d+b facades

OVERCLADDING SPECIALISTS

The solution to a legacy of **1960's** academic buildings

RECYCLED - a 1960's building with a super energy efficient 2010 facade utilising 60% recycled materials that are 100% reusable at the end of their 60 year life in 2070.

University of Plymouth

Scope of Works

Aluminium Rainscreen
Window Replacement
Curtain Walling to Stair Towers
Insulation
Concrete Repair
Internal Finishes to Windows

Programme

Onsite: 19 Weeks

Contract value

£1 Million each phase (2 phases)

Rod Lane Head of Strategic Property Development for the University of Plymouth

"The project was a triumph of co-operation and excellent organisation. We are delighted with D & B Facades UK Ltd's management of the contract. On completion of Phase 2 the campus will have two attractive, efficient high-rise buildings that will require minimum exterior maintenance well into the twenty-first century. Phase 1 has shown us just what can be achieved and we look forward to working with D & B Facades UK Ltd and Ove Arup to complete the project."

Overcladding, the economic, social and environmentally sound solution to a legacy of **1960's** academic buildings

This document sets out why options to 'leave and maintain' or 'replace' are increasingly unacceptable and why the case for refurbishment is fast becoming irresistible.

Having made the case for refurbishment, this document then goes on to offer a mechanism to improve efficiency of the delivery process. A complex process made simple based on the Egan Report "Rethinking Construction" (1998).

economic

External refurbishment of dated academic building stock is estimated at 1/10 of the cost of replacing them with new buildings. Heat savings alone currently represent a payback period of circa 21 years.

environmental

To refurbish is to recycle, the embedded energy in the existing building is re-used. Carbon emissions are reduced by up to 80% via super thermal efficient facades that match or surpass that of new buildings and/or current building regulations.

social

Quality design in refurbishment using crisp modern facades will modernize the poor work place and drab image created by 40-50 year old buildings to new build equivalent standards with a fraction of the disruption to occupants and normal use of the campus.

Ellison E Block, University of Northumbria

Scope of Works

Aluminium Rainscreen
Window Replacement
Insulation
Concrete Repairs
Recoat existing stair tower
Tile ground floor
Existing panel restraint

Programme

Offsite prior to commencement: 3 weeks
Onsite: 21 weeks (5 weeks ahead of programme).

Contract value

£922,000.00

Gary Wilson, Senior Projects Co-ordinator (building)

"The contractor provided us with a refurbishment that was delivered both within budget and ahead of time."

"The contractor was receptive and adaptable to changes made within the contract."

"We now have a building that not only looks current rather than 60's, but also has increased energy efficiency thus lowering our carbon emissions."

d+b facades
OVERCLADDING SPECIALISTS

contents

Marple Hall School, Stockport

Margaret Cuckson Head Mistress of Marple Hall School

"We are delighted with our new building."

"The appearance both externally and internally has transformed our environment with surprisingly little disruption during installation."

Richmond Building, University of Bradford

Scope of Works

Aluminium Rainscreen
Window Replacement
Insulation
Concrete Repair
Brise Soleil
Curtain Wall Replacement

Programme

Offsite prior to commencement: 4 weeks
Onsite: 28 weeks

Contract value

£ 1.3m

Clive Wilson, Director of Estates

"The service we received was excellent with quality products delivered on time and within budget."

"We now have the first phase of a modern energy-efficient building and would have no hesitation in using D & B Facades on the subsequent phases - the improvement to the internal environment is equally as dramatic as the more obvious external improvement."

d+b facades

OVERCLADDING SPECIALISTS

Introduction

Research indicates that over 40% of the Universities estate was built between 1960 and 1979 and currently remains, externally at least, untouched and in the original state, poorly insulated and generally undesirable.

Estates Directors are faced with increasing pressure of reconciling an ageing stock of buildings with ever increasing social, economic and environmental demands.

Universities must project a good image if they are to attract quality staff & students who in turn demand quality accommodation and a quality environment in which to work.

Soaring energy costs and poorly insulated, deteriorating facades with high maintenance requirements compound to drain available funds.

Concerns about energy consumption and carbon emissions are common to everyone from Board of Governor down to the individual student or member of staff. Dated buildings consume vast amounts of energy and emit carbon at up to 5 times that of a modern building.

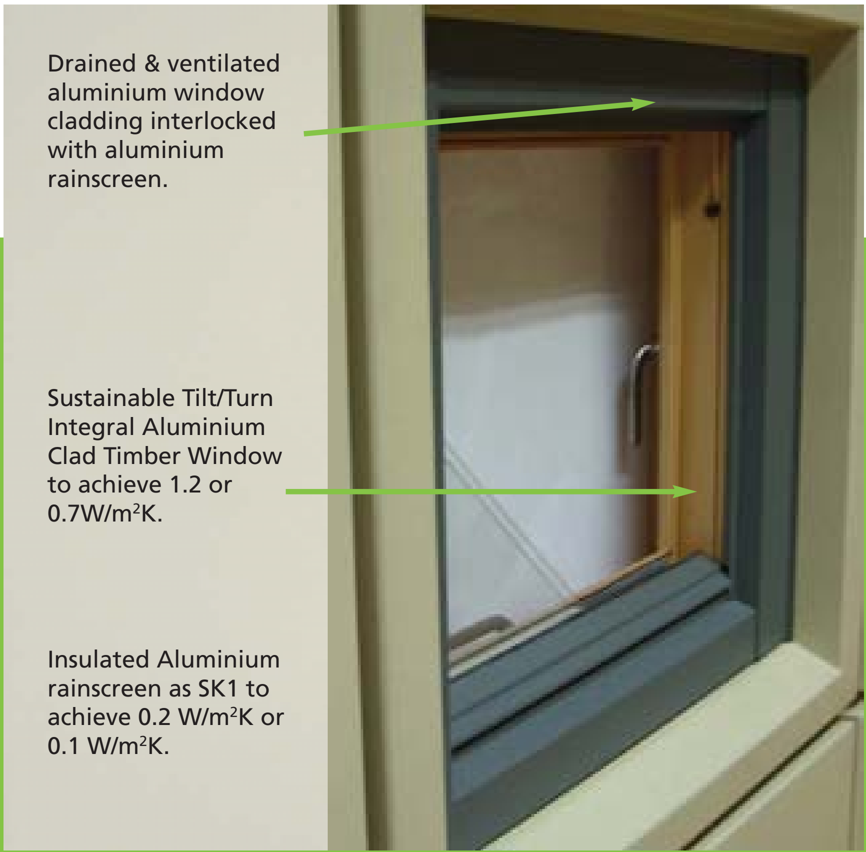
The Association of University Directors of Estates commissioned in 2007/8 an investigation into one of the big issues in Higher Education estates today – how to renew a very large proportion of the property portfolio that was built in the 1960's. The ensuing report recognised that to 'leave and maintain' existing 1960's stock was unacceptable in the long term and went on to address the key question: Refurbish or Replace?

