

SCOSS TOPIC PAPER

June 2015

Structures at the end of their design life

Design life varies according to the type and use of a structure. A structure should retain fitness for purpose as it approaches and passes its design life or changes use.

Much of our small scale built environment was developed without a defined service life. The structure, services and finishes are likely to have been upgraded progressively without disproportionate cost and with limited regulation.

For major public infrastructure and industrial/commercial structures a design life will have been specified in the design brief but changes in loading and use will have often required upgrades long before the design life has been reached. Bridges in particular have an inspection and assessment process in order to evaluate ongoing serviceability. For essential public infrastructure the consequence of closures for replacement is such that life extension, strengthening and upgrade whilst remaining in service may have to take place.

For industrial structures the economic life of the system of which the structure is a part is usually governed by the M&E equipment and the commercial viability of the production system or the resource being exploited.

For many commercial structures the structure itself is likely to have a longer economically viable life than the commercial application. M&E equipment upgrade requirements, changes in technology and changes in use can limit the economic life of a structure. The presence of hazardous materials may limit the economic viability of modifications to older low value structures to meet new commercial needs.

In pure structural terms life extension is greatly facilitated if the structure is accessible for inspection and repair and the design and fabrication information is readily available. BIM will be valuable for future life extension of new structures.

Whilst the focus in structural assessments is on the primary components of a structure consideration of secondary elements such as cladding panels and facades is also necessary because they may fail due to corrosion of fixings and decay of masonry.

Internationally there is a need for greater awareness and regulation in some countries as there have been many structure failures arising from combinations of poor construction and maintenance and additions beyond the capability of the original structure and foundation.

We need to avoid the largely unnecessary cost and effort associated with calling for design life assessments for all structures. Major structures with inspection and maintenance programmes and those actively managed and maintained are already largely satisfactorily addressed, but would be helped by more design attention to inspection and maintenance. Industrial structures often have a short life but changes in use may not be fully covered. Domestic structures do not need it. Perhaps small scale commercial structures do.

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