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GROUND OPERATIONS PROCEDURES AND PRELIMINARY DESIGN RESULTS OF SOUTH KOREA'S NEW LAUNCH COMPLEX FOR THE NEXT GENERATION LAUNCH VEHICLE

Abstract

South Korea successfully launched its first space launch vehicle, the NARO, in 2013, further became the seventh country in the world capable of launching practical satellites using a self-developed propulsion system by launching the NURI in 2022. Currently, South Korea's third launch vehicle, the Next Generation Launch Vehicle is under development by KARI (Korea Aerospace Research Institute), aimed at launching a lunar lander to the moon in 2032. It is initially planned to have two stages, with the first stage designed to cluster five 100-ton-class engines. Accordingly, new launch facilities for the new launch vehicle are also under development at NARO Space Center in Goheung, one of the southernmost areas in South Korea. The launch complex is generally categorized into mechanical ground support equipment, propellant supply facilities, and launch control facilities. The mechanical ground support equipment consists of transportation systems for moving and erecting the launch vehicle, umbilical retraction mechanisms for providing support and retracting umbilical lines separated from the launch vehicle, holding devices for supporting the launch vehicle until engine ignition, and fixed structures such as a launch pad or an umbilical tower. Focusing on the perspective of mechanical ground support equipment, this paper introduces the development goals for the new launch complex and presents the preliminary design results. Introduction is provided for each subsystem of the mechanical ground support equipment under development, along with specifications and challenges that need to be overcome for the development of each subsystem. Additionally, the launch operation procedures are introduced with an analysis of the differences compared to the previous launch operations of the two launch vehicles.