With the economic downturn and increasing environmental pressures to recycle and improve energy efficiency, now more than ever Major Capital Schemes need to demonstrate Value for Money.

Master Planners need to be provided with accurate information to assist informed decision making. This document contains many past examples and case studies of University Refurbishment Projects along with technical information that may be of assistance.

Improving the efficiency of the delivery process is equally important if we are to achieve a successful outcome for our academic institutions. By application of the principles advocated in the Egan Report of 1998: "Rethinking Construction" we consider many of the complex issues surrounding the highly specialised refurbishment option for which the industry does not yet provide a satisfactory mechanism to progress from feasibility stage and procurement through to delivery.

Rainscreen Panel system + Integrated Window



Case study: Horton Building - University of Bradford

Can you afford to leave or rebuild your buildings when **refurbishment** is up to **1/5 of the cost** in CO_2 and pounds?

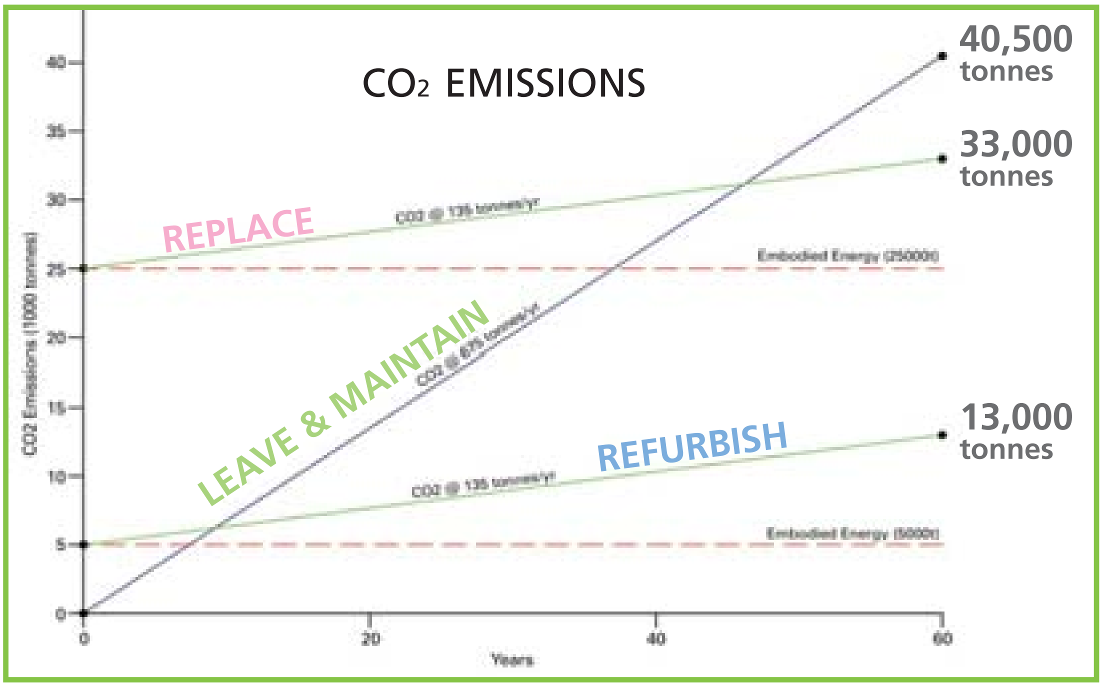


Figure 1
carbon emissions

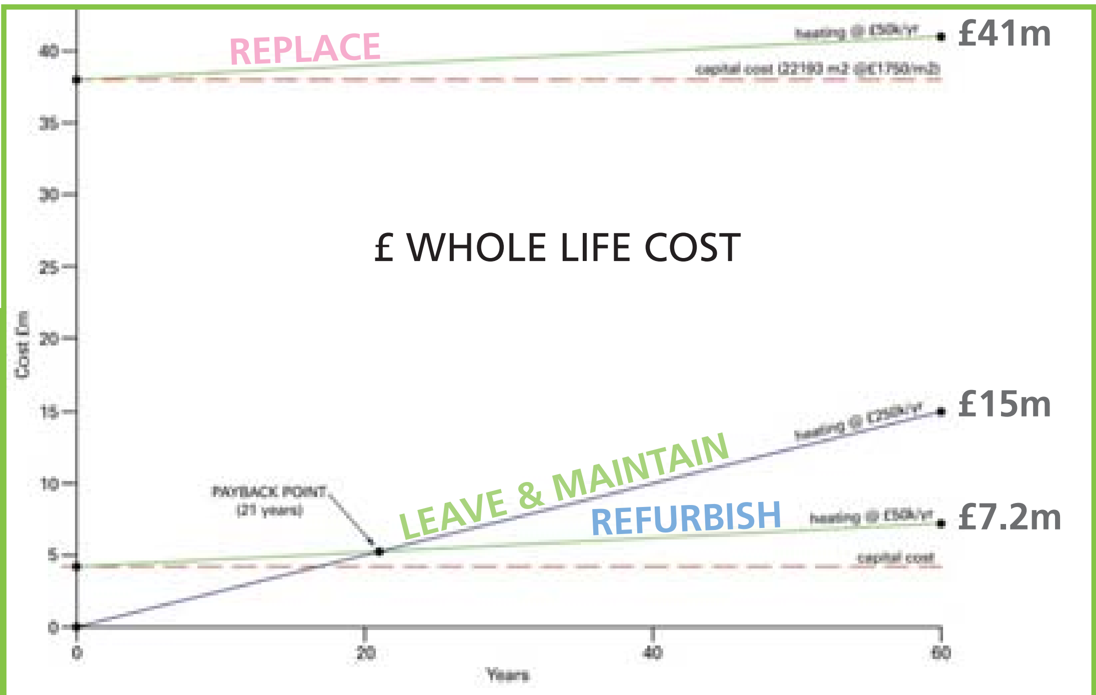


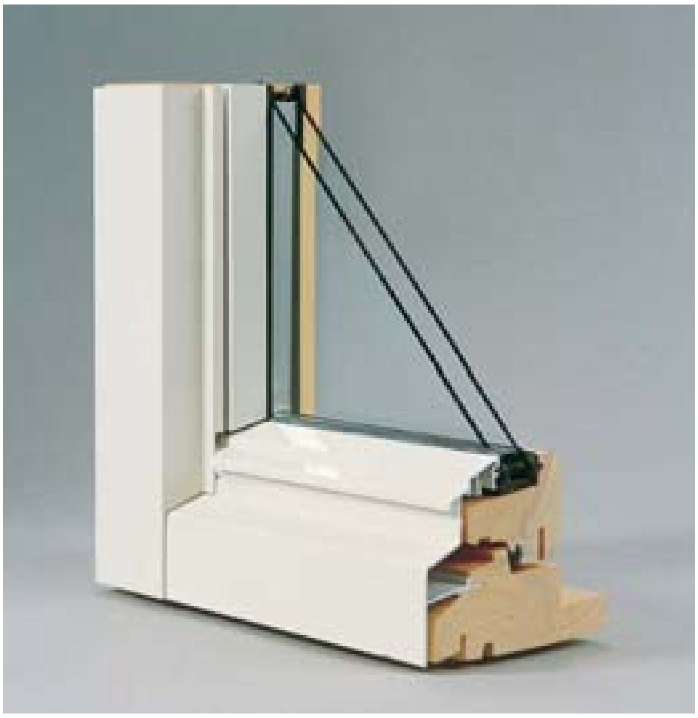
Figure 2
whole life cost

60 YEAR LIFE SUMMARY

	Leave & Maintain	Replace	Refurbish
Carbon Emission	40,500 T	33,000 T	13,000 T
Heating Cost	£15 M	£41 M	£7.2 M

The importance of U-values & reducing energy consumption

There is no other component in the building Sector with as rapid a progress in quality than in the field of building envelopes. The thermal loss coefficient of envelopes on the market (U-value) has been reduced by a factor 7 during the last 30 years.



A typical 1960's single glazed window has a u value of 5.0 W/m²K, the current regulations specify 2.0 W/m²K. 0.7 W/m²K is now achievable with today's technology representing a 7 fold improvement. A typical 1960's wall achieves circa 1.37 W/m²K, the regulations today specify 0.3 W/m²K and 0.18 W/m²K is readily achievable, again representing a 7 fold improvement.

The whole life cost options for a typical 1960's building can be measured both financially (£'s) and environmentally (CO_2 emissions) – see graphs opposite – to refurbish is by far the most economic solution in either case with a direct payback period of 21 years in heating costs alone.

A highly insulated envelope, using latest technologies and surpassing current regulations, is essential to achieving energy efficiency, minimizing CO_2 emissions, reducing heating bills, and conserving energy. Similar quality façades are achievable for both The 'refurbishment' and 'replacement' options.

NorDan Alu-Clad timber window

Before and after window replacements at Ellison Building, University of Northumbria. Transforming the internal work space with improved ventilation, solar, thermal and acoustic control.

