Summary

Flat roofs are most commonly used for high-rise buildings in Singapore. However, it is the most neglected part in the entire building due to its remote location from the ground. The present flat roofing problems are due to the inadequate attention paid by the developers, designers, contractors, maintenance managers and building owners in the following areas:

1. The correct choice of a roofing system,
2. The ability of the materials to perform as a system,
3. The achievable level of workmanship,
4. The effect of warranty and
5. The implementation of regular and corrective maintenance.

The writer therefore hypothesizes that the service life of the flat roofing systems can last much longer if all the above factors are properly understood and executed.

This study covers field studies, review of literatures, interviews with relevant parties and surveys of roof contractors. All the feedback are collated and analysed. The problems are established, causes identified and solutions proposed for the design, construction and maintenance stages of the roofing performance.

It is discovered that the premature roof failures are due to the failures of waterproofing membrane, insulation and
substrate. These failures can be avoided if designers exercise greater understanding of the material properties, its performance and site application especially in the non-standard areas. Better site control by the use of quality control measures such as work control standard and checklist in the course of construction can eliminate many workmanship problems.

With proper design and construction, the problems of premature roof failure can best be avoided. The vital element of roof maintenance is critical to the lasting performance of a roofing system. It is discovered that there is relatively no roof maintenance in the current building maintenance system due to:

1. the misconception of warranty,
2. the young age of buildings,
3. the inadequate building knowledge by the maintenance staff,
4. the tight operating budget,
5. the annual appointment of managing agent,
6. the inadequate commissioning procedure and
7. the unavailability of 'as built' documents.

The writer proposes that a roofing maintenance management system enabling the implementation of a systematic inspection, preventive and corrective maintenance be adopted. On a wider scale, a feedback system involving all
the parties such as the designers, contractors, developers, property managers and relevant institutions such as the Singapore Institute of Architects, Construction Industry Development Board, and National University of Singapore can be instituted. This feedback system enables the sharing of knowledge and avoidance of costly mistakes.

A roofing association can be set-up to administer the training, upgrading and registering of roofing contractors and skilled workers. The roles of the association include the establishment of suitable materials for local use, its performance on field and accelerated tests, code of practice and the implementation of a proper roof maintenance management system.

It is concluded that with the bridging of the missing links in the present building industry, the service life of flat roofing systems can be much longer.