CHAPTER 3

RESEARCH METHODOLOGY

3.1 INTRODUCTION

ANSYS CivilFEM 12.0 performs advanced customization for the ANSYS in the finite element analysis. Actually, ANSYS and CivilFEM are the combination of two programs and they are integrated well and thoroughly with providing Construction and Civil Engineering fields in a wide range of projects with the possibility by applying high-end technology. CivilFEM is being widely used due to its capabilities of including a unique and extensive materials and sections library for both concrete and steel structures. Finite element analysis can be done and analysed through its postprocessor. Code checking is the system provided in the postprocessor for users to analyse the modelling by referring to the code that is chosen for analysis (Moreno et al., 2001). ANSYS CivilFEM 12.0 is an engineering simulation software for the finite element modelling and analysis.
3.2 RC BEAM MODELS

3.2.1 Control Beam

Figure 3.1 and 3.2 show the schematic diagram of the control beam that being used in this study. The cross-section of the control beam was 120 mm x 600 mm with a length of 2400 mm as shown in the figures. Figure 3.2 also shows the arrangement of steel reinforcements in the control beam.

![Figure 3.1: Schematic diagram of control beam](image1)

![Figure 3.2: Arrangement of steel reinforcement in control beam](image2)
3.2.2 RC Deep Beams with Square and Circular Openings

i. Opening shape: Square
Opening size: 120 mm x 270 mm x 270 mm

   a. RC Deep beam with square opening without strengthening (45% of reduction)
   b. RC Deep beam with square opening with CFRP strengthening (45% of reduction)

Figure 3.3 and 3.4 show the schematic diagram of RC deep beams with square openings. The opening is 300 mm from the side of the beam as shown in Figure 3.3 while Figure 3.4 shows the arrangement of the steel reinforcements.

Figure 3.3: Schematic diagram of deep beam with square openings

Figure 3.4: Arrangement of steel reinforcements in deep beam with square openings