Marple Hall School, Stockport

Scope of Works

Aluminium rainscreen
Window Replacement
Insulation
Concrete Repairs
Curtain Walling to Stair Tower
Curtain Walling to Entrance Screen

Programme

Onsite: 24 weeks

Contract value

£916,000.00

In May 2003 d + b facades UK Ltd commenced work on the design, supply and installation of aluminium rainscreen overcladding, incorporating integral windows and curtain walling system in the secondary school refurbishment project.

before

after

Environmental, social and economic considerations

Environmental

Energy efficiency is described as our 'sixth resource'. The others being oil/gas/coal (80%) renewables (13.5%) and nuclear (6.5%). Energy consumption must be efficient in order for it to last and reduce emissions. Utilising energy from renewable sources (hydro), recycling old materials and reuse of materials at the end of there useful life will each contribute to energy efficiency and reduced emissions.

Re-use is a key concept in sustainability - the opposite of the wasteful throw away culture - in part what the Landfill Tax was introduced to address.

1960's buildings represent considerable amounts of embodied energy expended by past generations in their original construction. They are generally proven to be structurally sound but require excessive energy to heat. A sustainable solution is required.

To demolish 1960's buildings and 'replace' with new buildings involves huge energy expenditure in construction and embraces the throwaway culture we are seeking to curtail - see Figure 1 on page 8.

The graph also shows the option to 'leave and maintain' the existing building where continued high energy consumption in heating becomes prohibitive.

Overcladding an existing building can readily surpass current building regulation standards for new build projects in all respects at a fraction of the cost to the environment. The old building fabric is repaired, strengthened as required, wrapped with an insulation blanket and protected from the elements, its useful life extended by 30 years. The building is truly recycled.

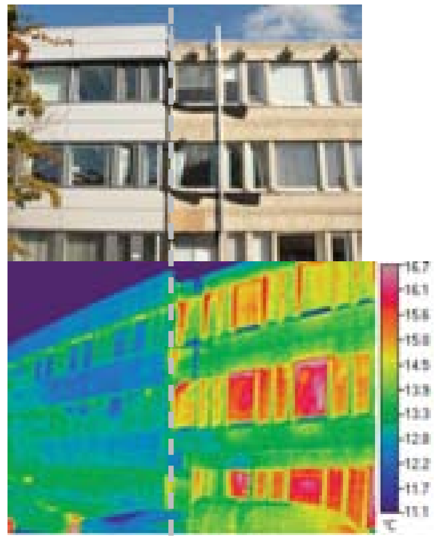
Social

The general run of academic buildings from 1960's have a very dated appearance. Built to stringent UGC budgets there was little money to spend on style, quality materials or finishes. They often look decidedly utilitarian and are rarely attractive to the modern eye. Nor do they function well. They tend to be cold in winter and overheat in the summer. They may well have been refurbished several times internally but are unlikely to have had anything done to upgrade the external fabric.

However, they frequently house potentially really good quality space. With the external fabric brought up to standard and the same good quality teaching aids as would be installed in a new build, they can be made as attractive to use as their new build equivalent.

