The Terminator is coming

JEZ RALPH ON WHY WE NEED TO HUG HIM NOT KILL HIM

I'm fairly certain that 30 years ago there was a felling gang working some lowland hardwood site scoffing at the idea that harvesting machines would ever make their way out of the confines of large-scale production forestry. Yet here we are now, regularly thinning hardwoods with harvesters. Highly automated systems are rapidly becoming the norm in many sectors and slowly crawling towards forestry. At all levels, at all scales they will arrive and, if we can grasp them, they hold revolutionary potential to forestry and timber processing. What follows is a basic primer in the systems set to revolutionize forestry over the next generation.

Automated vs autonomous systems

Fully autonomous systems are those requiring no human input and are probably a way off in our and others industries, though autonomous tractors are making their way into agriculture. Automated systems bridge the gap between total human control and total digital control. A harvester, a GIS system, an optimized sawmill could be seen as basic automated tools already in wide scale use in forestry. A raft of new technologies are now becoming available.

Scanning

Once the realm of large estates that could afford basic photographic aerial reconnaissance, the development in multi band-width scanners that take feedback from visible and non-visible parts of the light spectrum has been remarkable. Laser based, x-ray and other scanning methods are becoming portable and affordable and will allow not only full mensurational assessment but also indicators of forest health and timber quality. Forest inventory will become fast, information will be passed directly to contractors and buyers, databases of specialist timbers held on line for niche markets.

ROVs – remotely operated vehicles

We are mostly familiar with airborne remotely operated vehicles that are being used for large scale forest inventory in many countries. Though the difficulty of running these in the UK's crowded airspace limits the use of larger aerial ROVs, small-scale drones can be fitted with cameras, scanners and sensors to overfly most woodlands for information gathering whilst satellite imagery is now getting good enough to select individual forest trees. On the ground, remotely operated and autonomous tractors are making their way into agriculture and will arrive in forestry. The idea of operating a harvester from the comfort of the sofa is an entirely realizable concept with current technology and will arrive in real applications.

Outside the forest gate, automated systems are revolutionizing most areas of manufacturing. It is possibly easiest to think of these technologies as either extractive (machines that cut material down to the final form) or additive (machines that build up layers of material to the final form). Both robotics and 3D printing can be additive or extractive and boundary and definitions of the two are blurred.

Robotics

Bearing in mind the ubiquitous nature of robotics and multi-axis CNC machining (Computer Numeric Control, or automated machine tools) in most industrial sectors (think about images of car plants with robots performing tasks from moving to fixing to welding), robotics will eventually become commonplace in sawmilling and timber processing. Whilst the programming of these highly efficient machines to be used on the anisotropic nature of timber pose some difficulties, these are being and will be overcome in the near future.

