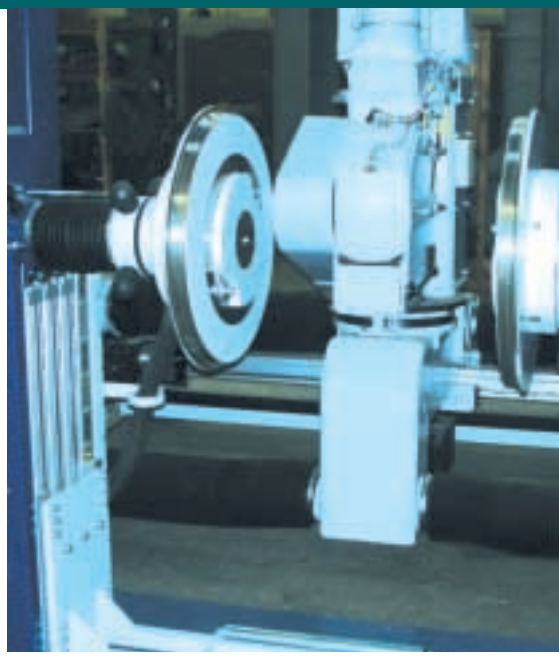
Collmann relies on TwinCAT NC I for tire buffing machines

Everything new all around

Collmann Spezialmaschinenbau GmbH, manufacturer of special machines for the tire and sweets industry based in Germany, has been using Beckhoff "New Automation Technology" for its tire buffing machines for nearly 10 years. Collmann machines are used by tire manufacturers including Continental, Uniroyal and Bridgestone. The tire buffing machines would not have been able to reach today's development stage without the high degree of integration of the software PLC and NC on the Industrial PC.



Tire retreading? Many people would turn up their nose at this when it comes to their own car. And for cars, tire retreading is indeed quite insignificant. However, the situation is completely different for aeroplane and lorry tires. Aeroplanes and lorry tires are so expensive that they are even retreaded several times. Collmann builds suitable machines for the first step, i.e. buffing of the tread. For this process, the tire is fixed in the machine and buffed, for example with the buffing device, at a rotational speed of up to 400 m/min. What appears to be quite simple at first glance is in fact a complex procedure, since each type of tire – particularly for lorries and aeroplanes – is designed for a specific task and is subjected to quite different stresses than a normal car tire. The buffing device follows the basic tread of the tire. This is realized through a 2-axis kinematic system with tangential tracking through the NC I kernel of TwinCAT. A further difficulty is the fact that foreign objects that may have penetrated the tread (stones, nails) have to be removed manually. After this process, the NC program has to resume flawlessly. Here, the advantage offered by the high degree of integration of PLC and NC becomes apparent.

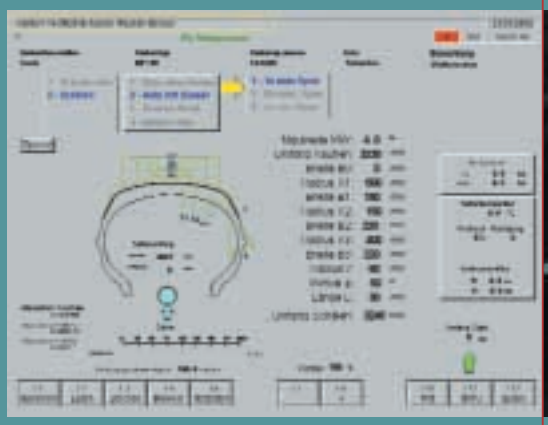
The distance of the buffing device from the steel belt can be measured with an analog inductive sensor connected via the Bus Terminals with Lightbus interface, and the machine can be controlled in such a way that the process can run fully automatic.

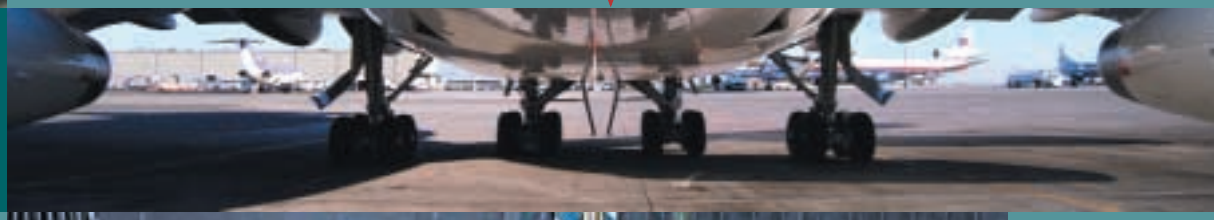
Special requirements for aeroplane tires

For aeroplane tires, which usually do not have steel belts, the machine control fulfils a further task: The stress during start and during landing makes the tires oval. The high flexibility of the Bus Terminal enables the connection of different sensors for the metrological examination of the tire during the operation. For particularly fast measurements for quality assurance purposes, the KL3362 Oscilloscope Terminal is used. This enables the buffing device to follow the ovality of the tire during the buffing process.

The signals are transferred to the C6140 control PC via the fast Lightbus, which is optical fibre-based. Collmann customers fully benefit from the open control technology from Beckhoff, based on Industrial PCs: The machine can be integrated simply and economically into the production network. Access to the process planning databases, communication with other systems and production monitoring via bar code are no problem.

The Scada system ProCon Win from GTI is used for machine visualization. Interfacing with the TwinCAT system is via the integrated ADS driver. These data are displayed on a customer-specific Control Panel, which, connected to the PC via CP Link, is available to the operator wherever it is required. The Control Panel is designed in such a way that it can even be operated with thick work gloves.





Flexible motion control solution

Collmann also uses Beckhoff technology for further innovations on their machines. The high adaptability of TwinCAT NC I enable the new tire buffing machines to carry out additional processes such as peeling and grinding of tires. This requires only a change of tools and/or the selection of another process in the software. For the peeling process, the buffing device is turned through 180°, so that the peeling knife mounted at the rear of the device can process the tire.

The differences are quite significant: During peeling, up to 30 mm are removed from the tire, during buffing up to 10 mm, while during grinding imbalances of 1/10 mm are compensated. The Beckhoff technology thus enables very flexible application of the machines during production. Jürgen Kuhn, responsible for control technology at Collmann: "Without the use of Beckhoff components, the machine would have been very difficult to realize!" In future, drives from the company Lenze, which hitherto had analog control, can be integrated with high precision via CANopen (see "High-precision drive synchronization with CANopen", PC Control 1/2002).

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