Timescale

A replacement building, while it may sometimes be essential, takes a lot longer from inception than refurbishment of an existing one. Assuming that a suitable site can be found and even where a development plan exists, the size of site will rarely exactly match the requirement. There is also



The University of Stirling commissioned a thermal imaging survey of the works whilst they were in progress, and the thermal photograph illustrates the improvement in energy efficiency achieved.




The existing building is wrapped with an insulation blanket up to 200mm thick, prior to overcladding. The end result is a new, super energy efficient building that surpasses current regulations by up to 50%, slashing energy consumption and carbon emissions.

(not always) an issue of providing new services. The brief for the new building has to be consulted on and a scheme design developed. The funding process often leads to a shuttle between what is desirable and what can be afforded with delays while plans are modified. Planning is usually a protracted operation and detailed design, procurement, site operations, fitting-out, commissioning and furnishing can extend the whole process to as much as seven years from start to finish.

A refurbishment takes much less time. The building is already there. If it is continuing to serve the same function minimal internal alterations will be required. Design and procurement of the cladding package by experienced specialist consultants can be achieved in a few months and planning consent is much less of an issue. Not only that but the building can remain occupied throughout the operation.

Economic
Over 40% of the university estate in England was built between 1960 and 1979. A conservative estimate of the replacement cost of all the 1960's buildings of this era within the 216 English Universities is of the order of £11 billion excluding demolition and decanting costs. This would fund 283 refurbishment projects of the size of our University of Stirling case study. Put another way, external refurbishment of the 1960's stock would cost of the order 1.1 billion, still a huge figure but only one tenth of the new build cost.

The significant factor in this though is that the cost of overcladding the highly inefficient uninsulated 60's buildings with a highly insulated new envelope would be paid back in 21 years through energy cost savings alone.

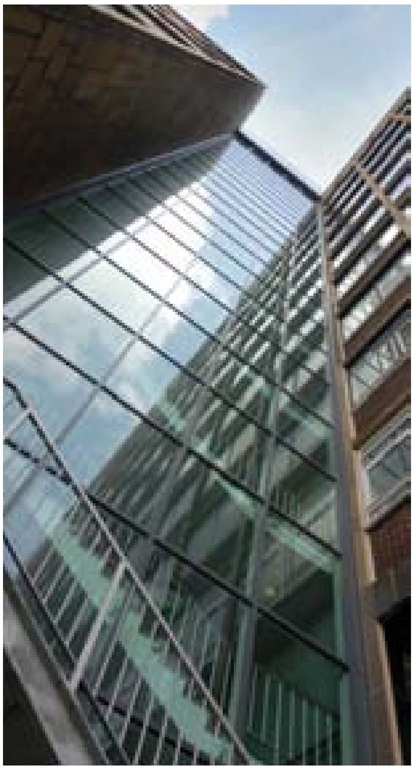
As Figure 2 on p8 shows, no such crossover point is reached with new replacement buildings. There are other cost benefits which, factored in, will further reduce the payback period. For example:

Maintenance Costs
Maintenance is often the Cinderella of University budgeting. Repairs to the fabric, particularly the parts of it exposed to the weather, become more and more extensive as the building ages. Protecting it from the weather prevents that deterioration. Maintenance of the overclad itself is minimal.

Life Expectancy
Life expectancy of buildings is an amazingly elastic phenomenon. Buildings almost invariably continue in use long after the notional life expectancy used in their original funding models has expired. However, it is still true that the materials and construction only envisaged the notional life expectancy and once beyond it they become an increasing problem. Investment in extending the life expectancy has a payback as a higher return on the original capital cost and saving the capital cost of a replacement . Typically an overclad will extend the life expectancy of a building by the same 50 to 60 years that would be expected of a new building for about a tenth of the cost.

Increased Occupancy
It is unlikely that the occupancy level for the university's own use will vary very much. Teaching space is at such a premium that all available space tends to be used whatever its condition. However an attractive new appearance can help the University's business operations by making its space more marketable as a conference venue or for use by other teaching and training organisations outside term time.

University of Bradford Staircase



in conclusion ...

Patrick Finch, Director of Estates at the University of Bath and chair of the steering group behind the AUDE report, said: *"Many universities have spent nothing like the amount they should have done on maintaining the buildings of the estate. All the problems are coming to a head at the same time, so we have to put substantial funding into refurbishment of the estate. A significant number of these buildings will need major investment, and the buildings that have already had that are in the minority".*

In the past, many universities ploughed their HEFCE funding for buildings into creating new facilities rather than maintaining old ones, he said, but the funding council was now strongly encouraging them to spend on upkeep. Many institutions were doing only enough refurbishment to comply with legislation and were not dealing with "decrepit" buildings, a strategy that could harm student recruitment in the long run, he said.

The education sector although unique in many ways cannot avoid the sustainability argument which is driven by legislation, rising energy costs, tightening of Building Regulations and changing stakeholder expectations.

Feasibility

Informed decision-making is the key to success. It is normal for any project to carry out a feasibility study to explore alternative ways forward. With three alternative courses of action for dealing with the exterior fabric of buildings of the 60's and 70's - maintaining them as they are, replacing them completely or refurbishing them - what is required is an option appraisal to identify the positives and negatives and inform the optimum course of action.

Issues to be covered by a typical option appraisal are cost, sustainability, reducing energy consumption, disruption and appearance. Also crucial are cost in use and lifetime cost including the value of the building's possible 50/60 year extended life.

The location of the existing building and its connections to other buildings is significant. One recurring issue with earlier buildings is that they frequently occupy pivotal positions in a campus. This means that to perform the same function they should ideally occupy the same site. Their demolition and replacement then means that this space is denied to the University for a considerable period of time and temporary decant space has to be found to replace it for the duration.

A further issue is the size of the building. The larger it is the more disruptive is its loss and the more difficult to find a site big enough to build a replacement. Also the amount of money required to replace it is also big. The concept of using the sale of city centre sites to fund new campuses on the periphery has been badly dented by the economic downturn.

Maintenance of the existing building
The costs of maintaining the building as it is by carrying out only essential fabric repairs are relatively easy to estimate. Its energy consumption will remain much as it is though fuel cost rises will have to be taken into account. The appearance will not of course change. However one element likely to need full replacement over time will be the windows and re-glazing into the existing openings is relatively disruptive. Insulation levels can be improved by cavity fill or adding insulation to the inside of the walls but the existing construction will often leave cold bridging in the former and radiators, services and fixed furniture will complicate the latter. The problem with both insulation options is that there is no protection to the part of the wall most exposed to weather and it will continue to deteriorate. This is the low initial, medium total cost option.

