

Requirement/Sub-problem

Assembling

3. Develop a system that has a minimal chance of incorrect assembly.

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Description

Assembly errors increase if components/sub-assemblies are complex, difficult to align, insert or if there is restricted access for insertion. Manual assembly is not suitable for harsh environments that don't provide enough gravity, temperature, and pressure like Mars.

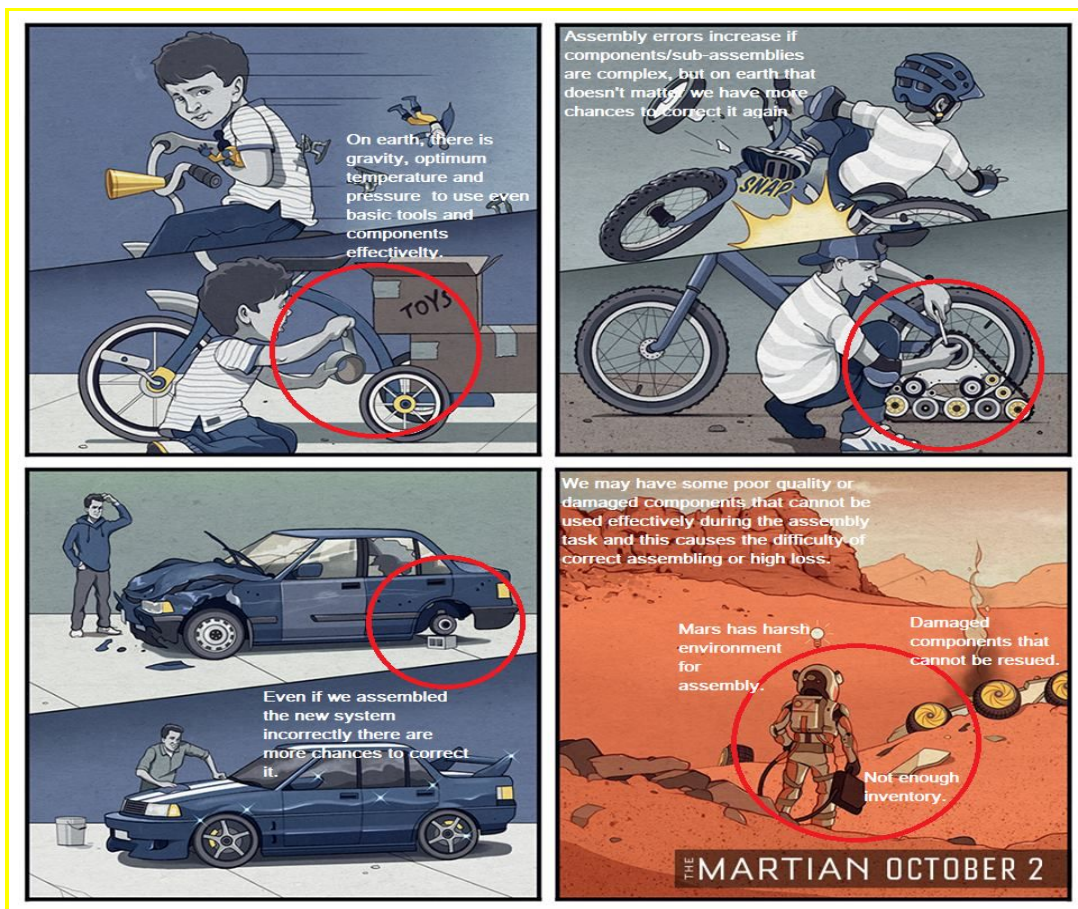
Also, the size and weight of parts to be assembled on Mars may be problematic when it comes to correct handling because of the limited inventory that cannot be reused. We may have some poor quality or damaged components that cannot be used effectively during the assembly task and this causes the difficulty of correct assembling or high loss through the advanced assembly steps. So, This type of problem happens when the end-users, with or without following the instructions of installation of the product, they make by error an incorrect assembly of the parts, causing with the mistake of that the product does not work according to specifications; in worse cases causing serious damages to users when they start to use the product. In conclusion, designers should look for ways to mistake-proof their designs, making the proper assembly of mating parts instantly recognizable and impossible to assemble incorrectly.

Simulation/Measurement

Assembly component is always measured in a given configuration, using an over-constrained measuring set-up. So the measured shape S^m corresponds to the theoretical shape S^d , added to the form deviation E^f and the deformation under the combined effect of the measuring set-up and the component's own weight E^{mc} , which can be expressed by,

$$S^m = S^d + E^f + E^{mc} .$$

Illustration w. Keywords



References

DFM/DFA Article available at <https://quality-one.com/dfm-dfa/>

Engineering Manual Assembly Article available at <https://www.sciencedirect.com/topics/engineering/manual-assembly>

The illustration is available at <https://imgur.com/gallery/QKPt8>

