

Long term vaping at an angle of 20° with the vapour being used for a cell exposure study

Cerulean, Milton Keynes, UK

Introduction

Quality assurance is vital to any manufacturing business, not least vaping products. For those transitioning from the tobacco to vaping industries, it is easy to assume that familiar testing equipment will be suitable for vaping products.

But our new industry of vaping HNB has quickly outgrown many of the solutions found in a cigarette testing laboratory. This drives the demand for new testing equipment or modifications of existing equipment so that vaping products can be adequately tested. Here is a case study where existing equipment did not quite meet the demands of vape testing and how Cerulean responded to this challenge.

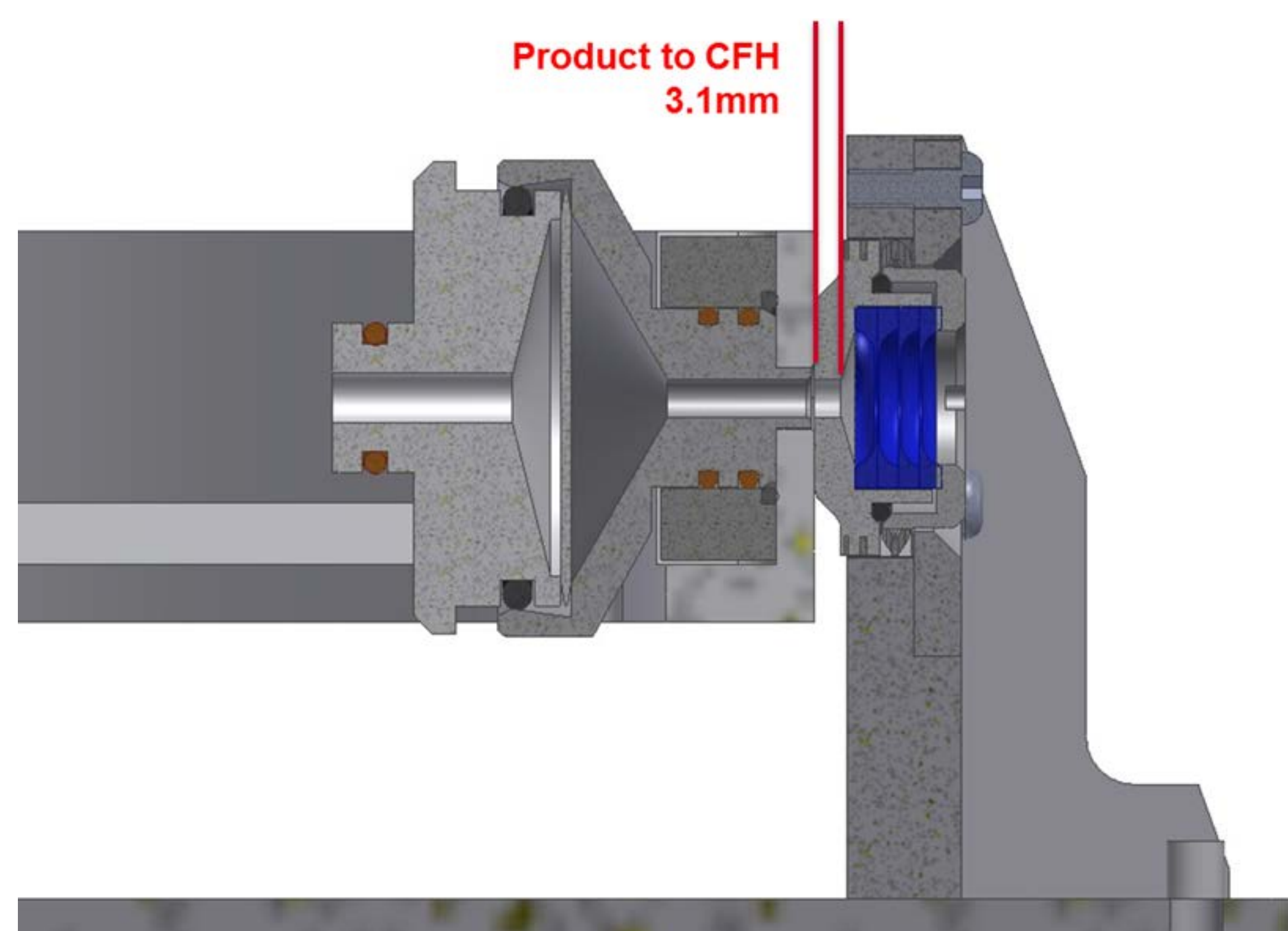
There are two basic types of smoking / vaping machine for test purposes. The linear, where a static product under test is placed in line with a capture system, and the rotary system, where the product is moved to where it is puffed. In the former each product has its individual performance tested and in the latter 5 or more products have their aerosol aggregated.

The linear system catches all the aerosol formed – the high moisture and humectant content of the aerosol from vaping can result in loss of aerosol if the dead volume to the capture system is large. Linear systems are also suited to the addition of button pressing devices and changing of the vape angle so have become the machine of choice for the industry.

Rotary machines traditionally have large dead volumes but have the advantage that a near constant stream of vapour can be produced over long periods. This is suited to exposure studies – where aerosol is passed over cell cultures for example – but only if the dead volume problem can be solved.



