

The background features a dark, monochromatic image of technical ceramic parts. On the left, a large, curved, textured surface, possibly a turbine blade or a similar component, is visible. On the bottom right, there is a circular opening or hole in a dark material. The overall aesthetic is industrial and technical.

# ceratec

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- ◆ Developing added value of ceramics in applications
- ◆ We do not produce ceramics.

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- ◆ From prototype to series Production
- ◆ High mix, low volume, high complexity
- ◆ Full in-house expertise

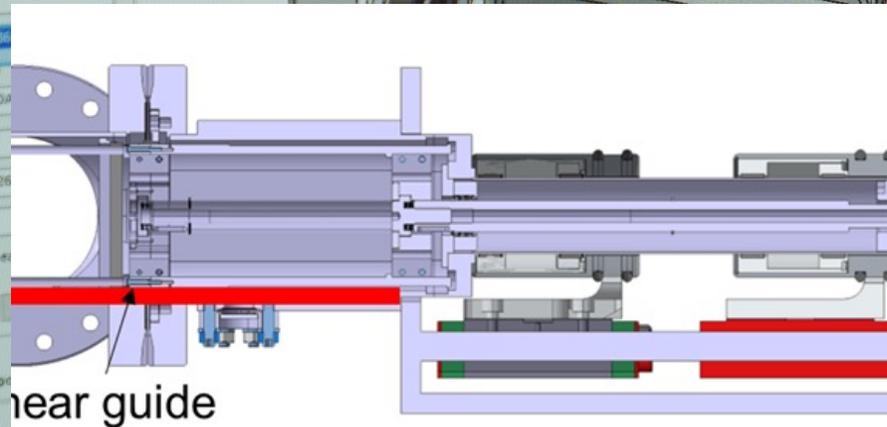


# Solution first, material second!

- ◆ Where others say *impossible*, we engineer the customer solution

# Business with CERN

- ◆ How it started
- ◆ From idea to concept
- ◆ Application-specific material combinations
- ◆ The right stakeholder within CERN



interest in this, if you need any more details let me know.

**Verzonden:** vrijdag 24 november 2023 10:43

**Aan:** ceratec <[ceratec@ceratec.nl](mailto:ceratec@ceratec.nl)>

**Onderwerp:** Linear guides for Ultrahigh vacuum

**LET OP:** Dit bericht is verzonden van buiten onze organisatie. Klik niet op linkjes of bijlagen waarvan je niet zeker bent.

Hello,

I am working on a development project at CERN, where we are trying to build a linear motion system in ultrahigh vacuum.

Are you able to provide a brochure or some more information on the specifications of these guides?

Our application will have a top speed of around 1 m/s, a stroke of around 300mm, and be at around  $10^{-10}$  mbar.

Any help would be greatly appreciated, I can provide more information on the specific application if required.

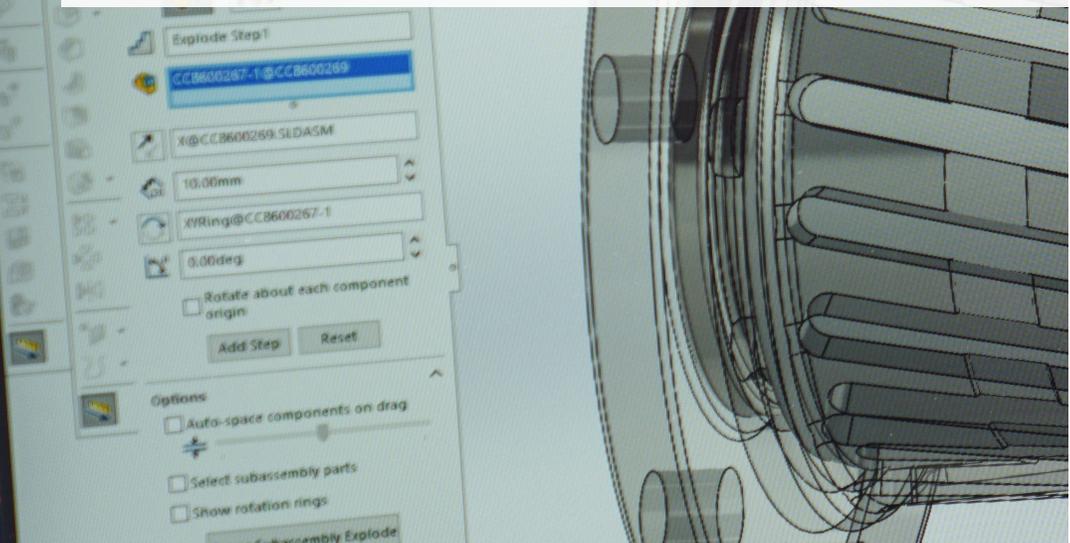
Kind regards,

Mechanical Engineer  
Beam Instrumentation group  
CERN



# What happened next

- ◆ Following publications
- ◆ Offer → Order
- ◆ Execution
- ◆ Testing



PEEK cages, running on a Si3N4 rail. The bearings were preloaded onto the rail via thin sections of the titanium carriage, which acted as mechanical springs to provide a smooth motion profile.



