Venetian Casino, there were a number of design integration problems between the Venetian themed GRC facades and the concrete structures. The design issues contributed to delays during the tender and construction stages.

In reaction to the challenges on phase one, the client supported the adoption of BIM 3D CAD modeling during the detailed design phase and construction documentation stage before the specialised façade contractor was appointed. A BIM team from the InteliBuild were appointed to work in parallel to the architects and structural engineers to build 3D CAD models to identify design conflicts where structural elements were clashing with architectural elements of the façade. These issues were then resolved by the designers before the drawings were issued to the contractors (Figure 2).

At the commencement of the 12 week detailed design and tender documentation phase for the Parcel 5&6 Façade project, the BIM team assume their role of coordinators, assembling 3D CAD models from the architects and structural engineers 2D CAD drawings. The BIM co-ordination engineers worked on tasks as to identifying design clashes, conflicting information and missing details on the consultant's drawings. A schedule of work was developed with the design team to integrate the 3D CAD design validation review into the overall design co-ordination process. The 3D structural modeling team assembled the structural frame model from the Arup 2D CAD drawings. The 3D architectural modeling team built the GRC façade models from the architects' 2D CAD drawings.

As the design for each of the 18 themed facades was completed, a report was compiled by the BIM coordinators identifying issues which required the attention of the architects and engineers. These issues included conflicting information between architectural plans, sections and elevations, misalignment and setting out issues between the structural framing and GRC panels and many other technical queries. These issues were previously discovered by the main contractor on site.

The architect and structural engineers issued drawings to the BIM team on a weekly basis. One week later a design co-ordination workshop was facilitated by the client to review the design progress and to resolve the technical queries raised from the 3D modeling process. The 3D models were used throughout the design co-ordination process to review details and to illustrate different design conditions. The 3D models became the focal point for discussions between the client, architect and engineers. The architects and engineers made design changes and revised their respective 2D drawings according to decisions made during the co-ordination work-shops. The updated drawings were then incorporated in the 3D CAD models to ensure that the issues raised previously were fully resolved.

There was an initial resistance from the Architects and Engineers to the inclusion of an independent check by the 3D CAD modeling team. But designers soon became fully engaged when they found the BIM models and technical query process facilitate better understanding of the issues. At the end of the scheduled 12 week tender documentation process, the architects and engineers produced a set of fully coordinated design drawings and the 3D Modeling consultant produced a detailed interactive model of the podium façade. The 3D model was included with the tender documents issued to the specialist façade contractors. As the client noted, the BIM coordinated tender was completed in a shorter duration than the previous phase.

Case 2: The Cathay Pacific Cargo Terminal, Hong Kong

The project is located on the south side of the Hong Kong International Airport platform the Cathay Pacific (CX) cargo terminal facility, costing roughly USD$500M. The facility will be the largest air cargo terminal in the world (when measured by tonnage per square metre) with a target throughput capacity of 2.6 million tonnes of cargo per annum. At peak times, the cargo terminal will process more than 75 flights per day with each flight containing up to 110 tonnes of cargo from silver bullets (converted 747 cargo carriers) or up to 25 tonnes from passenger planes.

The client specified that the design must be coordinated using the BIM process from the very beginning of the design stages. CX was determined to use the latest technology available to reduce the risk of delays and cost over-runs on the complex fast-track building. The cargo facility is a structure with a very specific purpose that requires extensive mechanical, drainage, ventilation, electrical, and specialised mechanical systems. As the design, drawings and specifications for these systems are incorporated into the BIM, a detailed clash detection analysis matrix can be implemented to identify and eliminate any design conflicts between various systems (cargo handling, structural, architectural, municipal systems, specialised systems).

There are different types of clashes that must be indentified in a project such as this. A hard clash will exist where piping or other systems are passing through or otherwise interfering with structural or architectural elements. This could cause a delay on site that might require an RFI if overlooked during the design process. Cargo enters the facility on 6 tonne pallets which are then processed by the Materials Handling System (MHS). The MHS consists of a semi-automated assembly of roller-decks, which move the cargo pallets laterally while large hoists are used to raise or lower the pallets vertically between levels. This requires the BIM to account for the different systems that may