resistance.
- The product was introduced into BAA terminals meeting all these important performance requirements. Subsequently, ASIAD guidance notes were published by the Department for Transport (DfT) covering the performance of materials used in higher risk landside areas of airports against terrorist attack. The MICAM product was blast tested and performed extremely well, remaining in situ without producing secondary fragmentation.
- 2013 MICAM Air Glass launched as a high-performance cladding in areas where public safety is of paramount importance. The glass faced composite panel was rigorously and successfully tested against hard body and soft body impact tests (BS8200, BS12600 and BS6206), and the very tough 'drop ball' test to EN356. Resistance against bomb blast was tested at a secure test facility to ISO 16933 in controlled explosions. Passes in all of the tests ensured the suitability of StoVentec Glass and its specially designed aluminium/stainless steel sub-construction in public safety zones, as demanded by rail and airport authorities e.g. Crossrail, London Underground, BAA.
- 2015 StoVentec glass further successfully bomb blast tested to ISO 16933 for a modified sub-construction using metal 'top hats' and incorporating vision panels of clear toughened glass. MICAM Secure developed an upgraded version which meets the requirements of Loss Protection Standard (LPS) 1175, resisting prolonged action by a determined attacker. The product is introduced in Restricted Zone (RZ) and Critical part (CP) boundaries within airports, train stations and the London Underground.
- 2017 Following the terrorist attacks on both Brussels Airport and Manchester Arena, where the devices deployed contained significant levels of primary fragmentation, significant testing was undertaken to examine the behaviour of materials against this type of threat.
- The MICAM composite based panel was found to perform extremely well and did not fragment or splinter to produce dangerous secondary fragmentation, unlike compact laminate-based systems which produced large amounts of damaging secondary fragmentation travelling at high velocities, capable of further injury. Further R&D has resulted in the development of a number of systems, both wall lining and free standing, which are able to contain blast-borne fragmentation reducing collateral damage (further details on request).
- 2019 TMP & S - MICAM collaboration for T2 extension at Manchester Airport. The design development and installation of a co-ordinated and seamless wall lining system consisting of both glass and composite panels which met the enhanced aesthetic and performance requirements of modern airports and mass transit hubs.
- 2020 Additional blast testing taken place demonstrating the TMP & S - MICAM system meets and exceeds the blast resilience standards set out in ASIAD 2017 and SIDOS (Security in the Design of Stations) ensuring on-going conformance.





# Manchester Terminal 2. Making passenger protection paramount.

The most recent project to involve a partnership between TMP & S and MICAM is Manchester Airport's Terminal 2 expansion.



