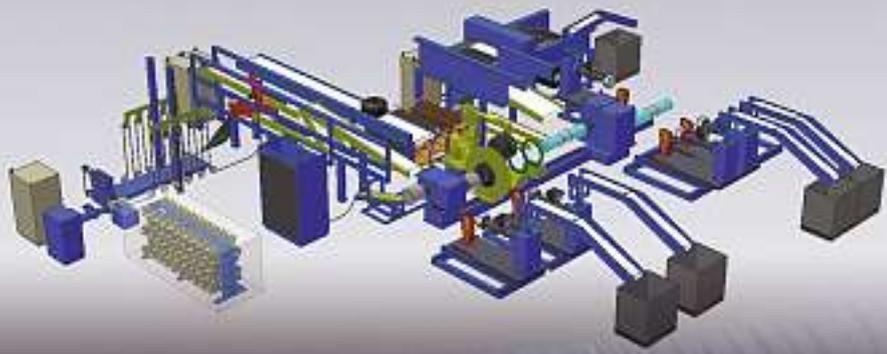


GLOBAL ORGANIZATION - LOCAL SUPPORT



MTM

MODULAR TIRE MANUFACTURING
THE VMI SOLUTION FOR FLEXIBLE TIRE PRODUCTION



VMI GROUP

TKH GROUP MEMBER



MOVING TECHNOLOGY

VMI is committed to supplying custom-engineered systems to the rubber and tire industry, including machinery for rubber compound handling, tire components, tire assembly, tire curing and tire testing for radial passenger, light truck and all steel radial truck, bus and off-road tires.

Since the company was founded in Epe, the Netherlands in 1945, VMI has established a sound reputation as a leading supplier to the rubber and tire industry, with customers worldwide. Our leading position is based on our capacity to provide custom-engineered solutions using cutting edge technology in precision workmanship to ensure accurate, reliable performance.

All systems are backed by the VMI worldwide service, 24 hours a day, seven days a week. Our service centers are strategically located in Epe (the Netherlands), Yantai, Shandong Province (China) and Stow, Ohio (USA). There is a full range of services throughout the lifetime of your machine including preventive maintenance, spare parts, and upgrades.

MTM MODULAR TIRE MANUFACTURING

THE VMI SOLUTION FOR FLEXIBLE TIRE PRODUCTION

The VMI Modular Tire Manufacturing (MTM) gives the ultimate flexibility to respond at short notice to the demands of the car industry for different types and sizes of specialized tires. MTM produces tires of higher quality and at a lower cost per tire than possible in traditional large-scale tire building on high volume machinery from stock piled components.

The continuing trend for smaller series of tires is out of step with the industry's traditional tire manufacturing process. This is exactly why VMI brings you the revolutionary solution: Modular Tire Manufacturing. This completely self-contained tire building unit has been developed by VMI Epe Holland and its capacity and durability demonstrated by applying proven technology in prototypes. The first full-scale production unit is being built for Marangoni Tyre S.p.A. in cooperation with Marangoni Meccanica S.p.A.

APPLICATIONS

With an output of 1200 tires per day, MTM is suitable for any tire plant and is the optimum solution for:

- Short runs of HP or SUV tires in large and small tire plants
- Expansions in small and medium-sized tire plants
- OE feeder facilities to car manufacturers for just-in-time supply
- Satellite plants of a major tire manufacturer to serve specific markets.

SELF-CONTAINED CELL

The MTM cell is a completely self-contained unit for tire building and includes all process steps from rubber components and reinforcement, green tire manufacture, curing, finishing to quality control. The output is a fully finished tire ready to mount on the rim.

The cell is configured around a highly flexible tire building machine, including a set of six dual cavity curing presses and the cell controller that individually programs each tire to be built. The controller is programmable for automatic change of width and outside diameter of the tire. Up to 12 different tire sizes can be produced concurrently without manual intervention or loss of cycle time. Concurrent tires are of the same bead size, and use the same compounds, belt wire density and ply density. Changing bead size is

a single operation done in less time than in a conventional tire building process.

A WIDE RANGE OF TIRES

MTM gives flexibility to produce radial tires for a bead range from 14" to 22" in different types and sizes in both small and large volumes. The MTM cell is suitable to produce tires for cars, SUV's and light truck, for high performance, ultra high performance and run flat technology.

CONSIDER THE ADVANTAGES

MTM eliminates complex planning and logistics required in conventional tire production plants, which are geared to high volume production in a sequence of multiple process steps and thus require large buffer capacity after each process step. Because the MTM layout is based on producing tires by work flow, there are fewer process steps. Inventories of rubber compound and steel cord are reduced as well as investments in material handling equipment, floor space and associated labor costs. There is less scrap.

An MTM cell is highly automated and requires only three operators per shift.



Baldwin 2 x 25



Baldwin 2 x 25

THE MTM SYSTEM

COMBINES UTMOST FLEXIBILITY

WITH HIGH QUALITY AND LOW COSTS

PER TIRE

ADVANCED TECHNOLOGY

The MTM incorporates the very latest in tire building technology to produce consistent, uniform tires of the highest quality, at a high speed and at the lowest possible cost per tire.