Replacing the building
Costing for a new replacement building is also of itself relatively easy, certainly to the level required for option appraisal. This will take account of the need for a suitable site, access roads and services. The time involved in briefing, project design, planning consent, procurement and construction will need to be taken into account. This should provide a stylish modern building - how stylish will depend to some extent on the budget. What it should certainly provide is a tailor-made solution to the functional requirements. This is the high initial, high total cost option.

Refurbishing by overcladding the building
The other two options are generally within the competence of most consultants. Overcladding is a much more specialised field. It is also different from cladding a new building. A feasibility study for this operation needs a good understanding of building tolerances, limits on panel and window sizes, optimum spans for support structure and identification of points where structural connections can be made. Only when these issues have been addressed can an outline design for an overclad be developed. D & B Facades would always recommend that they be brought in to advise at the outset. The earlier they have input the better informed the feasibility study will be. They would also recommend that references be taken up with other Universities where D & B have installed an overclad. Overcladding is a medium initial cost, low total cost option. It is the only option where the capital cost can be completely covered over time by the energy savings.

Overcladding will not be the optimum solution in all cases. It will be the optimum solution in a very large number of cases.

University of Bradford, Richmond Building

University of Stirling, Cottrell Building

Cottrell Building, University of Stirling

What D & B Facades offer

1. Excellent value for money
2. A proven track record of successful overcladding projects
3. A well engineered, robust, crisp and precise cladding solution
4. Complete general arrangement and detailed product drawings produced in house
5. Efficient installation based on accurate surveys
6. Detailed project programming and ability to keep to it
7. Flexibility in working on occupied buildings - no decant required
8. Fully integrated design and build operation to ensure minimal disruption
9. Single point responsibility for design, delivery, installation and performance
10. Warranted performance and full insurance backed guarantees.

Procurement and project delivery

We have demonstrated that overcladding is a highly specialised area of the building industry. Specialised works are best served by special tendering procedures.

'Rethinking Construction' a Report of the Construction Industry Task Force by Sir John Egan highlights the need for improvement in the construction industry as a whole and states.

To achieve these targets the industry will need to make radical changes to the processes through which it delivers its projects. These processes should be explicit and transparent to the industry and its clients. The industry should create an integrated project process around the four key elements of product development, project implementation, partnering the supply chain and production of components. Sustained improvement should then be delivered through use of techniques for eliminating waste and increasing value for the customer.

While university standing orders and procedures, constraints imposed by Government and the EC and best practice guidance from numerous sources, stipulate project tendering to ensure competition, it is recognised that for some highly specialist work only a very few companies can deliver. Finding the fair price for such work can, in the spirit of Egan, be a matter of comparing historic costs from previous similar projects. Or it can be done on an open book with guaranteed maximum price. Either certainly meets the transparency criterion.

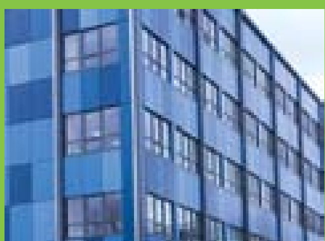
One clear measurement of performance is assessment of completed projects and references from those who have commissioned them. Visiting completed overclad projects or, even better, projects under construction, seeing how the operations are carried out and speaking to the Consultants, Directors of Estates and University Project Managers involved will give an unbiased measurement of performance from a demanding client peer group. A proven track record in this work is not a benchmark, it is the benchmark.

The need for competitive tendering often pushes the procurement process down conventional tendering routes, this is fraught with danger. Putting a 'Design and Build' project out to tender with fully detailed drawings and specifications, wherein the key decisions have already been made, often led by system suppliers who will have little or no responsibility post award is likely to lead to unclear roles and responsibilities ending in contractual difficulties and unforeseen construction problems. The completed works must be the sole responsibility of the Design Build contractor and this must be reflected in the enquiry.

The tender process need only contain existing and proposed elevations along with pure performance requirements, inviting contractors detailed proposals for evaluation post tender. Ideally specialist consultants will work with specialist contractors to produce workable, well engineered and cost-effective design. Again, this for D & B Facades, is a proven process. The best results in this type of project come from architect and contractor working in partnership.

A consultant with experience of overclad can prepare a scheme design using his knowledge of its practical construction and constraints. He can agree the appearance with the client and once that is agreed obtain a planning consent. He can then prepare a performance specification, again based on experience and include all the Employers Requirements and Site Constraints in this document. Finally he can encapsulate the essentials of the design in a set of design intent drawings.

Tenderers then submit their detailed contractors proposals for meeting the requirements. This is assessed on the basis of price and quality and track record. Once selected they become the single point of delivery, developing their detailed design with the consultant to ensure that they stay within the parameters of the performance specification and design intent but with flexibility from both sides to use their combined expertise to achieve the best results. The specialist contractor warrants all aspects of the design and construction.