MI

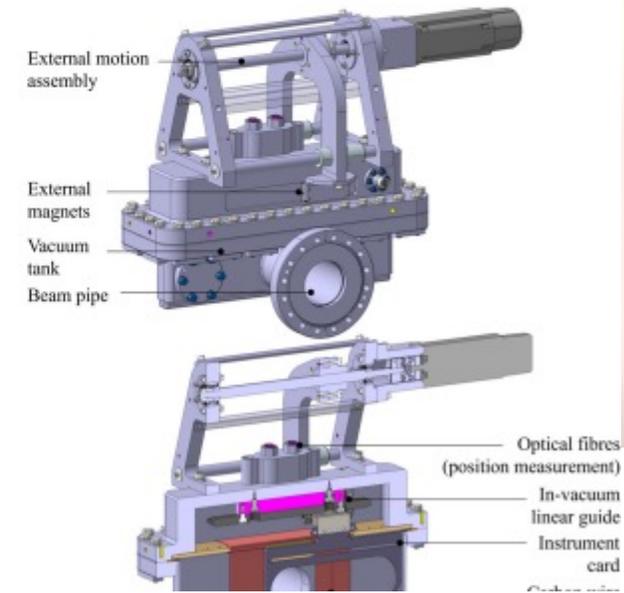
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CALLY  
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Figure 3: Image of 2<sup>nd</sup> iteration ceramic linear guide. [Name], L. Hanson, Following initial testing, the guide was modified to th

## Abstract

Linear wire scanners are essential instruments for beam profile measurements in the Large Hadron Collider (LHC) at CERN. The current scanners installed in the machine have shown reliability and performance limitations in recent years. This work presents the development and validation of a bespoke motion system for the next-generation LHC wire scanners. The design replaces vacuum bellows with a planar magnetically coupled linear drive, coupled to a custom ceramic in-vacuum linear guide capable of high-velocity operation in ultra-high vacuum. A dedicated test rig has demonstrated the system's positional accuracy, rigidity, and long-term durability, with over 80,000 cycles completed without degradation. This motion technology will be integrated into the first prototype scanner for impedance verification during the 2025 year end technical stop (YETS) and offers potential for wider application in demanding vacuum environments.