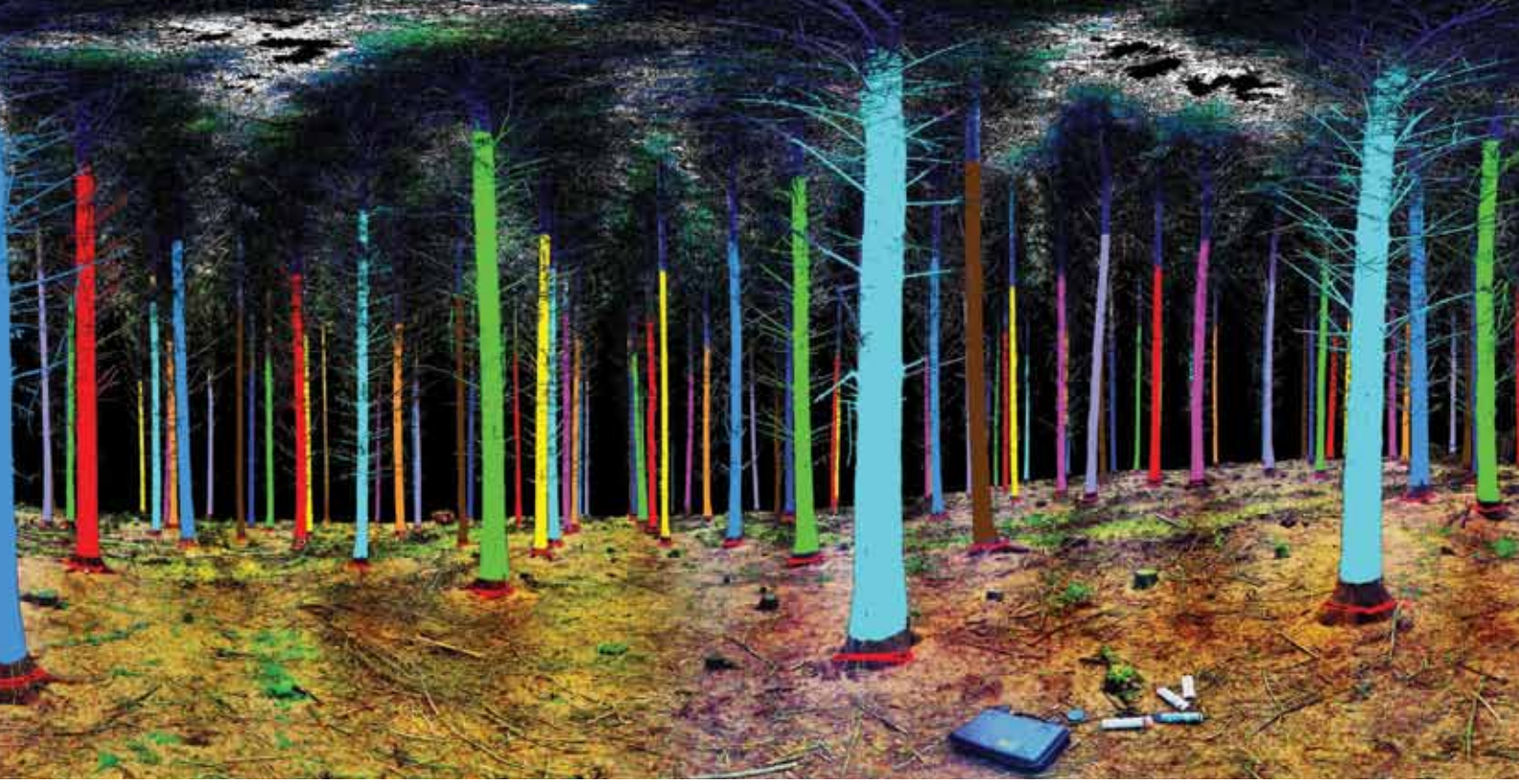
The Kuka robotic arm at the Architecture Association's campus at Hooke Park is probably a globally unique look at how robotics can be applied to timber processing. Their affordability and flexibility make them potentially ideal tools in all sizes of processing and fabrication operations.

ⓘ **https://hookepark.aaschool.ac.uk**

3D printing

Of all the technologies presented this is the most widely known about and the most difficult to imagine in a forestry-specific application. 3D printing is starting to make big impacts in the manufacturing of equipment nd the point of being able to get bespoke parts printed for, say, older machines not now supported by manufacturers is a reality which should allow substantial cost savings in capital expenditure. On the other end of the scale there are already new markets for reformed wood that form the basic substrate from which 3D printed objects can be printed.

See also, p36.



[1] 3D stem profile used in a terrestrial laser scanning inventory, produced by Confor member Treemetrics.
ⓘ **www.esa.int/spaceinimages/Images/2016/02/Treemetrics_woodland_laser_scan**

[2] Use of Robot arms used in a New Zealand LVL to create manufacturing line efficiency

Jez Ralph is the Director of Timber Strategies specialising in timber quality, product and supply chain development. He won a Nuffield Farming Scholarhsip in 2012 to look at global advances in timber processing technologies and also works at the Architectural Association School of Architecture's woodland campus at Hooke Park.
ⓘ **www.timberstrategies.com**

Look forward to more on the topic in our New Technologies feature in October. In part 2 of his series, Jez Ralph will talk about Data, Communication and The Internet of Things and how digital process will make us reimagine silviculture and timber processing.