EDFAS Virtual Workshop

3D Packaging & MEMS Panel Discussion

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Ryan Ross

Lead Analysis & Test Laboratory (ATL) team at the NASA Jet Propulsion Laboratory (JPL)

- Component reliability & environmental testing / qualification
- Component Failure Analysis & technique development
- Component screening development
- Physical Characterization (FIB / SEM)
- Non Destructive Evaluation (CT / X-Ray / SAM)
- Construction analysis & reverse engineering

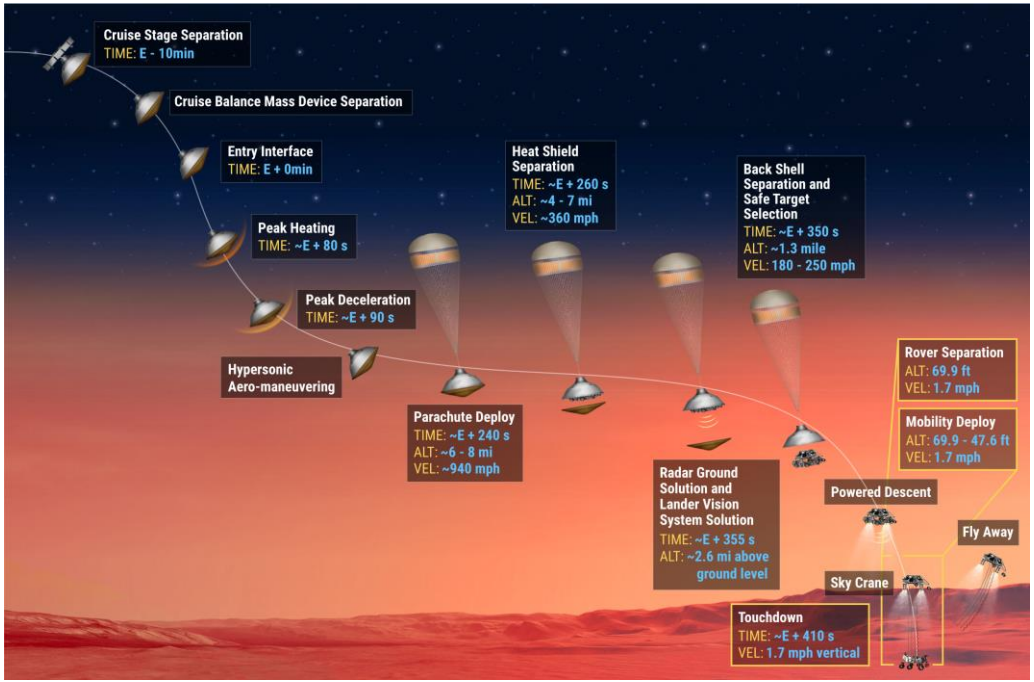
Prior to JPL, 19 years in Semiconductor FA

MEMS & 3D packaging

MEMS widely used in position sensing

- Inertia Measurement Unit (IMU)
  - MEMS using 3-Axes
- Inclinometer
  - MEMS using 2-Axes

Mars Helicopter Ingenuity

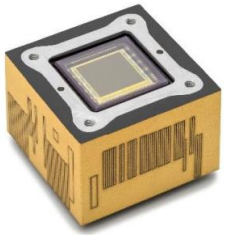


Mars Entry Descent & Landing (EDL)

