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# INNOVATION

## Jet engines smaller than a penny will propel satellites

### ROCKETRY

JET engines less than a quarter the size of an American penny — smaller than a 1p coin — could soon power hundreds of tiny satellites, writes Mark Prigg.

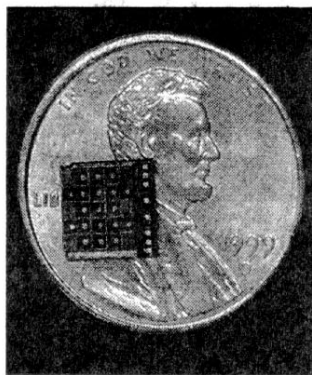
Developed by the Aerospace Corporation, each engine consists of 19 individual rockets, and could power a satellite weighing up to 4lb.

A prototype engine was successfully tested in space for the first time on the last space shuttle mission in July. The engine consists of three thin layers: the top layer holds a series of ignitors, the middle layer propellant and the bottom layer a series of nozzles used to direct the engine's thrust.

The first mission for the new engine is likely to be aboard the International Space Station (ISS) in 2001.

Researchers hope this could soon be followed by an operational test where a satellite powered by the new engine would be released from the station, as part of a mission to examine the station's exterior.

Nasa is also planning sev-



The engine and a US penny

eral other missions that will use small satellites that could be powered by the new engine.

A mission currently scheduled for 2003 will use three tiny satellites to monitor the solar activity outside the earth's atmosphere.

Called the Trailblazer Constellation mission, the satellites will work together to test new software and hardware designed to allow up to 150 satellites to work together. Should a satellite break down, others in the group can automatically rearrange themselves to cover for the broken unit.

Each Trailblazer satellite is

about 16in wide and 8in high and will be launched from a research rocket that Nasa is developing.

According to Dana Brewer at Nasa's Washington headquarters, the Trailblazers will also test a new smart coating for satellites.

She says: "We are using the variable-emittance thermal-control system for the first time and we hope this could reduce the cost of future missions, and also have new applications here on earth.

"The new coating could eventually be applied to surfaces such as car windows. It becomes highly reflective when you apply an electrical current to it. It blocks out a lot of the sunlight, keeping the inside of a car cooler."

If the £18m Trailblazer system is successful, Nasa hopes to launch hundreds of tiny satellites to monitor weather. It has already designed a craft able to carry them into space before releasing them at set intervals, allowing huge areas of space to house weather-monitoring stations.

The system could also be adapted to study the atmosphere of other planets or monitor the earth's oceans.

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