

THE DACAPO COMPANY

DACAPO OTR STRIP WIND BUILDERS

Dacapo produces two builders for strip winding of earth mover tyres in the size range from 25 to 63 :”

Ø DB ULTRA covering 33 to 63 ”

Ø DB LARGE covering 25 to 49 ”



DB ULTRA building station and spin station building a R57 size tyre

A builder consists of three units:

- the extruder including the temperature control unit (TCU) and a roller die. A 120 or 150 mm pin extruder will normally be used. The roller die is mounted at the front end of the extruder. It is shaping a well defined rubber strip which will be transferred to the tyre
- the building station with the applicator head. The applicator head is applying the extruded rubber strip to the buffed casing. A correct tread profile is built by moving the applicator head back and forth over the casing surface, following a program in the computer. The position of the applicator head is controlled by three axis: sideways (X), lengthways (Y) and the azimuth angle.
- the spin station with an expandable chuck or a hub system (option) to hold and spin the tyre in front of the applicator head.

A user friendly PC-based operators workstation is used to create and select building programs as well as storing production data and statistics.

The tyre builder is fully automatic regarding speed, temperature settings, building positions, etc, therefore minimizing process failures.

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Spin station and building station with applicator head



Building R49 tyre



Applicator head



Roller Die

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Operation

The PC is the operators interface to the builder. The PC is used to create building programs, to select which building program to use and to store statistical and measurement data.

- § *A building program is created starting with a drawing of the buffed tyre or using buffing parameters from the tyre buffer. Building program data is entered to a table. A practically unlimited number of building programs can be stored.*
- § *The operator is changing to a new tyre size by selecting the adherent building program from a list. Extruder temperatures, extruder speed, tread profile etc are automatically set without any other intervention from the operator. To change the building program will take from 5 seconds to 30 seconds.*
- § *After finishing the building of a tyre, the PC will store all information about the tyre as well as other process parameters. This data could be retrieved by tyre, by building program or by batch.*

Besides the operators PC, there are four other control panels from where parts of the builder can be manouvered:

- *CP1 at the building station for manual control*
- *CP2 at the applicator head*
- *CP3 at the roller die*
- *CP4 at the extruder feed funnel*

Quality control system and production traceability

The control system is continuously supervising the building process through several sensors and measurement devices to eliminate any errors in the built result. All values are also stored in a database for later analysis.

- § *The extruder temperatures are controlled in fours zones: head, barrel, screw and feed zone. The compound should be extruded under optimal conditions.*
- § *Extrusion pressure. A pressure sensor in the extruder head will continously monitor the pressure*
- § *Rubber temperature. A temperature sensor in the extruder head will measure the melt temperature and an optional IR temperature sensor after the roller die will measure the temperature of the extruded rubber strip. A third IR temperature sensor will measure the strip temperature when it is applied to the casing.*
- § *The strip width. A line camera at the roller die is measuring the extruded strip width. The measurement is used by the control system to keep the extruded strip width constant*
- § *The stretch of the strip. The stretch of the extruded strip is measured and controlled to achieve maximum repeatability..*
- § *Tyre measurement. As an option, a vision camera system above the tyre will measure the casing and the built tyre. The measurements are used to prevent any out-of-size casing from being built and to correct the building program for minor size variations.*

Networking

Several builders could be networked to a server.

- *using a common database for building programs and process data.*
- *developing building programs remotly*

Spareparts etc

Even if the builder has been designed for a long life and high quality parts have been used, a brake down could occure. To minimize the time the builder is out of production, all parts has been choosen as standard parts from wellknown manufacturers with world wide service networks, like:

- *ABB - electric motors*
- *Benzlers (part of Textron group) - gear boxes (except extruder gear box)*

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- *Schneider electric / Telemecanique -variable speed motor drives, PLC(Modicon Premium), power supplies, circuit breakers, etc. Allen Bradley PLC can be offered as an option*
- *SKF - bearings and parts for linear movements*
- *Troester GMBH - extruder and extruder gear box*
- *The operators PC is a standard PC built in to a cabinet*

Other brands can be used as an option on customer demand.

Regulations and standards

The builder is designed following the CE-regulations:

- *Machine safety regulations EN292-1 and EN292-2 following the provision of directive 89/392/EEC with amendments*
- *EMC regulations following the provisions of directive 89/336/EEC*
- *Electrical equipment of machines EN 60-201-1 following the provisions of directive 73/23/EEC*

All used equipment are also UL-listed

Outside the EU, the documentation will normally be in English.

