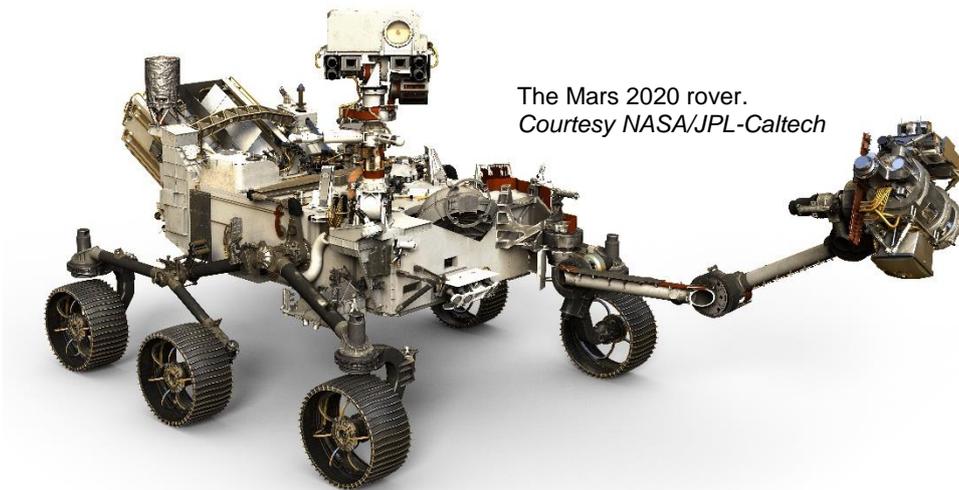


Once again, NASA relies on maxon technology

Swiss-made BLDC motors for the Mars 2020 rover



The Mars 2020 rover.
Courtesy NASA/JPL-Caltech

NASA's next Mars rover will collect soil samples, seal them and deposit them on the Martian surface for future collection and transport back to Earth. Swiss manufacturer maxon motor supplies several drives specifically developed for the task.

maxon motor is on its way to Mars again for NASA's fifth rover mission. The Swiss drive specialist delivers brushless flat motors to the Jet Propulsion Laboratory (JPL), which builds the Mars 2020 rover for NASA.

Sample handling for soil samples

The maxon drives are being used for mission-critical tasks. The plan is for the rover to take dozens of soil samples, seal them in containers, and deposit these in caches on the surface of Mars, where a future mission may retrieve and return them to Earth. Nine BLDC motors from Switzerland are responsible for the rover's sample handling. The drives can be found in the sample caching system, including the end-effector (sample tube holder). The sample handling arm moves the sample containers from station to station within the sampling system. Additional motors are used to assist with obtaining the samples and seal the containers.

Media release, July 4th, 2017

For this project, maxon motor uses brushless flat motors from the standard range (EC 32 flat and EC 20 flat combined with a GP 22 HD planetary gearhead). However, the drives have been modified specifically for the mission: they need to survive a dynamic entry, descent and landing sequence as well as the harsh daily conditions on Mars with sandstorms and temperatures ranging from -130 to +70 degrees Celsius.

Curiosity's successor

From the outside, the Mars 2020 rover looks similar to its predecessor Curiosity, which is still operating on Mars. The upcoming mission will have several new instruments on board that will deliver unique new data for scientists. A key mission goal will be to search the environment for bio-signatures. Another instrument on board will test whether it is possible to generate oxygen from the atmosphere as a precursor for future human visits. However, the most significant innovation is the capability to take rock samples in several locations and prepare them for return to Earth.

maxon motor is a critical part of several current Mars missions

Currently, maxon motor is involved in several projects destined for Mars. NASA's InSight Lander is scheduled to fly to the Red Planet in 2018 to measure its seismic activities and temperature. A maxon DC motor will power the mole that hammers the measuring sensor into the ground.

Two years later, both NASA and the European Space Agency (ESA) will send rovers to Mars. More than 50 maxon drives are installed in ESA's ExoMars vehicle, including some complex actuator systems that were assembled in maxon's high tech manufacturing facilities. These actuators provide the main drive and steering systems for the vehicle. Additional precision motors are used in the drill head, the on-board laboratory, and the camera mast.

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Mars missions with maxon participation:

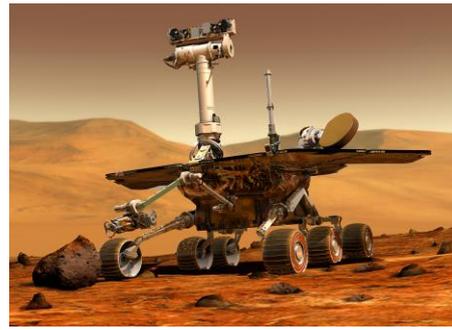
Sojourner

The first Mars rover landed on July 4, 1997. Mission duration: three months. maxon supplied eleven DC motors with a diameter of 16 mm for the drives, the steering, and the scientific devices.



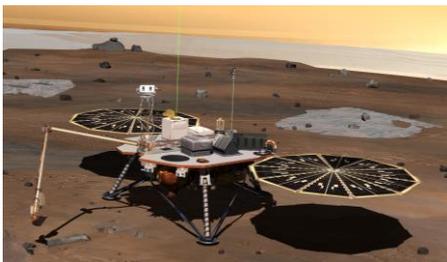
Spirit/Opportunity

The twin rovers landed on Mars in January 2004. Spirit collected data for six years; Opportunity is still active today. The rovers were equipped with 35 maxon DC motors each.



Phoenix

A stationary Mars probe that landed on Mars on May 25, 2008. With its robotic arm, it took rock samples from the ground for analysis. Mission duration: five months. maxon supplied nine RE 25 brushed DC motors with special ball bearings for aligning the solar panels.



Curiosity

The star of the rover squad landed on Mars in August 2012. It surpasses its predecessors not only technologically: Curiosity is the size of a small car, weighs 900 kg, and is powered by a radionuclide battery. maxon supplied the encoders controlling the drive.