THE MTM SYSTEM INCLUDES:

- 60-second assembly of a consistently uniform green tire on a four-drum single stage machine.
- Application of gum components by strip winding technology according to the profile specified for each tire.
- Cutting and placing of body ply (strip built or from pre-calendared stock) to required width and cord angle for each individual tire.
- Robot selection and placement of pre-assembled bead-apexes.
- Individually built breakers (width, length and cord angle) for each tire.
- Consistent uniform turn-up made on mechanical drums with hands-off bead width setting for different types of tires.
- Robot handling of green tires.
- Curing in one of six dual cavity curing presses (the 52" VMI-Rogers H200T).
- Highly automated production planning and processes including:
 - ▶ Scheduling of daily production
 - ▶ Individual specification of each tire
 - ▶ Occupancy of curing presses and molds
 - ▶ Settings for the tire building machine
 - ▶ Control of raw material inventories.



Alpha Stripwinder

THREE REASONS TO INVEST IN MTM

High productivity

- MTM cell produces 1200 tires per day (with only 3 operators per shift)

Flexible production

- Programmable for large as well as small production runs (the basic MTM batch size is one)
- Produces up to 12 tire codes concurrently

High quality tires

- MTM incorporates the latest technology to produce consistently uniform tires of top quality

MTM MODULES

MTM Modules can also be used for upgrading of existing tire building machines, giving them extra flexibility.

BALDWIN 2X25 FLEXIBLE BREAKER MAKER

The Baldwin 2x25 can be delivered as a stand-alone breaker servicer for a tire building machine. The speed of the breaker assembly from strips is high enough to be integrated to a VMI 248 or VMI 348 (or other brand tire building machines).

B&T TOOLING

The Breaker and Tread building drum from MTM offers servo controlled diameter and a 200 mm diameter stroke without changing of segments.

CARCASS DRUM TOOLING

The MTM system is equipped with carcass drums featuring mechanical turn up arms. The extended centerdecks from the MTM program allows the beadlock distance on the carcass drum to vary from 250mm up to 520mm without changing of parts. Adapting the drums on a standard VMI 248 or VMI 348 with these centerdecks will minimize downtime for size change.

MTM EXTRUDERS

Gum components can be applied using the Marangoni Alpha stripwinder technology. Any given width and thickness can be achieved using the recipe driven movements of the strip applicator.

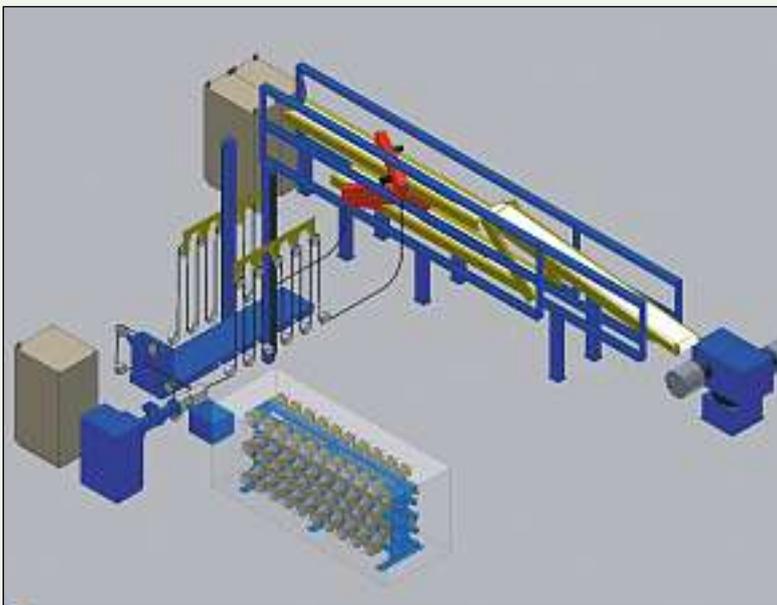
VMI-AZ Crosshead Extruders are available for the production of Breaker or Body Ply strips. These uniform strips can be used by the Baldwin equipment to assemble the breaker and body ply component as required by the tire building machine.

BEAD APEX PRODUCTION

The VMI Bead-Apex assembly machine assembles extruded Apex components onto the beads, loading into cartridges ready for processing in the MTM production cell.

BEAD APEX HANDLING/GREEN TIRE REMOVAL

The MTM production cell comprises an automatic handling and placing of bead-apex components. Additionally this unit takes care of green tire removal. This unit can transform the existing VMI 248 and VMI 348 tire building machine into a totally hands-off production unit.



Baldwin 2 x 25

VMI SUPPLIES A COMPREHENSIVE RANGE

OF MACHINERY FOR RUBBER COMPOUND

HANDLING, MANUFACTURING

OF TIRE COMPONENTS, TIRE ASSEMBLY,

TIRE CURING AND TIRE TESTING FOR THE

PRODUCTION OF RADIAL PASSENGER, LIGHT

TRUCK, ALL STEEL RADIAL TRUCK AND BUS

AND OFF THE ROAD TIRE.

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