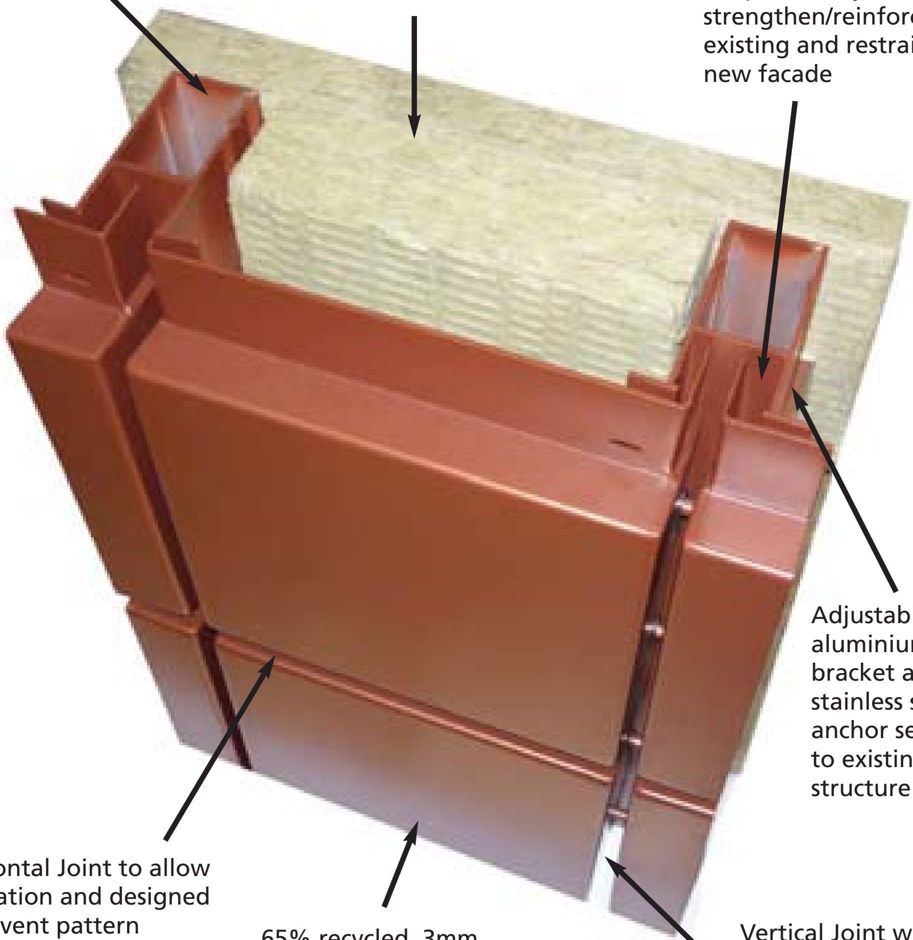
A proven track record of success

"The industry must replace competitive tendering with long-term relationships based on clear measurement of performance and sustained improvements in quality and efficiency."

Rainscreen Panel System

60% Part recycled material + 60 yr life + 100% reusable

Side profile



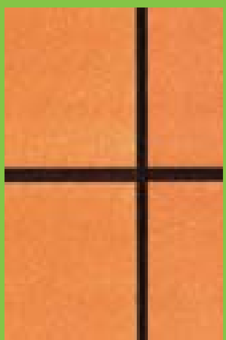
The service/scope of works/outline specification for external envelope & overcladding works

RAINSCREEN CLADDING SYSTEM FEATURES & DESCRIPTION

- General Description; Panels with Modelling and Joint Details to prevent pattern staining are manufactured from 3mm aluminium, fully welded & dressed prior to powder coating, secretly hung/supported on an aluminium framework secured by stainless steel connections to the existing structure. High performance windows are fully integrated utilising aluminium window pods. Interface connections to adjacent systems/curtain walls made using proprietary extrusion profiles.
- System supplier:
  D&B Facades UK Ltd
  The Packway,
  Larkhill,
  Salisbury,
  Wiltshire.
  SP4 8PY
  Tel: 01980 654240
  Fax: 01980 653611
  Email: mail@dbfacades.com
- **Type:** Pressure Equalised, back ventilated aluminium cassette system.
- **Panel:** Aluminium cassette stiffened as necessary to meet performance criteria for deflection under wind load. Panels are simply supported and laterally restrained in place by keyhole slots in the panel flanges which locate onto pins in the support rails isolated via a nylon clip. Security screws are added to provide additional restraint from uplift. This system allows each panel to be individually removed or replaced quickly and simply if necessary. Cassette Panels are fully welded to form a diaphragm construction.
- **Panels** can be designed to span Vertically, Horizontally and around corners thus giving considerable design flexibility.
- **Material:** Aluminium sheet complying with BS EN 485 & BS EN 573.
- **Thickness:** 3mm.
- **Finish:** Polyester powder coating complying with BS 6496 Interpon/Akzo. (Also available with PVF2 (if required).
- **Colours:** Standard Colour Chart Range. Non-standard colours available.
- **Joint Type and Width:** Standard 20mm baffle joint.
- **Air Gap:** 38mm.
- **Support System:** Support system comprising of Vertical support rails with fully adjustable wall brackets.

  Material: Extruded Aluminium complying with BS EN 755, BS 1161, BS1474 and BS EN 515. Stainless Steel fixings, fasteners and bolts complying with BS EN ISO 3506-1 & 2, grade A4 for visible fixings, grade A2 elsewhere. Number and location as per structural design.
- **Support System** can span vertically or horizontally and a whole family of Extruded sections exist to suit specific requirements of project.
- **Panel security fixings:** Stainless Steel low dome self-drilling security fixings. (Generally one per panel).
- **Existing Substrate:** System compatible with most forms of construction.
- **Vapour Control Layer:** (Subject to Design requirements generally not required).
- **Breather membrane:** (Subject to Design requirements generally not required).
- **Thermal Insulation:** Insulation thickness varies to suit U-value requirements. A whole range of insulation products including Rigid, semi rigid and flexible slabs available.
- **Nylon isolation panel clips** in slots to allow differential movement. Nylon clips designed to be UV Stable (Kocetal K300).
- **Primary fixings** are stainless Steel and the Fixing manufacturer is to provide full fixing test pull criteria prior to installation. (Hilti Fixings).
- **Bracket and Rail** arrangement to be to Engineers calculations.
- **Window Pods;** Fully welded single components manufactured from 3mm Aluminium with integral water management to prevent pattern staining.

Aluminium Rainscreen
Versatile and economic, it is used primarily to overclad existing buildings. Finishes can vary from anodised to any RAL colour.

