

Issues to Consider

Weight

Summary

- The introduction of the *Kingspan KoolDuct*[®] System to a project can save money and add value.
- The System provides the only practicable solution for some projects.
- The System can function to ensure project viability.
- For the above reasons, the *Kingspan KoolDuct*[®] System should be an automatic consideration for refurbishment projects.

Current Practice

- HVAC systems are commonly added to built environments which have not previously incorporated such systems.
- Existing building structures commonly have insufficient load capacities for new service loads.
- HVAC ductwork is traditionally constructed using galvanised sheet steel insulated with mineral fibre, which is installed as a separate construction activity.
- Time constraints mean that projects may start before the design process is complete.
- The ductwork material is commonly not considered until late in a project's design process.
- Those who are not intimate with a project's constraints commonly select the ductwork material.
- Detailed surveys of existing structures to the level required to plan service layouts are commonly unavailable before construction commences.
- Services design and design co-ordination commonly occurs concurrently with the construction process, often requiring significant changes to the ductwork configuration.
- Delays are commonly caused by unforeseen obstacles discovered only once construction starts and full exposure of the structure occurs.
- Delays are commonly caused by design changes that are required during the construction period.

Review of the Alternatives

Kingspan Insulation commissioned an independent review of six UK case studies by independent consultants, Rider Levett Bucknall*. The purpose of this review was to examine insulated sheet steel ductwork and the *Kingspan KoolDuct*[®] System, their relative performance with regards to weight and the benefits that this can incur.

A series of refurbishment or fit out projects that used the *Kingspan KoolDuct*[®] System were reviewed. Data was collected by interviewing personnel involved, including the project managers, architects, structural engineers, services engineers and quantity surveyors, contractors, services sub-contractors and ductwork sub-sub-contractors.

Almost without exception, the light weight of the *Kingspan KoolDuct*[®] System had an impact on the project, contributing to its success through a reduction of the potential project cost or by directly influencing its feasibility.

In some instances, the *Kingspan KoolDuct*[®] System had been selected at the outset because of its known properties and the project constraints. Generally however, it was not an initially specified choice but was subsequently selected to overcome problems that arose during the development of the detailed design.



Cadogan Hall, Sloane Square, London

The loadings imposed by the new theatre ventilation system were minimised with the *Kingspan KoolDuct*[®] System, removing the need for additional support members, which would have been difficult to install within the existing historic structural element.



Virgin Roof Gardens, Kensington, London

The light weight of the *Kingspan KoolDuct*[®] System enabled the new extension structure to accommodate the load of the existing structure in addition to the considerable network of ductwork, eliminating the need for a substantial redesign.

The explanation for this is that, for historical reasons, the majority of ductwork in the UK construction industry is fabricated using galvanised sheet steel with the insulation subsequently installed, if required. The selection of ductwork material is therefore generally assumed. Additionally, the construction project client's specification for ductwork is normally limited to a set of performance criteria rather than a specific material. The actual selection of the ductwork material is made by the mechanical services sub-contractor or, more often, its ductwork sub-sub-contractor. Neither of these organisations derives a direct benefit from the selection of the **Kingspan KoolDuct® System**. Indeed, because of existing manufacturing setups, it may be disadvantageous to move away from the existing specification norms. With the material selection so far removed from those dealing with the specific project constraints, it is not surprising that the selection of the most appropriate material often occurs well into the design process or, to the client's disadvantage, not at all.

On the reviewed projects, the main reason for the selection of the **Kingspan KoolDuct® System** was that it could overcome severe constraints on structural loadings. In these circumstances, the selection of the **Kingspan KoolDuct® System**, over a galvanised sheet steel ductwork system, was often the only realistic choice, the alternative normally being the introduction, at potentially significant additional cost, of secondary steel supports to transfer service loads back to the structure. In some projects, even this option was not available for example, where buildings contained features of historic or architectural importance that could not be obscured by the introduction of new structural members.

An additional attribute contributing to the selection of the **Kingspan KoolDuct® System** was its ability to be delivered to site in a flat form and for the ductwork sections to be assembled onsite or even, in extreme situations, in their final locations. For sites with extreme space constraints, this characteristic became crucial to the success of the project. The pre-insulated nature of the **Kingspan KoolDuct® System** also removed the need for access space required for the subsequent insulation installation, which proved to be another valuable advantage in the constrained environment of existing buildings.

The flexibility of being able to fabricate the ductwork onsite also proved advantageous in rapidly dealing with unexpected changes to the design required by the uncovering of unforeseen obstructions, or as a result of other design amendments. This feature played an important part in enabling contract programmes to be maintained whereby the replacement of fabricated and delivered galvanised sheet steel ductwork would have taken 2–3 weeks.

In all situations, the lightweight nature of the **Kingspan KoolDuct® System** made the installation process easier. A further, more direct result of the lightweight properties was that the material had a greatly reduced hazard potential. Risk assessments, required for construction operations, were less onerous than those associated with installing the far heavier alternative materials and hence the safety strategies and protection measures that were adopted were also less onerous.

*A copy of the Rider Levett Bucknall report is available upon request from the Kingspan Insulation Marketing Department on +44 (0) 870 733 8333.



Lloyds No.1 Bar, Chichester
The **Kingspan KoolDuct® System** purged the need for the probable introduction of secondary steel supports in this existing single storey steel frame structure, for the new suspended ceiling and major ductwork serving the new services installation.



Crawford Theatre, University of Strathclyde, Scotland
The roof was prohibited from being subjected to additional loading. The use of the **Kingspan KoolDuct® System** reduced the overall service loading, and the consequent design strength (and hence cost) of the steel support system.