According to Franz Stuefer, who heads the CLC plant, the new process for buffing, rebuilding and curing tires in a sustainable and resource-efficient manner represents a huge step forward in the retreading business for Continental and the industry as a whole. "Retreading extends the useful lifecycle of the tires, saves resources and reduces vehicle fuel consumption and CO₂ emissions by improving the rolling properties of tires. These are significant competitive benefits, because reducing the fuel consumption of trucks and buses is just as important to our customers as the tread life of their tires. After all, retreaded tires account for about 40 % of the market in the truck and bus segment."

**Complete resource recycling**

When a tire is retreaded, the buffing process generates rubber granulate. In the past, the granulate was either disposed of or it was recycled into lower end products, such as filler material for rail ties. With a new process, 100 percent of the granulate is now processed into high-quality raw ingredients for the new rubber mixture. "This concept of reusing 100 percent of the granulate completes the ContiLifeCycle recycling process," explains Franz Stuefer. "The lifecycle of a tire begins with its production, using raw materials like synthetic rubber, natural rubber or carbon black. Next, the tire hits the road and, if desired, customers..."
have the option of re-cutting the tread to get more miles out of their tires. Once
the tread is worn down, it comes to our CLC plant and is buffed. The granulate
enters the mix production process after having passed through an innovative
recycling test procedure to finally re-enter the production cycle. Then another
tire is retreaded with this mix."

The conditions were ideal for the construction of the new factory, remembers
Franz Stuefer: "We completed the project in only 12 months with roughly
200 Continental employees. We benefited from the fact that R&D, quality
management, mixing production, inspection, engineering and Continental Ma-
chinery – our own machine and system engineering company – were already
on-site. This also generated many synergies. For example, we now fully analyze
and evaluate each tire that is sent to us for retreading. This provides the R&D
department with valuable information that ultimately benefits the development
of new tires."

Universal control technology
Dr. Paul Malliband, Project Manager of Control and Drives at Continental, notes
that the company was also able to apply its synergies and many years of control
technology experience for ContiLifeCycle: "We employ PC-based technology
from Beckhoff for all control systems in this plant. At the start of the CLC project
in November 2012, we used four different controller types. However, to make the
maintenance process as simple as possible and streamline the controller inter-
faces to the MES level, we decided to make PC-based control the standard sys-
tem. In addition, Continental Machinery, the machine manufacturing business
unit of Continental Tires, has used Beckhoff technology in production machines
for many years, which provided us extensive expertise directly on-site."

Beckhoff C6925 and C6650 control cabinet Industrial PCs (IPCs) are used to
control all 25 production machines. Malliband explains: "The PC-based control
technology from Beckhoff is highly scalable to accommodate every individual
application requirement. We use the C6925 predominantly for basic machinery
like our vulcanizing presses. The C6650 comes into play whenever more comput-
ing power is required. Examples include the multi-axis machines for attaching
the tread strips to the tire casing in the cold retreading process, or for layering
the strips in the hot retreading process. The same applies for the HMI, where we
use the proven CP7931 Control Panel with 12-inch touchscreen and an alpha-
numeric keyboard. This is supplemented with additional electromechanical keys
where necessary, for example when a machine offers many application-specific
motion control options.

MES connectivity via OPC UA
In line with Industrie 4.0 concepts, the entire facility is fully networked and
connected to management-level IT systems. This is where the openness of PC-
based control really shines, according to Malliband: "Vertical integration, i.e.
the communication with the SAP system that serves as an MES (Manufacturing
Execution System), is implemented via OPC UA. Since all C6925 and C6650
Industrial PCs run an OPC UA client, they directly communicate with the SAP
system. At the start of the project, Continental’s standards called for OPC DA for
this purpose. OPC UA had not been tested at the time, but it is currently being
analyzed for new production plants containing a large number of machines.
We currently use several basic communication functions. The move to OPC UA
positions Continental as a trailblazer in this area."

The benefits for universal OPC UA communication are already clear for Mal-
liband: "It will increase the flexibility and efficiency of our production overall
as envisaged in Industrie 4.0 concepts. For example, we plan to scan the tire
barcode directly on the machine at the start of the retreading process and pass
it on to the MES. The MES will then recognize the order for this specific tire and
return the appropriate processing recipe to the machine." Alexander Kruse, Key
Account Manager at the Beckhoff Hannover office, adds: "The SAP system is
closely linked with the control platform. Production data, such as the barcode
data, or different production steps can be exchanged directly via OPC UA.
Method requests directly from the PLC into the SAP system will also become
more common in the future. This will speed up communications while freeing
up processor capacity for other tasks."

Further information:
www.continental-tires.com
www.beckhoff.com/Industrie40