



China's Hypersonic Wind Tunnel Surpasses US Capabilities

Description

Since May 2023, China's JF-22 wind tunnel has been conducting hypersonic tests, making it well-known for its remarkable speed. This wind tunnel, which is 167 meters long and four meters wide, started construction in 2018. It simulates the conditions a spacecraft faces when it re-enters Earth's atmosphere. This could significantly speed up China's development of hypersonic flight systems, including missiles that may reach the USA.

Although the JF-22 is not the first to achieve high speeds, it is the first reported to simulate conditions up to Mach 30, which is 30 times the speed of sound. In comparison, the United States' LENS II tunnel can only reach Mach 7. Furthermore, the JF-22 can run tests for approximately 130 milliseconds, while LENS II can run for only 30 milliseconds.

Mach 30 translates to about 23,000 miles per hour, which is faster than NASA's space shuttles, which approached Mach 25. The JF-22's unique method involves using chemical explosions for achieving hypersonic conditions, generating up to 15 gigawatts of power. Some experts believe this makes China's wind tunnel significantly advanced compared to Western counterparts.

However, many American wind tunnels are focused on Earth-based vehicles rather than space. Concerns also exist about the air chemistry created by chemical explosions. With the U.S. Department of Defense reconsidering physical testing methods, it remains uncertain if America can create a comparable tunnel.

Vocabulary List:

1. **hypersonic** //,haɪpə'r'sɒnɪk// (adjective): moving much faster than the speed of sound
2. **simulates** //ˈsɪmjəˌleɪts// (verb): makes a model of real conditions for testing
3. **re-enters** //,ri:'ɛntərz// (verb): goes back into an atmosphere from space
4. **gigawatts** //ˈɡɪɡə,wɒts// (noun): units for measuring very large amounts of power
5. **counterparts** //ˈkaʊntə,pɑ:ts// (noun): other people or things with the same role
6. **reconsidering** //,ri:kən'sɪdərɪŋ// (verb): thinking again about a decision or plan

Comprehension Questions



Multiple Choice

1. How long is the JF-22 wind tunnel?

- Option: 167 meters
- Option: 200 meters
- Option: 150 meters
- Option: 100 meters

2. What is the maximum speed that the JF-22 wind tunnel can simulate?

- Option: Mach 25
- Option: Mach 30
- Option: Mach 20
- Option: Mach 15

3. How long can the JF-22 run tests for?

- Option: 30 milliseconds
- Option: 100 milliseconds
- Option: 130 milliseconds
- Option: 200 milliseconds

4. What technique does the JF-22 use to achieve hypersonic conditions?

- Option: Rocket propulsion
- Option: Chemical explosions
- Option: Electric motors
- Option: Magnetic fields

5. How does the speed of Mach 30 translate in miles per hour?

- Option: 20,000 miles per hour
- Option: 15,000 miles per hour
- Option: 23,000 miles per hour
- Option: 18,000 miles per hour

6. When did construction for the JF-22 start?

- Option: 2015
- Option: 2016
- Option: 2018
- Option: 2020



True-False

7. The JF-22 is the first wind tunnel to achieve speeds up to Mach 30.
8. The LENS II tunnel can run tests for a longer duration than the JF-22.
9. The JF-22 wind tunnel is primarily focused on Earth-based vehicles.
10. Concerns exist about the air chemistry created by chemical explosions in the JF-22.
11. China's JF-22 maintains a remarkable advantage over Western counterparts.
12. NASA's space shuttles approached speeds of Mach 30.

Gap-Fill

13. The JF-22 wind tunnel can simulate speeds up to Mach _____
14. The duration for which the JF-22 can run tests is approximately _____ milliseconds.
15. Mach 30 translates to about _____ miles per hour.
16. Construction of the JF-22 began in _____.
17. The unique method of the JF-22 involves using _____ explosions.
18. The United States' LENS II tunnel can only reach speeds of _____.

Answer

Multiple Choice: 1. 167 meters 2. Mach 30 3. 130 milliseconds 4. Chemical explosions 5. 23,000 miles per hour 6. 2018

True-False: 7. True 8. False 9. False 10. True 11. True 12. False

Gap-Fill: 13. 30 14. 130 15. 23,000 16. 2018 17. chemical 18. Mach 7

Vocabulary quizzes



Multiple Choice (Select the Correct answer for each question.)

1. What technology allows users to interact directly with what is displayed?
Option: Keyboards
Option: Mice
Option: Touchscreens
Option: Trackpads
2. Which term describes something that provides great comfort but is not necessary?
Option: Basic
Option: Essential
Option: Luxury
Option: Standard
3. Which speed classification refers to speeds greater than five times the speed of sound?
Option: Subsonic
Option: Supersonic
Option: Hypersonic
Option: Transonic
4. What type of force is responsible for the attraction between masses?
Option: Electromagnetic
Option: Nuclear
Option: Gravitational
Option: Frictional
5. What term refers to beginning a journey or project?
Option: Disembarked
Option: Embarked
Option: Exited
Option: Completed
6. Which word describes something that is important or meaningful?
Option: Trivial
Option: Negligible
Option: Insignificant
Option: Significant
7. What is the path an object takes while moving around another object in space?
Option: Rotation
Option: Translation
Option: Orbit



Option: Revolution

8. Which term describes a state of losing water in the body?

Option: Hydrated

Option: Dehydrated

Option: Saturated

Option: Moist

9. What do we call the small celestial bodies that create streaks of light when they enter Earth's atmosphere?

Option: Asteroids

Option: Comets

Option: Meteors

Option: Planets

10. Which term refers to the ability to move or be moved freely and easily?

Option: Immobility

Option: Mobility

Option: Stagnation

Option: Static

Gap-Fill (Fill in the blanks with the correct word from the vocabulary list.)

11. The astronauts received various _____ to execute during their mission.

12. The _____ protects Earth from harmful solar radiation.

13. The _____ of the new equipment took several days to complete.

14. The presentation began with an _____ of the project.

15. The chef employed various _____ to enhance the flavors of the dish.

16. The _____ glassware must be handled with care.

17. The spacecraft performed a _____ of the planet before proceeding to orbit.

18. The spacecraft _____ the atmosphere at a high velocity.

19. The power plant produces several hundred _____ of electricity.



20. The technology has advanced faster than its _____ in other countries.

Matching Sentences (Match each definition to the correct word from the vocabulary list.)

21. The artist's style is known for its distinctiveness and creativity.
22. The pilot skillfully adjusted the aircraft's position and direction.
23. The team successfully started the engines for the rocket launch.
24. The group prepared for their journey to the International Space Station.
25. We need to change the settings to optimize the performance of the machine.
26. The discovery of water on Mars opened new possibilities for human exploration.
27. The airplane ascended to a height where the air was thinner.
28. The software creates a virtual environment for user training.
29. The committee is evaluating its previous decisions based on new information.
30. This research plays a crucial role in understanding climate change.

Answer

Multiple Choice: 1. Touchscreens 2. Luxury 3. Hypersonic 4. Gravitational 5. Embarked 6. Significant 7. Orbit 8. Dehydrated 9. Meteors 10. Mobility

Gap-Fill: 11. commands 12. atmosphere 13. installation 14. overview 15. techniques 16. fragile 17. flyby 18. re-enters 19. gigawatts 20. counterparts

Matching sentence: 1. uniqueness 2. maneuver 3. ignited 4. astronauts 5. adjust 6. significance 7. altitude 8. simulates 9. reconsidering 10. significant

CATEGORY

1. Sci/Tech - LEVEL3

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