

Façade engineering is not so transparent



Graham Fairley
Chairman of the Society of
Façade Engineering (SFE)



Allow me to introduce myself;

I am Graham Fairley the newly appointed Chairman of the Society of Façade Engineering.

Perhaps unexpectedly I am not an engineer of any sort: I am an Architect.

And during my time in this role one of my main aims is to increase the number of architects who are members of the Society.

Why?

This may take some time but bear with me.

What is the Society of Façade Engineering, what does it do and why has it come into existence?

Without betraying my age I have been involved in the business of putting the envelope around buildings together for over 30 years and the world of work I now inhabit is very different to when I took my first professional steps.

By training I am an architect (actually my first degree was in Furniture Design but let's not go there) and the structure of the professional world seemed (perhaps naively or perhaps it is memory loss due to my age) very simple in those early years.

There were clients, there were architects, there were main contractors, there were engineers (structural and M&E), there were cladding contractors and the main form of building contract in use was the JCT (Joint Contracts Tribunal).

There were very limited Construction Management Contracts, Design and Build Contracts had not yet been invented. In addition the Building Regulations were not that sophisticated.

There were no computers, no CAD drafting, no plotters, no e-mails, no internet, no software applications used to enable effective sharing of project-related information between geographically dispersed members of a construction project team (phew), and no BIM.

"U" value calculations, if carried out were normally done using a slide rule. Drawings were produced by hand on tracing paper with pens and draughting machines with parallel motions and were printed on reams of paper which smelled of ammonia and were called dyelines.





Finally, there were no Façade Engineers.

In fact there were no façades because when I first got involved it was called Cladding.

So what are façade engineers, how and why have they come into existence, what do they do and why is the Society of Façade Engineering so important?

To answer the above questions we have to understand what a façade is, what it does and how over the years it has evolved

In its simplest form the façade is there to modify the environment inside the building, to provide internally an acceptable working and living environment

In the early days of my involvement in the wonderful world of cladding it was reasonably simple because the pallet of materials, design options and fabrication techniques were fairly limited, as were the procurement routes.

There was glass which was mainly single glazing; it wasn't until the late 1970's that the double glazing industry really took off accompanied by the rise in glass coatings such as low emissivity coating (now simply known as low "E").

In the 1970's Structural Silicone glazing was a new and unproven concept.

There were extruded aluminium mullions and transoms and some even had thermal breaks if you were prepared to pay the extra! The extrusions were cut and drilled and assembled in cladding factories "by hand" There were no CNC (computerized numeric code) machines to cut and drill the extrusions to the very high degree of accuracy enjoyed today.

The majority of curtain wall systems being installed on buildings were stick systems which were erected up on site from a number of separate elements.

The idea of a unitized or panellized system fabricated under controlled factory conditions and then shipped to site was in the main seen as fantasy; as were any systems which were not orthogonal.

Basically the main role of the façade was to keep the rain out and the heat in and of course

look good (according to which ever particular architect was designing the elevations that day) However even in the 1970's things were beginning to change.

The first energy crisis.

The cost of oil reached new heights and over the next few years it become obvious that the era of cheap energy had come to an end and the cost of running our cars or heating our homes and offices was going to increase at an ever increasing rate unless the detailed technical design of our buildings was modified.

As a consequence of the oil crisis and the ever growing understanding that we needed to conserve energy, the heat loss of buildings was intensively analyzed and part of the result was that windows were declared to be one of the biggest 'heat holes' of any building.

It was this arrival of energy consciousness which was one of the driving forces which started the technical design review of the facade to enable it to provide a more energy efficient skin to our new buildings.

Over the consequent years and for a number of reasons, including subsequent environmental crises (such as a growing hole in the ozone layer) coupled with computer controlled cutting and drilling machines which has allowed complex shape formation which could be plotted using computer drafting programmes the façade has developed into a highly complex compressed multilayered skin which has to perform the many different tasks and functions as noted below:

Structural: If the façade is not part of the main building structure it has to support its own weight and transfer lateral loads to building mainframe.

Movement: Accommodate differential movement (caused by moisture, seasonal or daily temperature variations, and long and short term main frame structural movement).

Water: Prevent water penetration to the interior surface of the building

Air: Resist excessive air infiltration and exfiltration.

Condensation: Under agreed service conditions prevent formation of condensation on interior surfaces.

Energy conservation: Modify thermal transfer through the system via radiation, convection and conduction.



Sound: Attenuate sound transmission through the system

Fire safety: Provide rated resistance to heat and smoke.

