

PICO 7

Development of an advanced negative pressure wound therapy system



Smith & Nephew, a market leader in advanced wound care, wanted to upgrade its PICO single use negative pressure wound therapy system. Smith & Nephew needed a partner capable of the enabling technology development, subsequent product development and detailed design for manufacture.

Challenge ↵

Smith & Nephew was keen to build on the success of its dressing-mounted, canister-free negative pressure wound therapy (NPWT) system.

- Could the device be made smaller and quieter and what battery-powered vacuum pump would enable these performance improvements?
- Could the required performance improvements be achieved using off-the-shelf pump technology or would a custom design be required?
- Could a custom design satisfy the commercial considerations of cost-of-goods and time-to-market, whilst achieving the necessary improvements in device size and quietness?

Approach ↵

The project started with a pump technology phase. Sagentia mathematically modelled sources of loss and inefficiency in candidate vacuum pumps in order to understand how Smith & Nephew's needs could be met. We explored the technology landscape for possible off-the-shelf pumps, and, having identified no good options, developed a range of bespoke concepts using structured innovation techniques to target the best blend of performance, cost and development risk.

We de-risked three lead pump concepts through development of looks-like, works-like prototype pump heads and electronic drive systems. Iterative performance improvements, directed by high-speed video analysis of the pumps in operation came from optimisation of both micro-moulded components and the drive electronics and software. The revised prototypes were tested to allow key criteria, including efficiency and noise, to be compared.

The focus then shifted to full device concepts. We took a systems approach to generating and evaluating device concepts, considering the impact of pump efficiency on energy storage needs, and hence the potential for overall device miniaturisation. Ultimately, Smith & Nephew's preferred concept was the quietest and most efficient pump, rather than the smallest, as this best served the system-level device needs.

Our innovative custom design was optimised for the particular requirements of this NPWT application and provided a step change in pump efficiency, meaning a smaller and quieter device.

We developed a device design, incorporating our novel pump technology, and provided a range of industrial design concepts for the device. We then worked alongside Smith & Nephew's contract manufacturing partner to optimise the design for manufacture and to initiate design transfer.

Benefit ↵

In February 2018 Smith & Nephew announced the European launch of its PICO 7 product. PICO 7 delivers a number of enhancements which benefit both clinical effectiveness and the patient experience. Clinically PICO 7 delivers a more efficient vacuum and superior leak management. It's designed to support improved application on anatomically-challenging areas where it is traditionally more difficult to achieve and maintain a seal. For the patient, PICO 7 is more than 25% quieter than the previous version making it less intrusive, of particular value when the patient is outside the home or sleeping.

Smith & Nephew has filed a patent application using embodiments from Sagentia's work in order to protect the technology which enables the performance improvements of the PICO 7 device.