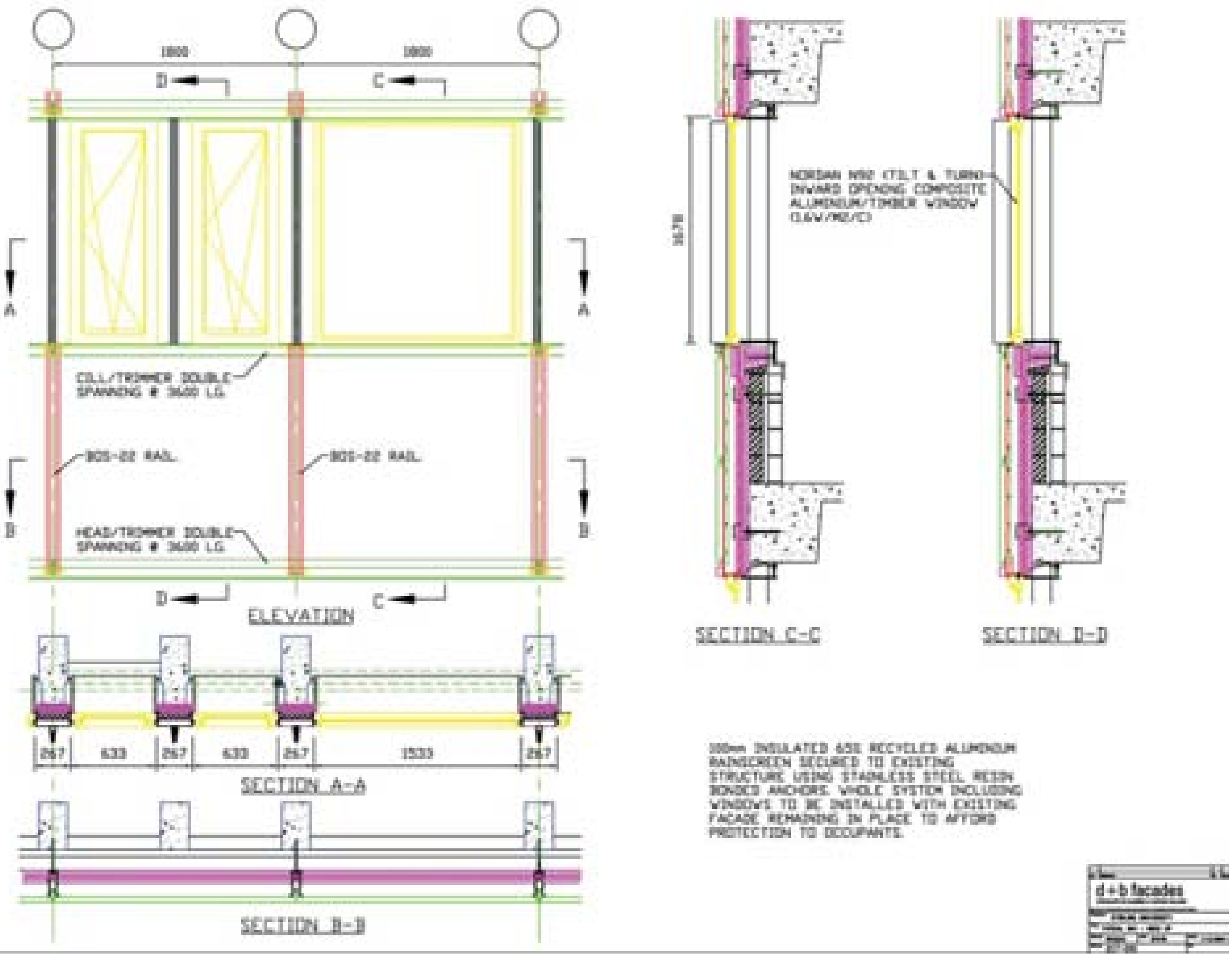


Terracotta Rainscreen
Natural clay tiles available in a range of modules and colours. Generally supported by a secondary framework.

Curtain Walling
Total wall construction mainly of double-glazed units supported on an aluminium framework.

Design Drawings and Mock-up for University of Stirling

On site mock up constructed outside of the Director of Campus Services office



Cottrell Building University of Stirling

case study

An example of a major external refurbishment project carried out whilst the building was occupied. Involving approximately 10,000m² of cladding and 2,000 new windows. The works were carried out ahead of programme and within budget. A testament to d + b facades UK Ltd ability to deliver on a very sensitive project.

Scope of Works

Aluminium Rainscreen
Window Replacement
Insulation
Concrete Repairs

Programme

Offsite prior to
commencement 4 weeks.
Onsite: 72 weeks
(12 weeks early)

Contract value

£3.9m

Recycled

A 1960's building nearing the end of its useful life regenerated for use until the 2060's

Cottrell Building University of Stirling

before ...

Architect **David Burnett** of Burnett Pollock Associates said

"The constructive post-tender design development process between architect and specialist contractor and the level of D & B's project pre-planning prior to commencement and placement of bulk orders was exemplary and provided the level of quality control and a smooth running which delivered the project ahead of programme and within budget".

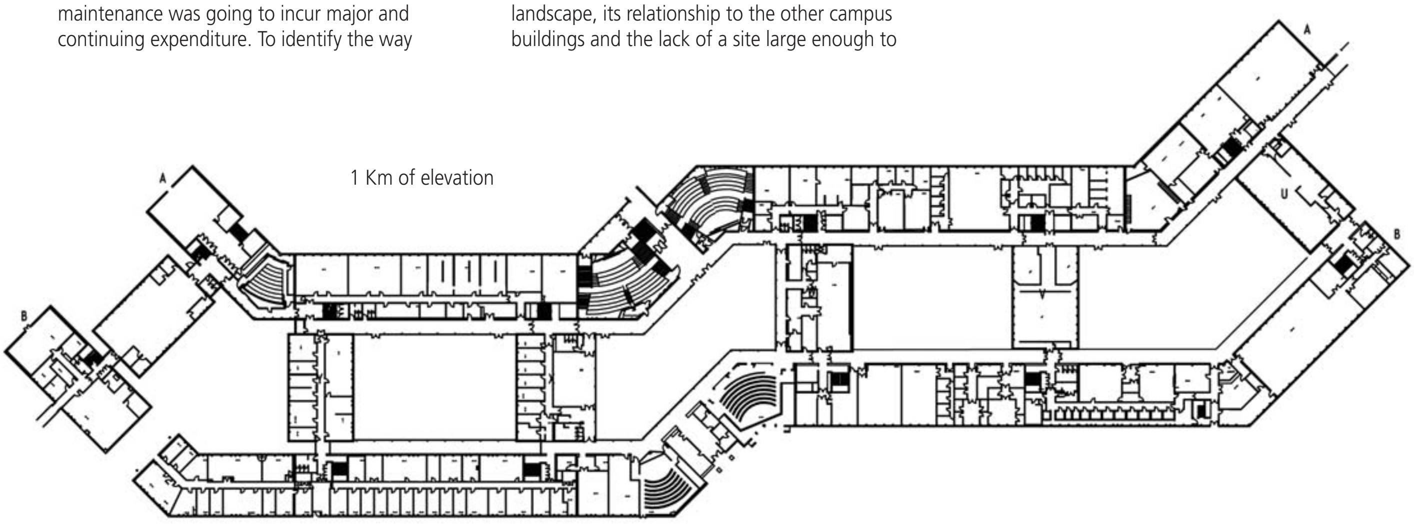
Case study

The Cottrell Building at the University of Stirling, constructed between 1969 and 1972, provides some 22,000m² of academic and administrative accommodation over 3 storeys with elevations which, including internal courtyards, run to 1 kilometre in length.

