AAOS bone model by Ogle Models + Prototypes

Case Study

With a strong reputation for applying its experience and know-how to medical device development projects, Ogle was privileged to become involved in the design and development of a system to demonstrate the key stages of the surgical procedure for contemporary total knee arthroplasty (or, in layman's terms, total knee replacement).

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DePuy Orthopaedic, a member of the Johnson & Johnson family of companies, develops and manufactures surgical instruments and is a market leader in evolving product development processes for surgical instruments Ogle Models + Prototypes has previously worked with DePuy in creating two completely new surgical instruments for total knee arthroplasty, so they were a logical choice for this new project.

The task was to create a set of six bone models which would allow each step of a total knee arthroplasty to be demonstrated or practiced. In addition, the models would have to be sturdy enough to allow the use of real surgical instruments at each of the key stages of the surgical procedure. Finally, the models had to reflect the high standard and quality of other DePuy products.

Even with the expert knowledge of Ogle Models + Prototypes it was an unusual and demanding commission. It was apparent that further design input was required to develop the concept. Ogle models and Prototypes turned to Andrew Kelly at Skywide Design – a product design studio, to kick start the design process and to deliver the necessary 3d CAD models.

The design process required Skywide Design to work with DePuy to understand their requirements and then with Ogle Models + Prototypes to understand the limitations of the manufacturing process.

Andrew Kelly describes the early stage of the project: "Collaborating from the early stages with Ogle, we managed to tailor a design that made use of Rapid prototyping, machining and Vac moulding processes which delivered a product that was minimal in part count, simple to assemble, robust and visually appealing."

Throughout development, the customer was updated at key stages of the development process. These were in the form of printed test models, prototype rigs and technical animations to show user interaction.

The early designs were relayed to the customer via multimedia presentations. Later in the design process some physical models were manufactured to check mechanical interaction of parts of the design.

Working closely with Skywide's CAD models and drawings, and advising on alterations where needed Ogle Models + Prototypes were able to anticipate and resolve problems as early as possible in the process, making the construction of the final models much easier and quicker.

Ogle Models + Prototypes had to create new systems to make the models operate correctly, creating voids in the models to mirror the operation of real legs in order to tension the joint correctly.

Clear silicon was overmoulded onto SLS parts to create a life sized skeletal leg system displaying the first stage of alignment and measurement of the surgical equipment. The final design was a multi-functioning display stand which could transform into an interactive demonstration/ training aid.

Nick Adams, the project manager at Ogle Models + Prototypes, said: "One of the successes was the fact that we sat down at the beginning and prioritised some of the design, due to it having a lot longer manufacturing cycle.

Only when Andy [Andrew Kelly] had finished the CAD and we were manufacturing did a second cycle start for the ankle clamp, then a third cycle for the pin block – this enabled us to deliver all the parts within the given timescales."

Developing new surgical instruments, tools and models is not a fast-moving activity – from the inception of the initial concept through to the operating room or lecture theatre can often take many years of development, testing and dedication. However, the rewards for seeing it through often bring great benefits to both patients and surgeons that go way beyond financial gains.

Bringing on board experts in the medical product development program – experts such as Ogle Models + Prototypes – can reduce the lead time significantly and arrive at the optimum solution much sooner.

FOR MORE INFORMATION PLEASE CONTACT:

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