

Orbiter Lander Device 軌道降落器

Discovery

A lander is a spacecraft that descends towards, comes to rest on, the surface of an astronomical body. In contrast to an impact probe, which makes a hard landing that damages or destroys the probe upon reaching the surface, a lander makes a soft landing after which the probe remains functional.

Application

Students were tasked to study, design and create an orbital lander that will be able to safely land on the planet or moon of their choosing. These landers had to ensure that all astronauts were kept safe during descend and eventual landing. During this project the students learned about how to speed up and slow down certain objects as they fall, we also tested various materials to see which will make the best landing gear to create a soft spring like landing.

Testing and results

When the time came for testing, the students were very excited. We tested their landers from different heights, 30cm, 1m, and 2m. The goal was to land the lander upright with the "astronauts" still safe inside. The final test, if they made the 2m mark, was from the ceiling. With the initial testing, not many made it to 2 meters, but after rethinking their designs, improving on what went wrong and finally testing the improved landers again, most of them made it to 2 meters. This project was a great example for the Engineering Design Process, since the students could not wait to finish a stage and move on to the next. The project concluded with the teams cheering each other on when their lander landed safely on the ground.

啟發

降落器是一種向天體表面下降並停在天體表面的航空器。撞擊式探測器在到達表面時進行直接降落會破壞探測器，相比之下軌道飛行器會進行安全性降落，之後探測器仍可正常運作。

應用

學生的任務是研究、設計和製作一個能夠安全降落在他們選擇的行星或月球上的軌道降落器。這些降落器必須讓所有飛行員在下降和最終降落期間都保持安全。在這個專題中，學生學習如何使物體在下降時加速和減速，我們測試了各種材料以得知哪種材料可以創造出最好的起落架，像彈簧一樣柔軟降落著陸。

測試與結論

到了學生們興奮不已的測試時間！我們從三十公分、一公尺和兩公尺的不同高度測試降落器。目標是讓降落器直立降落，且「太空人」在裡面仍然安全。最後的測試是從天花板的高度降落，如果成功了，就是突破了兩公尺。在一開始的測試中，雖然沒有太多組別成功突破兩公尺，但經過重新設計、改善問題，最終再次測試改良的降落器，大部分都能成功突破。這個專題是工程設計過程中一個很好的例子，因為學生們迫不及待地想完成一個階段，然後趕快再進入下一個階段。在專題的最後，當他們的降落器安全降落時，各隊互相為彼此歡呼慶祝。

1

ASK + IMAGINE
提問 + 創思

2



We investigated different landers to discover which bodies and landing gear were the best. 我們調查不同的降落器，來查出哪些機身和起落架是最好的。

4

CREATE
創造



We worked together to build our lander. 我們共同努力建造了我們的降落器。

6

PRESENT
展現



We recorded the results from testing and shared them with the class. 我們記錄測試結果並與全班分享。



3

PLAN
計畫

1



Groups studied different materials to come up with the best plan. 小組研究不同的材料以提出最佳計劃。

5

IMPROVE
改進



We helped each other test and improve. 我們相互幫助測試和改進。