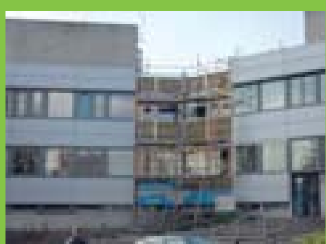
Deterioration of concrete supports to external cladding panels lead to a number having to be removed. Though not actually part of the wall their removal exposed parts of it never intended to be seen. It was also recognised that the uninsulated cavity blockwork walls and single glazed windows in thin metal frames were causing substantial heat loss and ongoing maintenance was going to incur major and continuing expenditure. To identify the way forward the University's Estates and Campus Services Department, in conjunction with a team of professional advisors, carried out an option appraisal on the whole exterior fabric.

Six options were considered and ranged from simple repairs to full overclad and window replacement. Important considerations were cost, sustainability, reducing energy consumption and enhancing appearance. Also crucial were cost in use and whole life cost including the value of the building's 50/60 year extended life. In addition to the prohibitive cost of replacing such a large proportion of the University's accommodation, the building's integration with the parkland landscape, its relationship to the other campus buildings and the lack of a site large enough to accommodate a replacement, all made extending its useful life essential. The value to the university of giving the building a crisp modern appearance was also recognized. New buildings stimulate a campus. This could provide that stimulus at a fraction of the cost.

The assessment demonstrated that the objectives could best be achieved by a full overcladding. A higher initial cost was more than compensated by substantial long-term savings. The remaining concrete cladding panels were removed as an enabling works contract and the University's appointed Architects, Burnett Pollock Associates,



Cottrell Building University of Stirling



during ...

obtained the statutory consents and developed performance specification and drawings showing the scope of the works and the design intent. This was put out to competitive tender.

The works were to be let on a Design and Build basis where the contractor would ensure single point responsibility for detailed design, design of fixings, all aspects of performance, programming, ordering, delivery, access and site security and provide a Warranty for the new envelope. The tender documents recognized that detailed design of the cladding would be carried out by the specialist contractor to suit his system. This design would meet the performance requirements and be developed with the architects to ensure that it also met all aspects of the design intent.

An exhaustive list of tender deliverables allowed weighted assessment of tenders on price, technical proposals, quality, minimizing disruption and past performance. Assessment of the preferred bidders involved visits to past projects and references from their clients.

Following careful assessment, the award was made to D+B Facades in December 2006, with a contract period of 21 months and value of £3.9m. Many of the contractor's design proposals had been carefully reviewed pre-award with provisions being made for client options post-award, thus building the project team and allowing detailed design to proceed rapidly with the project architect. The design development facilitated resolution of several significant issues:

1. **MOCK UP** - Detailed calculations, drawings, method statements and samples were submitted and commented upon by the client and project team. Contractor's details were submitted to Building Control and approved as amendments to Building Warrant. As part of detailed design development D & B Facades constructed a full size in-situ mockup to demonstrate the proposals prior to final sign off by the client team. With disruption and sequencing being a major apprehension throughout the university the mockup was courageously constructed on the wall of the office of the University's Director of Campus Services. This demonstrated the low level of disruption and allowed minor experimentation with appearance and colour. It also enabled the final appearance to gain wide acceptance prior to commencement.
2. **SEQUENCING** - To minimize disruption to the building users the design was amended with the new windows well outside the line of the existing ones. This enabled them to be fully installed and weather proof prior to removal of the existing windows which were covered with protective film during this operation. The internal sequence involving removal of existing windows and installation of new window linings was carried out during a night shift utilising flat packed pre-finished internal linings to enable rapid, one visit installation. The disruption to building users had been successfully designed out and the need to decant totally removed, with considerable cost saving to the Client. A further major benefit was that sequencing of external and internal work could be independent of any critical path allowing flexibility to programme the work round temporary user restrictions in certain areas to accommodate exams or special academic requirements.
3. **WINDOW SELECTION** - The aluminium window envisaged in the design intent was substituted with a NorDan, ecofriendly aluminium clad timber window with the architect's approval. Timber for these is from a sustainable source, the aluminium is smelted using hydropower and their U value exceeded building regulations minimums by 20%. They arrived factory glazed to facilitate rapid installation.
4. **COURTYARD DESIGN** - The treatment to the courtyards had initially been downgraded to rendered blockwork and cavity insulation to meet the budget but streamlined design and procurement, together with economies of scale, allowed the high quality aluminium rainscreen to be used in these elevations as well.
5. **ARCHITECTURAL FEATURE FINS** - During the design development process fin features, which replicated the original rhythm of the window mullions, were developed on the mock-up, costed and incorporated to provide added richness to the elevations.
6. **LOGISTICS** - Programme and sequencing proposals for implementation of the works with minimal risk and disruption were continuously developed by the project team as the design progressed. A main satellite compound was constructed to which all main deliveries were made outside normal hours. Materials were loaded and distributed from there on a daily basis before 8.00 am when the normal daily activities of the University began. Noisy operations of drilling for fixings were also done outside normal hours. With these clear, workable site rules and procedures in place, work continued efficiently with minimal interface between contractor and University.

Using scaffold access and with this level of preplanning, the works started in January 2007 on a carefully controlled rolling programme and were completed in June 2008 – 3 months ahead of programme and under budget since the design had avoided expenditure set aside for decanting to temporary accommodation.

Cottrell Building University of Stirling

after ...

Andy Duncan of The University of Stirling said

"The project was a tremendous success, we are saving energy cost and have significantly reduced our carbon emissions, the project will pay for itself in energy savings alone in the coming years. Thanks to the careful design, the building has been truly regenerated and its useful life extended well into the future – the delivery process was surprisingly and refreshingly smooth and professional".

George Moore Building Caledonian University

Scope of Works

Aluminium Rainscreen
Window Replacement
Insulation
Concrete Repair
Brise Soleil
Curtain Wall Replacement

Programme

Onsite: 14 weeks

Contract value

£750,000.00

George Scott, Head of Estates

"We have switched off the boilers since the new highly insulated cladding system has been installed."

"Classrooms which were either drafty and cold in winter or hot and poorly ventilated in summer are now comfortable and economic to run all year...they look great too!"






d+b facades

OVERCLADDING SPECIALISTS

The experts with a proven track record

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