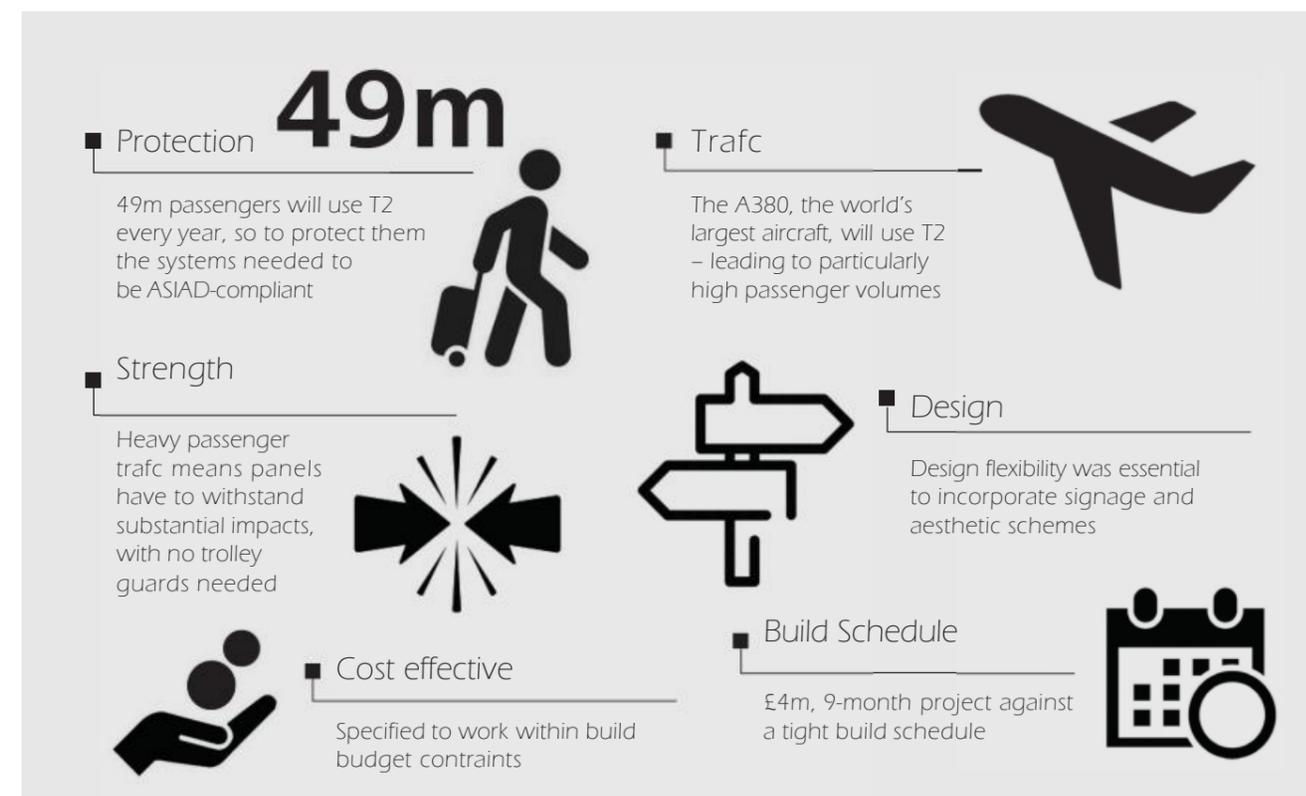
# Terminal 2. Specification challenges

Part of the £1 billion Manchester Airport Transformation Programme (MAN-TP) to create a world class international gateway for the North of England. The terminal will more than double in size to become the airport's main centre.

The newly-expanded Terminal 2 has a range of state-of-the-art features designed to deliver a smooth and seamless passenger experience. Incorporating 60 new restaurants and shops, 127 new check-in desks and is capable of handling the world's biggest aircraft, the Airbus A380.

29.5 million passengers a year to the 55 million capacity its two runways provide. This is a major step change in maintaining Manchester's position as the North's main global gateway, at the heart of a truly-connected Northern transport network, and a top 10 European airport.

Started in 2017 and due for final completion in 2024, this 'super terminal' is also part of a forward-thinking plan to help Manchester International Airport grow from its current





# Manchester Terminal 2. Extending airport safety to new levels

Introduction by Mike Crossley – Crossley Consult Ltd.

Being a modern terminal, Manchester Airport Terminal 2 Extension (T2X) must meet or exceed the security requirements set out within ASIAD 2017. This includes the general requirement to provide glass and composite based wall lining systems that will not fragment, splinter or spall in the event of a terrorist attack or other potential blast scenarios.

All stages of the project have been carefully monitored in accordance with the ASIAD PDCR audit procedures and have been independently tested, validated and signed off for compliance.

At Manchester Airport, critical locations have been identified which have required the MICAM and TMP & S systems to be modified and adapted to further enhance performance, including floor-mounted check-in tear drops, airline ticket ofces (and all associated furniture) and private search rooms.

Passengers and staff using the T2 extension at Manchester Airport can rest assured that the project is fully compliant with ASIAD, meeting and exceeding current requirements.

In order to deliver the enhanced levels of security required within T2X, MICAM as the system installation team for both MICAM Air Glass and MICAM composite systems were required to work closely with main contractor Laing O'Rourke,

architect's Pascal + Watson and the Client (Manchester Airport Group / Arcadis) to provide on-going design and logistic support.

Our Team were considered to have provided a service which far exceeded the high levels of performance expected and required on the project (references are available).

