

### CHARACTERISTICS

*To be successful in this career, you have to be meticulous in the way you work. Absolute precision is critical.*

### RELATED CAREERS

*Applications engineer, automotive engineer, aviation/aerospace project engineer.*

*"I am constantly challenged by my job and am surrounded by brilliant minds that guide me through my projects. I fell so in love with the nature of my work that I don't see myself doing anything else for a very long time."*

*— Ipeleng Mathebula*

Ipeleng Mathebula

# PRECISION ENGINEERING DOWN TO A FRACTION OF A MILLIMETRE

Ipeleng Mathebula builds cameras. Not the kind that you buy at your local electronics shop, but high-tech optronic sensor systems used for specialised purposes such as detecting small objects in adverse conditions and tracking subjects in low visibility or stabilising cameras mounted on unstable platforms.

**AT THE CSIR'S OPTRONIC SENSOR** systems group, the success of a project relies on a multitude of skills: atmospheric modelling, lens design, mechanical and electronic engineering, embedded software design, image processing and systems engineering. Mathebula's contribution lies between that of the lens designer and the mechanical engineer as he designs the actual hardware used for capturing images.

An opto-mechatronic engineer is a rare breed within the engineering world, with only three in Mathebula's group. Mathebula says that he did not go looking for a career in optronics, but that it found him. After he completed his Master's degree in electronic engineering, he started working at the CSIR. "I am constantly challenged in my job and am surrounded by brilliant minds that guide me through my projects. I fell so in love with the nature of my work, that I don't see myself doing anything else for a very long time."

Not yet beyond his twenties, Mathebula has brought a meticulous and an innovative approach to the development of cameras and optronic systems. These are critical in surveillance and detection used, for example, to keep watch over our ocean borders and guard against piracy. He says, "To be great in this kind of working environment, you have to be absolutely meticulous, you must enjoy the challenges associated with the process of innovation and, most importantly, you have to be able to 'see' something coming before it actually happens."

"To work as an opto-mechatronic engineer you need to pay close attention to detail. If your measurement is off by a fraction of a millimetre, it won't work. Absolute precision is critical to the success of what I build," he continues.

The optronics team implements an iterative design process, whereby the mechanical engineer is responsible for optimising cost, weight, size and ergonomics. "Some of my biggest but most rewarding challenges come from integrating commercial off-the-shelf hardware into a technology demonstrator that is functional and cost effective," Mathebula explains. The hardware that he works on includes thermal cameras, sensitive printed circuit boards and delicate mirrors and lenses coated with films.

"For me, very few things compare to the exhilaration you experience when you see something you have envisioned become a reality, used on-board a patrol vessel helping to secure our shoreline and our country," he concludes.

—Lêsa van Rooyen



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## WHAT IPELENG MATHEBULA STUDIED

He obtained a BEng, BEng (Hons) and his Master's degree in mechanical engineering from the University of Pretoria.



## WHERE TO STUDY

Mathebula studied at the University of Pretoria, but most universities offer both undergraduate courses and postgraduate degrees in engineering.



Ipeleng Mathebula applies his skills as a mechanical engineer in the field of opto-mechatronics.