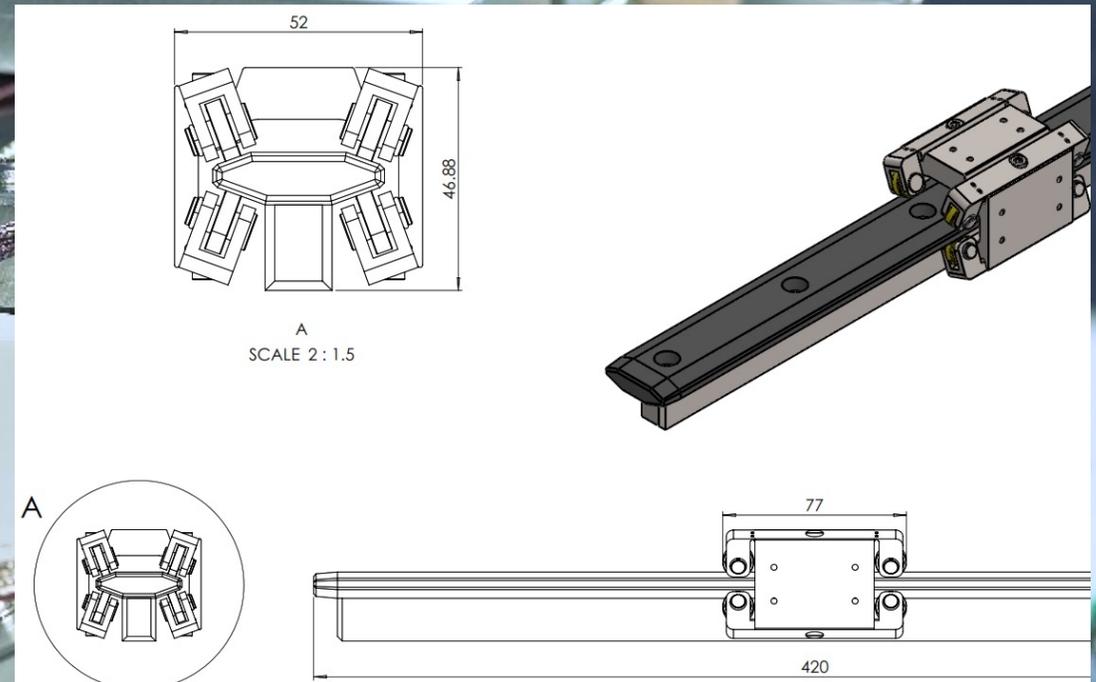


LI

- ◆ High-tech | Laboratory technology | Semiconductor

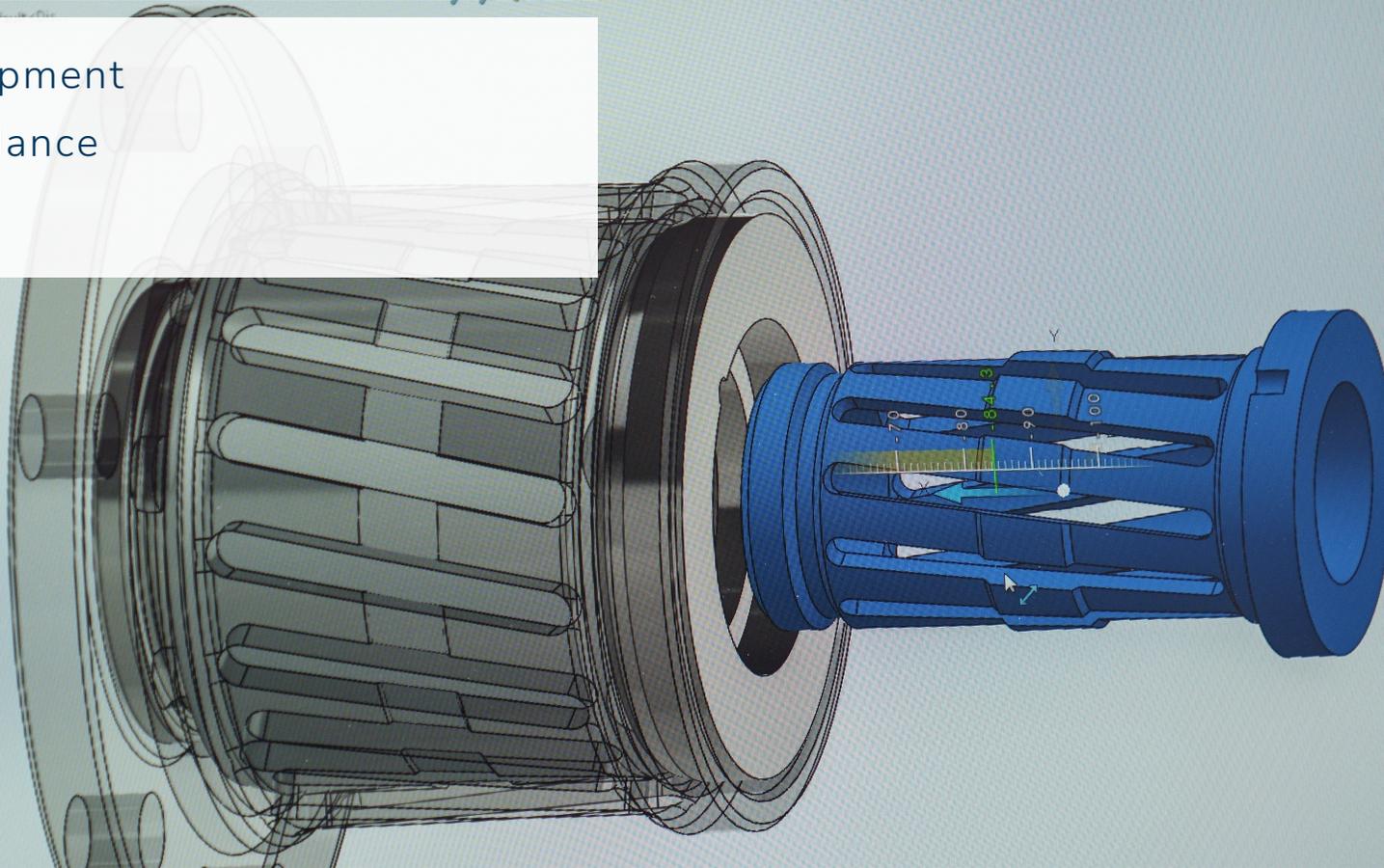
# Nanoprecision under control

- ◆ Extreme precision and thermal stability, powered by ceramics



## How we remain

- ◆ Succesfull development
- ◆ Stakholder accordance
- ◆ Ready to repeat



# Thank You

Let's keep in touch

- ◆ E-mail us: [ceratec@ceratec.nl](mailto:ceratec@ceratec.nl)
- ◆ Call us: [0345-580 101](tel:0345-580101)
- ◆ Visit us: [www.ceratec.nl](http://www.ceratec.nl)



◆ Thank you for your attention