Opposite page  
Manchester Airport  
Terminal 2

MICAM Expertise: Horizon  
Composite Wall Lining  
System (cutaway view)



Manchester Airport  
Terminal 2

MICAM Expertise: Horizon  
Composite Wall Lining  
System (cutaway view)

## Highlights

**£1.7bn**  
economic contribution to  
the UK economy every year

**50%**  
increase in customer  
numbers since 2010

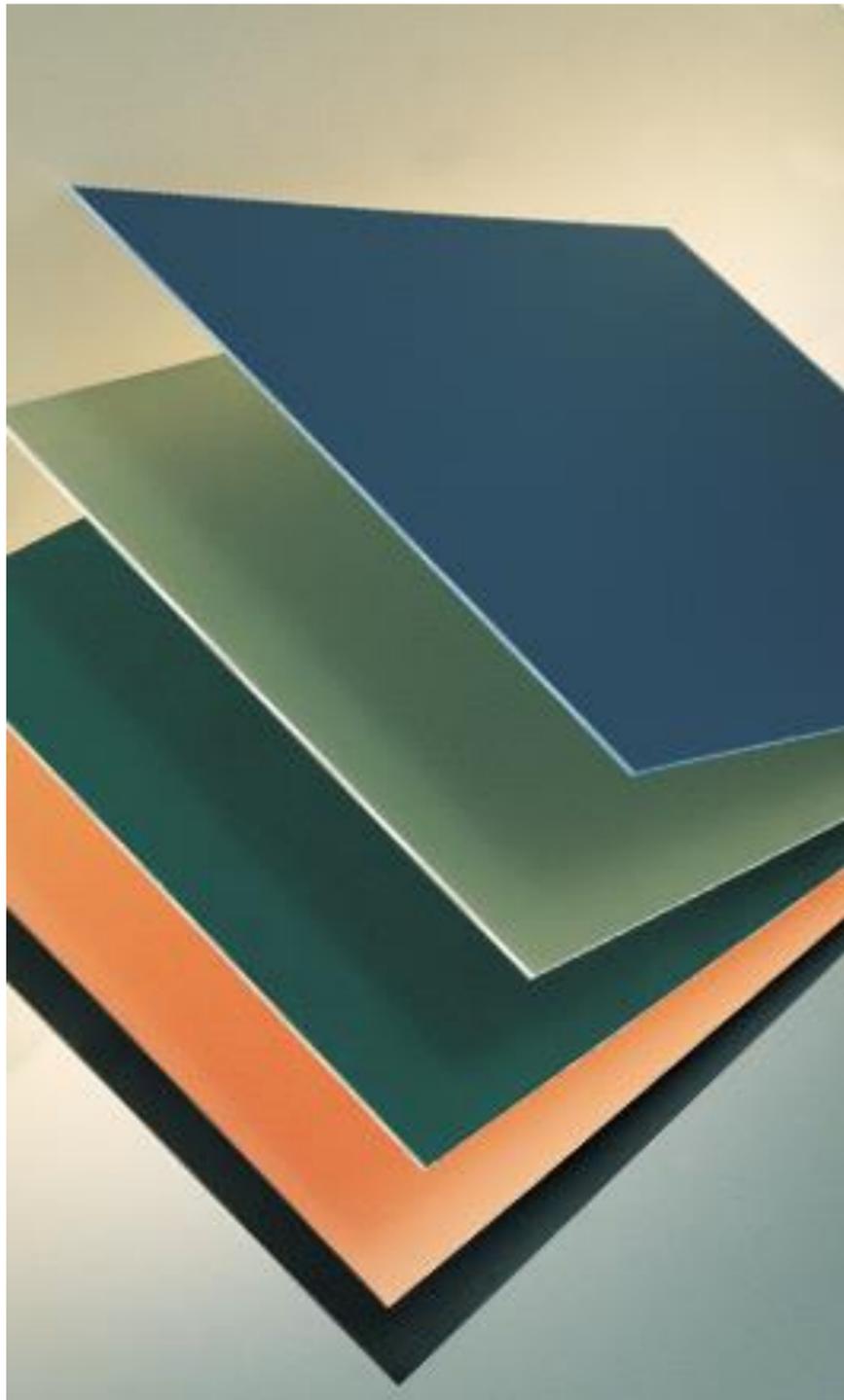
**220**  
direct destinations served  
by Manchester Airport

**1.6m**  
customers flown to the US  
from Manchester Airport last  
year

**10%**  
growth in point-to-point long  
haul growth in the past three  
years

**22,500**  
people employed at  
Manchester Airport





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