



Achieving successful innovation, lessons from failures.

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Abstract

Innovations to achieve construction that is fit for purpose, cost effective and which delights the eye have not always been successful. Some innovations have created a legacy of deteriorating, unmaintainable, functionally inappropriate and sometime ugly structures in housing, hospitals, highways, education and public buildings. Faulty diagnosis of the reasons for failure has often led to the discarding of sound innovations flawed only by easily remedied local faults. A check list for reducing risk in innovation is provided

Keywords: innovations; extrapolation; materials; structure; contract; risk; standards.

1 Introduction

The development of engineering design has not been smooth. There have been innovative revolutions interspersed with periods of stagnation or steady evolution, with failures and cul-de-sac along the way. This has led to the diversity of our built environment, with some well established good practice and a legacy of substandard construction and discarded innovations.

There is a need for successful innovations to meet the demands for cheaper but durable structures with lower environmental impact in construction and use, and which are better adapted to 21st Century life styles. Forensic examination of past failures and successes can reduce risk of misdirected creativity.

IABSE WG8 Forensic Engineering is a developing international forum for analysis of design, contract and construction failures and their consequences. Innovations in structural form, materials and/or contract frequently feature.

2 Flawed Innovations

Many 'innovations' have been widely adopted, but their deficiencies only became apparent many years later. In consequence substantial parts of our infrastructure have had to be discarded as unsafe, unmaintainable or socially unacceptable. Meanwhile the best of Historic construction remains serviceable. In manufacturing, innovations are developed with a series of prototypes, tested and refined before production, with follow up analysis of performance in service. To often clients, designers and materials specialists fail to inspect and analyse long term performance of what they have built, so as to provide a basis for evolving better construction.

3 Concrete Successes and Failures

Catastrophic fires drove the development of successful innovation in iron and then reinforced concrete structures. The innovators, Hennebique and Freyssinet, produced concrete to the highest standards 100 years ago, based on their research and knowledge of the fundamental of material properties and structural performance.