Security: In some cases protect occupants from outside threats.

Maintainability: Allow manageable access to components for maintenance, restoration and replacement.

Constructability: Provide adequate clearances, alignments and sequencing to allow integration of many components during construction using available components and attainable workmanship.

Durability: Provide functional and aesthetic characteristics over a number of years

Aesthetics: Do all of the above and look attractive (at least to the Stirling Prize judges)

Economy: Do all of the above for a pre agreed some of money

From a purely technical and economic point of view it would have been relatively simple to produce façades which provide technically and economically the required performance. However I suspect they might look just a tad “utilitarian” and similar.

Which is why there is a requirement which has shaped the modern façade and that is?

Aesthetics

It might be only one word contained in the list above but it should not be dismissed or underestimated.

For instance the aesthetic requirement from a number of architects and designers for bigger, clearer more light transparent visually flat high performance glazing with thinner mullions and transoms with no frames has been one of the driving forces in the development of large double glazed units formed from low iron glass with visually neutral glass coatings and structural silicone glazing.

I make no comment as to whether this is right of wrong; it is simply a fact.

During this time of technological improvement in the performance of façade systems and the new methods for producing and disseminating the information, the way in which construction projects were designed and being let was also changing, along with the time allowed to produce the visual and technical design; after

all, time is money. As the design/planning/ procurement/construction process accelerated and overlapped the more traditional procurement routes which allowed a large degree of designing up front before tender were being supplanted.

This has led to a proliferation in small specialist groups who are employed on specific elements of the design and completion of construction projects and in some cases this proliferation has to a degree been uncontrolled.

I speak specifically now about the group which is very close to my heart which are known as Façade Engineers (see we got there in the end).

As recognised above the design of any façade system (even that which could be considered a relatively simple system) has a number of different competing performance and visual requirements which need to be balanced.

The architects design vision (and for which he has achieved planning permission) may have large areas of highly transparent glass with very thin mullions, the M&E engineer has a design to meet part L which requires a high shading co-efficient and a low “U” value, the acoustic consultant needs a system which provides a high degree of acoustic attenuation the façade contractor has a cost plan to meet and let’s not talk about BREAAAM.

The façade engineer has become the mixing palette on which all these potentially competing aesthetic and performance requirements have to come together.

The façade engineer doesn’t need to know the answer or to be able to carry out the calculations. However he does need to have the experience to know that a question should be asked, when it should be asked, and to basically understand the reply and what it means to the design development of the façade system as a whole.

It is fundamental to the position in the team that the façade engineer needs to know a little about a lot of diverse facade related subjects.

In my experience (and I suppose why I got involved in cladding in the first place) this has been the natural position of the interested architect in the design team. He doesn’t know exactly how to get there but he does know



what he wants and a number of ways in asking the same question to a number of different groups which enables an acceptable balanced solution to be achieved.

The façade engineer needs to provide to the design team options for development of the system and given this, the façade engineer has to have had a high level of experience in the design and development of a variety of different façade systems.

So we have now established that there is a group of individuals who would appear to be crucial to the development of a successful facade system and by successful I mean a system which looks right, performs as required and costs an agreed amount of money.

Hopefully at this point we can agree that this group of individuals have earned the right to be called Façade Engineers.

The next question that has to be asked is who or what is a façade engineer and who or what decides who can call themselves a façade engineer?

The term Façade Engineer is uncontrolled

My window cleaner could call himself a façade engineer and there is nothing to prevent this occurrence and given some of the so called façade engineers I have encountered over the years I suspect that many window cleaners have indeed adopted the title.



And for this single reason alone the Society of Façade Engineering was formed by a group of individuals so that if a façade engineer is employed (or being considered for employment) and they have SFE after their name then there is a degree of confidence which is conferred by the letters which allows you to know that the person you are talking to has at least been scrutinized by a panel of experienced individuals who have recognized a level of academic and practical experience which allowed that person to join the group.

This is not to say that a degree from one of the façade engineering design courses currently on offer across Europe should also not be recognized as relevant but academic achievement is only one facet of the experience required to be a fully rounded facade engineer.

The Society of Façade Engineering was formed in an attempt to set a recognisable bench mark level of quality in the field of façade engineering.

It has groups across the world from the Middle East to Hong Kong and Australia.

I would urge anyone interested in the art of Façade Engineering (and of course especially architects who because of their traditional role in the development of the facade have a very big part to play in the group) to apply for membership and I would further urge anyone who is thinking of employing a façade engineer to ask a very simple question:

“Are you a member of the Society of Façade Engineering, if not why not?”