SUMMARY

The rapid economic development experienced by Singapore has placed an ever increasing demand on scarce land space. This is reflected by the preponderance of high-rise buildings all over the island, particularly in the city. Many of these high-rise developments, especially commercial buildings, are externally clad with various proprietary types of cladding.

This thesis reviews the different types of claddings used on high-rise commercial buildings in Singapore, and the importance of regular inspection and maintenance of these buildings. Efforts have been made to determine the frequency of occurrence of common defects on external cladding of these buildings such as cracking, water penetration, discolouration, and debonding. Causes of such defects are discussed together with suggestions for proper detailing, workmanship and repair methods to minimise and correct these defects. A review of various non-destructive inspection techniques available for defect identification is then presented. An overview of the local construction industry is given and the prevailing problems of declining productivity and acute labour shortage highlighted. The growing maintenance sector of the industry is discussed and the current problems faced by inspection and maintenance contractors in performing external cladding inspection presented. Suggestions are then made to overcome the prevailing problems through the adoption of automation in the industry. The concept of robotics technology with emphasis on construction robotics is introduced, and arguments are presented to justify the move towards the use of robots for inspection. Local contractors’ reception to the use of robots for cladding inspection, highlighting the benefits and limitations, is incorporated to support the case for robotisation. Finally, two robotic inspection systems are proposed and their systems architecture and applications discussed.