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TECHNICAL DATA

DB Ultra Builder

Size range

Tyre size 33 to 63 ”
Max diameter 4200 mm
Max width 2000 mm
Min diameter 2000 mm
Min width 800 mm
Max weight 6000 kg (built)

Bulding station

- q Three axis control
- q All axis are adjusted automatically following the building program
- q Casing and tyre profile and circumferences could be mwasured by a CCD-camera (option)

Spin station

- q Spin shaft center height: 2500 mm
- q Spin speed approx 2.0 -> 6.0 RPM
- q manual expandable chuck to hold the tyre. Different chuck adapters are used to cover the full tyre range. Two sets of adapters are delivered with the builder
- q Option: Automatic expandable hub for system with inflated tyres

DB Large Builder

Size range

Tyre size 25 to 49 ”
Max diameter 2700 mm
Max width 1000 mm
Min diameter 1300 mm
Min width 400 mm
Max weight 3000 kg (built)

Bulding station

- q Three axis control:
- q All axis are adjusted automatically following the building program
- q Casing and tyre profile and circumferences could be measured by a CCD-camera (option)

Spin station

- q Spin shaft center height: 1800 mm
- q Spin speed approx 3.5 -> 9 RPM
- q Manual expandable chuck to hold the tyre. Different chuck adapters are used to cover the full tyre range. Two sets of extenders are delivered with the builder.
- q Option: Automatic expandable hub for system with inflated tyres

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Extruder

Option 1

Troester QSM 120/k 12D, 120 mm pin extruder

*Extruded output: max 825-1200 kg / h

Extruder motor ABB 110 kW

Option 2

Troester QSM 150/k 12D, 150 mm pin extruder

*Extruded output: max 1400-2000 kg / h

Extruder motor ABB 160 kW

*This value depends on the compound used. To find the correct output from the extruder, a sample of the compound must be sent in for test.

Reduction gearbox

Lubrication by means of motor oil pump

Rated torque Md=23.000 Nm + 25% continuously overload able

Connection between gearbox and motor Direct coupling

Motor arrangement Behind the reduction gearbox

Hopper section

Designed for water cooling

Pipe connecting joints, hand valve

Hopper section liner

Exchangeable, nitride steel, hardness off inner surface, with spiral undercut

Feed roll

Material nitride steel

Designed with glandless rotary joint, thermostat valve for water cooling, adjustabel scraper knife for continous cleaning

Extrusion barrel

Extrusion barrel liner Exchangable, made of nitride steel

Number of barrel heating/cooling zones 2

Heating power 3/6 kW per zone

Extrusion screw

Screw design double thread with twin start design

with grooves for the pins, with mixing zone

Screw material

special steel, ground and polished

Screw heating/cooling

hollow-bored for temperature regulation by water

Screw connection for temperature control glandless rotary joint

Compound pressure measuring device

Design 0-350 bar, tranducer make Dynisco

Compound temperature measuring device

Design Make Dynisco

Extruder variable speed motor drive

Telemecanique ATV71

Option

Other extruders could be interfaced to the builder

Temperature control

4 zone TCU (head, barrel, screw and feed hopper w feed roll)

2 x 6 kW, 2 x 3 kW

Supply

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Electric:

120 mm extruder: 3x400 VAC, 250A, 50 Hz

150 mm extruder: 3x400 VAC, 335A, 50 Hz

Air: dry pressurized air, 8-10 bar

Cooling water: 1200 (120 mm) -1800 (150 mm) l/h at 20°

Painting

Extruder

Extruder general: Reseda green (RAL 6011)

Extruder base plate: Umbra green (RAL 7022)

Bulding station

Bedframe, base plates: Reseda green (RAL 6011)

Steps etc: Aluminium

Spin station

Reseda green (RAL 6011)

Electric motors

ABB standard

Moving parts, guard flaps, drive shafts, pulley housings

Yellow orange (RAL 2000)

Dangerous parts

Sulphur yellow (RAL1016)

Emergency switches, emegency signals

Red-yellow (RAL 3000)

EC guide lines

The machine and the associated technical documetation will be made according to EC-guidelines unless else is specified.

Technical documentation

On delivery of the machine you will receive 3 copies of the operation manual, maintenace manual and technical drawings in English.

Labelling

The labelling on the machine will be in the English language unless else is pecified.