

# Breakthrough mobile technology relies on Renishaw encoders



## Customer:

Sarantel Group PLC

## Industry:

Precision manufacturing

## Challenge:

To find an advanced motion control solution for a custom laser marking machine for the manufacture of Sarantel's PowerHelix™ antennas.

## Solution:

The RGH22 linear encoder travels with the spindle stage and achieves an accuracy of better than 1 µm.

## Background

A revolutionary mobile phone antenna has been developed by UK company Sarantel, based on the company's patented PowerHelix technology. When other conductors or the user's hand or head are next to the antenna, performance is completely unaffected, unlike conventional antennas. The unique manufacturing process uses a special purpose machine from Finnish company Citam Assembly Automatics Oy, fitted with Renishaw linear encoders to give very high accuracy. The antenna creates very low 'Near Field' energy in use, meaning that the critical radiation does not extend more than a few millimetres.

Dr Oliver Leisten, Sarantel's Technical Director, comments, "This style of antenna breaks new ground in the requirement for an unprecedented level of three-dimensional imaging technology during manufacture. Renishaw encoder systems are a vital part of this process." The key to the functional performance of these antennas is the very high accuracy of the PowerHelix™ pattern, which, in turn, relies on the high positioning accuracy of the Citam laser-marking machine, prior to etching away unmarked areas.



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Sarantel Group (UK)



Citam Managing Director, Mika Harju, explains: "The pattern must be accurate to within 5 µm, which is achieved with a combination of rotary and linear movement. The Renishaw scale and readhead on the linear axis is ideal at providing the feedback for this application. The scale is true 'cut-to-suit' – we buy it and use it at the length we want, which is very important on customised machines. We have also used Renishaw's end limits and reference marks, which are essential to control the linear motor used to drive that axis."

## High accuracy positioning

The Renishaw graduated tape scale has been applied to an Invar bar, chosen for its zero-expansion properties. The RGH22 optical readhead travels with the spindle stage. Like the Invar® bar, it has been mounted very close to the working volume to maximise the machine's metrology performance. In this way, the encoder system achieves an accuracy of better than 1 µm over the 400 mm axis length.

Mr Harju adds: "Another factor in choosing the Renishaw scale is the quick and easy installation. It is cut to the length required and stuck down with the self-adhesive backing on the moving stage, using the applicator supplied."

## Control and feedback during laser marking

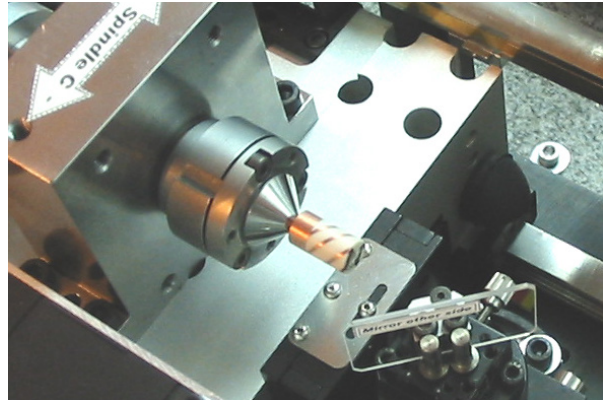
Machine control is implemented from an industrial PC which stores and displays the helix patterns taken from a CAD generated drawing. Prior to the laser marking process, the machine uses optical sensors to measure the actual diameter and length of the dielectric "puck", so the PC can adjust the CAD file and achieve the correct linear and rotary motion to suit the chosen pattern.



The Sarantel antenna assembly line

## Citam's specialised service

Sarantel approached Citam to develop this process due to its experience in producing specialised machines. Citam has more than 30 years of experience in the automation industry and has delivered more than 100 different machine platforms, including assembly machines for mobile phone covers. Citam frequently pushes the boundaries of technology to achieve the performance required - "faster and more accurate" is a saying often used within Citam. It is able to deliver complete automation solutions on a short design cycle that can quickly be installed and commissioned at the customer's production facility. Machines developed by Citam include advanced servo control systems from top-tier manufacturers, vision systems for inspection applications, high spec linear and rotary motors and lasers. Citam has a wide network of highly skilled partners and subcontractors providing manufacturing capacity, special technologies and skills for a broad range of applications.



The Citam machine, using a Renishaw tape scale mounted on an Invar bar for accurate positioning

It has worked closely with Renishaw in the integration of their encoders into a number of Citam machines. There are really no limits to the size or complexity of customer design requests that can be solved and delivered.

## Breakthrough antennas for mobile applications

Sarantel's PowerHelix™ antennas are the result of over 20 years of research and development, and are the subject of over 100 patents world-wide. These balanced antennas offer the benefits of small size, exceptional beam-width and low Near Field. When, for example, they are used with portable GPS (Global Positioning System) receivers, more satellites are acquired, no bulky ground plane is needed, and a predictable response is obtained regardless of proximity to conductors, other antennas or human tissue.

## The future for Sarantel

Many other wireless applications, such as Bluetooth™ and wireless LANs, can benefit from the PowerHelix™ technology, which also has the potential of being extended to next-generation mobile telephone handsets. Recognising that the applications for PowerHelix™ antennas demand a high volume manufacturing capability, Sarantel has installed a fully automated production line at its UK facility and has further facilities available in Asia for high volume manufacture.

For more information visit:  
[www.renishaw.com/encoders](http://www.renishaw.com/encoders)  
[www.renishaw.com/sarantel](http://www.renishaw.com/sarantel)

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