

## Analysis of Impact of Airplane Wheels Pre-Rotating on Landing Gears of Large Airplane

**Authors :** Huang Bingling, Jia Yuhong, Liu Yanhui

**Abstract :** As an important part of aircraft, landing gears are responsible for taking-off and landing function. In recent years, big airplane's structural quality increases a lot. As a result, landing gears have stricter technical requirements than ever before such as structure strength and etc. If the structural strength of the landing gear is enhanced through traditional methods like increasing structural quality, the negative impacts on the landing gear's function would be very serious and even counteract the positive effects. Thus, in order to solve this problem, the impact of pre-rotating of landing gears on performance of landing gears is studied from the theoretical and experimental verification in this paper. By increasing the pre-rotating speed of the wheel, it can improve the performance of the landing gear and reduce the structural quality, the force of joint parts and other properties. In addition, the pre-rotating of the wheels also has other advantages, such as reduce the friction between wheels and ground and extend the life of the wheel. In this paper, the impact of the pre-rotating speed on landing gears and the connecting between landing gears performance and pre-rotating speed would be researched in detail. This paper is divided into three parts. In the first part, large airplane landing gear model is built by CATIA and LMS. As most general landing gear type in big plane, four-wheel landing gear is picked as model. The second part is to simulate the process of landing in LMS motion, and study the impact of pre-rotating of wheels on the aircraft's properties, including the buffer stroke, efficiency, power; friction, displacement and relative speed between piston and sleeve; force and load distribution of tires. The simulation results show that the characteristics of the different pre-rotation speed are understood. The third part is conclusion. Through the data of the previous simulation and the relationship between the pre-rotation speed of the aircraft wheels and the performance of the aircraft, recommended speed interval is proposed. This paper is of great theoretical value to improve the performance of large airplane. It is a very effective method to improve the performance of aircraft by setting wheel pre-rotating speed. Do not need to increase the structural quality too much, eliminating the negative effects of traditional methods.

**Keywords :** large airplane, landing gear, pre-rotating, simulation

**Conference Title :** ICAEM 2017 : International Conference on Aerospace Engineering and Mechanics

**Conference Location :** Venice, Italy

**Conference Dates :** August 14-15, 2017