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Experimental

A client approached Cerulean with a need for equipment for a very specific test – long term vaping at an angle of 20° with the vapour being used for a cell exposure study. This was a significant challenge as a rotary machine would be needed to generate the near continuous stream of aerosol needed for the exposure study.

The dead volume constraint had already been solved by the Orbit20 and losses of whole aerosol of less than 7% could be demonstrated. Button pressing for a long vaping cycle (200+ puffs on 5 devices) is solved with a pneumatically operated pressing device. The major challenge was adding angled vaping to a machine that expects the product to be presented horizontally above an ashtray (present to control the air flow in conventional cigarette testing).

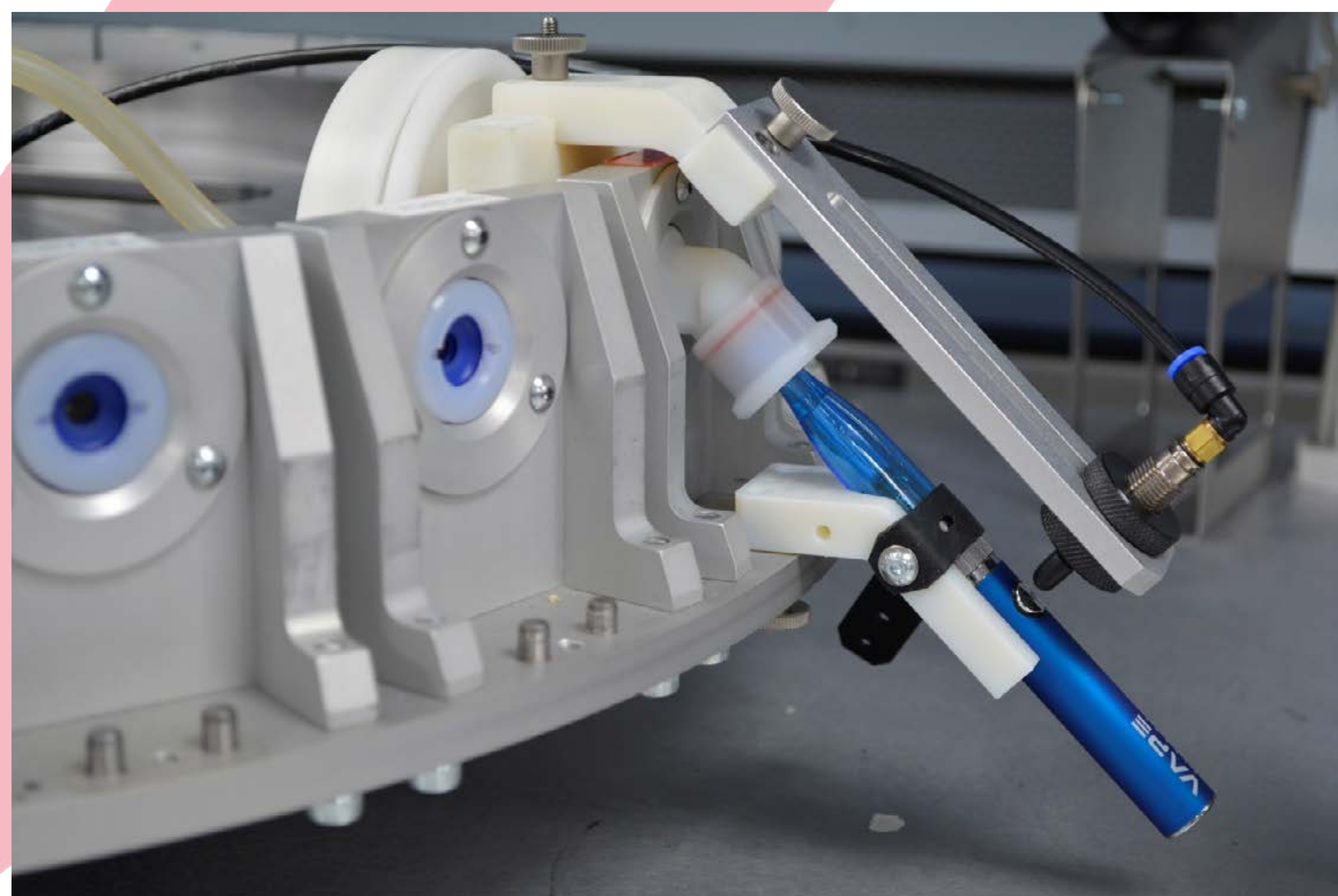


The Cerulean engineers were also under time pressure as seven days later the client had to present a potential solution to their board. The CAD model was studied and the team began brainstorming. Quickly it was determined that the ashtray could be removed and space created above the moving turret to angle test pieces downwards.

Sketch designs quickly led to a cradle to hold the device, new brackets for button pressing and a coupling to the Orbit20. Even so time was at a premium so our 3D printer was used to create a full set of parts overnight. The parts were fitted and the machine readied for test. Minor mechanical tweaks later, and some small software changes to extend the exhaust cycle of the puffing pump, and the modified machine was ready for test.

Problem Solved

Successful tests completed, our client could be informed that there was an available solution, the information accompanied by a video of the equipment in operation, all within the 7 day deadline.



About Cerulean

Based in Milton Keynes, UK, Cerulean manufacture quality assurance test equipment for the tobacco industry.

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