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Motor parts from ABB help children walk again

Motor stators, supplied free by ABB to a pioneering research team working at the University College London (UCL) are helping children to walk again.

The children being treated at the Royal National Orthopaedic Hospital, Stanmore, who have lost part of their leg bones after suffering from bone cancer, are being helped with a revolutionary new procedure that eliminates the need for years of painful surgery.

Because a large amount of bone has been lost, a prosthesis is implanted in the patient's leg to support the remaining bone. As the child grows, the implant must be extended as well to keep pace with the skeletal growth. Previously, this involved further operations, often three or four a year over a five-year period, each bringing pain and inconvenience for the patient and extra costs for the hospital.

The new procedure is non-invasive and involves placing a small magnetic rotor in the patient's leg. This is linked to the prosthetic implant by a gearbox and is turned by an external stator. To increase the length of the prosthesis, the patient's leg is placed inside the stator core.

When energized, the stator turns the rotor at 3,000 rpm, which drives the gearbox and extends the prosthesis by one millimetre every four minutes. A typical treatment will extend the prosthesis by four millimetres over the course of 16 minutes.

Quick and painless, the procedure can be performed in a clinic rather than an operating theatre. Depending on patient's growth rate, the implant is extended in small increments several times until fully grown.

The stator cores were supplied through ABB Motor Service Partner, EMR Silverthorn, in Wembley. The system was developed by researchers from the Centre for Biomedical Engineering, UCL, working at the Royal National Orthopaedic Hospital at Stanmore. The team had initially used six air-cored coils, configured as a 2 pole, 3 phase winding. Although this generated sufficient torque to turn the magnet, it was found to be inefficient and required oil cooling.

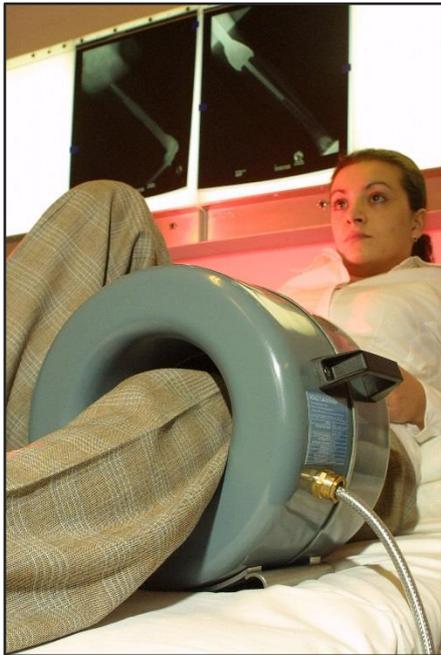
EMR's Managing Director Chris Fletcher says: "We were asked by the researchers at Stanmore to obtain the stator cores from ABB and rewire them according to their requirements. ABB gave the stator cores free of charge and working with the UCL research team we helped to develop a winding to meet the specifications."

Using a stator core based on ABB's standard 180 frame motor in a 2 pole stack for 3000 rpm nominal speed, UCL specified a series wound stator with 552 turns of 1.06 mm gauge wire, for star connection. This was the configuration that had produced the best performance during tests at Stanmore.

Fletcher says: "Our role was to interpret the needs of the UCL team and bring our expertise in motor winding to solve the problem, using standard and readily available equipment."

The first patient was treated with the new procedure in November 2002 and five have been treated in total so far. Stanmore Implants Worldwide Limited, UCL's commercial arm, has ordered five more windings from EMR Silverthorn. ABB will continue to supply laminations on a commercial basis for the additional windings.

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Caption: The stator core supplied by ABB energises the magnetic rotor inside the leg, extending the leg bone by some 4mm in 16 minutes.

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