



SPACE

awareness

WHO IS A MATERIALS ENGINEER?

Field Engineering, science
Type Research, industry
Level of study Bachelor, Masters



What is the field about?

Materials engineering is a relatively recent career path that has grown in importance and impact in our era of Technology.

By using well known and established materials, or by creating and manipulating atoms into something completely new, a materials engineer creates new tools and processes to bring technology one step further.

Material science and engineering is a multidisciplinary field. There is virtually no limit to what you may become as materials engineer: you may choose to dedicate your career to super-computers and modeling our world's biggest questions into a language other engineers and scientists can understand; you may prefer to do a hands-on job in a laboratory filled with great microscopes, seeing atoms one by one and how their unique relations create everything there is; or you may just as well become the one who optimizes quality, efficiency and the overall outcome of any given process.

Materials & Processes experts are vital to ensure the success of every process within the European Space Industry. Their work starts at an early stage by providing support or qualifying newly designed processes, and is often also related to failure investigations that may be exciting to solve, just like a mystery that needs to be explained. Laboratories are the place to be to expose materials to their limits and answer questions such as "Why did it fail? What can I do to make it work?". On a daily basis, new challenges rise and others are solved, leading the space industry better bit by bit.

What would I do every day?

I would use state of the art equipment, from microscopes to X-ray instruments, from thermal cameras (like the thermal vision in movies) to testing chambers with liquid nitrogen or liquid helium vessels to carry out experiments. I would use spectrometers to characterize materials, their constitution and physical properties. I would investigate not only the material in bulk, but also the tiny top layer of it which may have contamination that should not be there! I would then evaluate the effects of this contamination. Would the performance of my component drop too much? I would qualify a material for a specific task, ensuring it will work during a several-year mission for instance to the Sun or to Jupiter. I would participate in failure investigations, to ascertain the failure would not happen again.

Where can I work?

Materials engineers can work in a specialized research institute, in universities and in space agencies like ESA. They can work in cleanrooms where engineers assemble, integrate and test space-crafts. There are also private industries that need material scientists for many tasks from quality support to the development of new technologies.

This is the job for me, if...

... you are creative. If you like to think out of the box. If you try to solve problems in an innovative way.

... you like to use state of the art technology to create newer state of the art technology!

... you pay attention to details.

... you are eager to learn and stay up-to-date with the newest tech achievements. Technology is a non-stopping movement.

A materials engineer should:

Have a good technical background and be willing to **stay updated** about what is “out there”.

Be **good in communication** and dominate English language as in general this is the written and spoken language used: from publications, patents, and books to presentations in conferences.

Be **responsible** and willing to share knowledge with others.

Learn more about material engineering:

- "Materials make the space mission" article
- Video about the Polaris instrument

The text is kindly provided by Bruno Brás, Materials Engineer at European Space Agency (ESA).

Image: PCB - printed circuit board

Credit: ESA



This resource was selected and revised by Space Awareness. Space Awareness is funded by the European Commission's Horizon 2020 Programme under grant agreement n° 638653