Annex B

Operation of the Autonomous Tower Crane integrated with Skyjuster®

Before any on-site works begin, a comprehensive virtual design and construction model using Building Information Modelling (BIM) is developed and seamlessly integrated with the Autonomous Tower Crane. This information model, or 'Digital Twin', specifies the placement of each precast component, before they are hoisted. The Digital Twin is continuously updated during the installation process to help the Autonomous Tower Crane monitor live construction activity and maintain the required safety clearance from installed structures. To initiate hoisting works using the Autonomous Tower Crane, the crane operator only needs to touch a button in the operator's cabin, which then autonomously lifts and transports precast units through the through the shortest safe route to their designated locations recorded in the BIM. This streamlined process reduces operator fatigue and enhances operational efficiency on-site.	 *[Photo credit: HDB]*

During the automated hoisting and placement, the crane operator also acts as a safety contingency, where they can manually override the movement of the tower crane should they notice any potential safety hazard.	
The integration of the Skyjuster®, which houses a gyroscope, to the lifting frame further enhances the crane system by eliminating swaying motions of the modules, and automating the rotation and positioning of suspended components to the intended alignment before they are lowered into place. It removes the need for manpower to provide manual rope guidance, and speeds up the construction process while enhancing overall safety, especially for large and heavy precast modules that require significant effort to manoeuvre.	 *[Photo credit: HDB]*
The entire installation process from hoisting to final placement is monitored live through the Digital Twin model remotely at the site office, ensuring accurate and safe installation.	 *[Photo credit: HDB]*