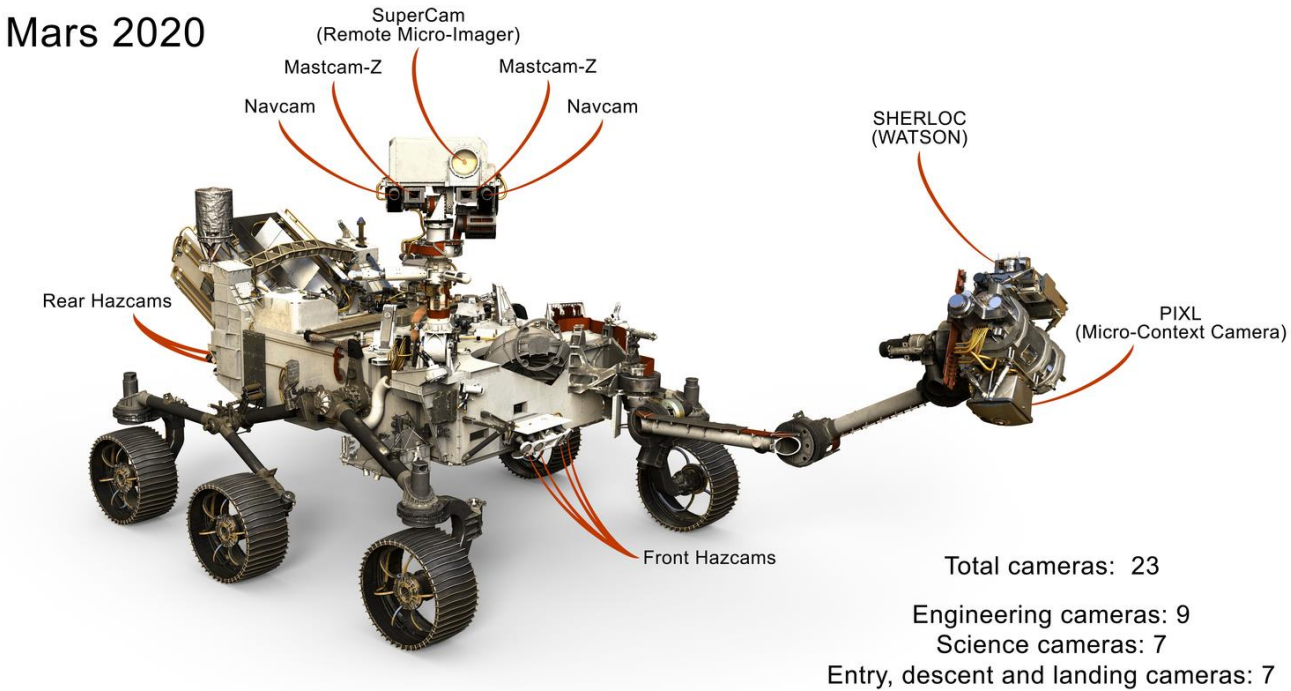
MEMS & 3D packaging

3D Packaging

- Cameras
- Memories
- ASIC's in MEM's

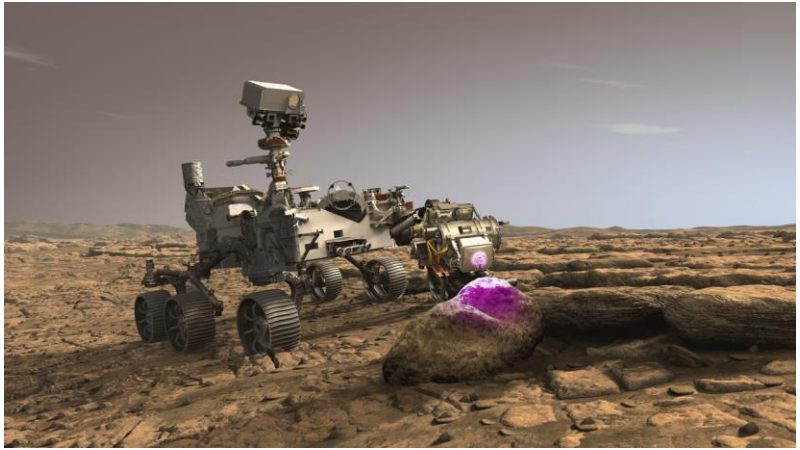


SuperCam Space Camera
Image courtesy of 3D plus



MEMS & 3D packaging Challenges

- Packaging Qualification Verification (PQV):
  - Qualifying device & associated assembly methodologies to meet mission requirements
- Replicating Dynamic / Extreme Environments
  - Extreme Cold / high temperatures
  - Vacuum / different atmospheres / high pressure
  - Evaluation of Radiation Effects
- Low volume, limited # of qualification / FA samples
- Failure analysis equipment primarily designed for use at room temperature, earth atmosphere
- Unable to retrieve “Customer Returns”



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