

**MAGUIRE**<sup>®</sup>  
*Intelligent Simplicity*

PET APPLICATION FOCUS

INJECTION  
STRETCH  
BLOW  
MOLDING

# NovaDrier<sup>™</sup>

## Membrane Materials Dryer



**NOVATEC**<sup>™</sup>  
Part of the **MAGUIRE** Family

# NovaDrier™

## Membrane Resin Dryer

The Maguire Novatec ND series of Membrane NovaDriers brings to single stage Injection Stretch Blow Molding processes several unique benefits for drying raw materials over and above traditional Desiccant Dryers.

The core benefits of the Membrane drying process for Injection Stretch blow molders are:

- **Reduced Maintenance**
- **Desiccant Free Process**
- **Constant Dewpoint**
- **Compact Design**
- **Portability**
- **Lower Product Running Costs**

### CONSTANT $-40^{\circ}$ DEWPOINT PROCESS

Start up in less than 4 minutes. Accurately dried materials in all environments.



### ENERGY EFFICIENT PROCESS

Uses 33% less compressed air to conventional dryers or add-on models.



### DESICCANT FREE OPERATION

Continuous high quality output. No dewpoint/regeneration spikes. No contamination. No desiccant replacement/service.



**ALL SUPPLIED IN ONE COMPACT, SPACE SAVING UNIT**

# PET DRYING FOR STRETCH BLOW

The injection stretch blow molding process is very economical for container designs requiring low production volumes and short runs, and offers major benefits in terms of control of Preform thickness that can then be shaped to allow consistent control of wall thickness when blowing rectangular and non round shapes.

## Production Process

In the single-stage process both preform manufacture and bottle blowing are performed in the same machine, either over a 4 station or 3 station method of Injection, Reheat, Stretch blow and Ejection.

Technically the process stretches the raw material molecules vertically then blows to stretch horizontally. The biaxial stretching makes the molecules a cross shape.

These "crosses" fit together leaving little space as more surface area is contacted which makes the material less porous and increases barrier strength against permeation. This process also increases the strength to be ideal for filling with carbonated drinks.

## Importance of Good Materials Drying

Drying for hygroscopic materials that are used in this process such as PC or PET is critical given the technical requirements of the process and product, effecting process efficiency, product quality and overall operation cost.

Given the nature of the process materials usage can typically range from as little as 10kg/h up to 250kg/h on the largest of machines.

**the NovaDrier range of membrane dryers meets the throughput needs of the majority of injection stretch blow molding processes**

## Typical container and bottle applications:

Carbonated and soft drink bottles

Agri-chemical bottles

Cosmetic and toiletry packaging

Edible oil containers

Pharmaceutical/health and hygiene products



# TRADITIONAL METHOD OF DRYING FOR PET

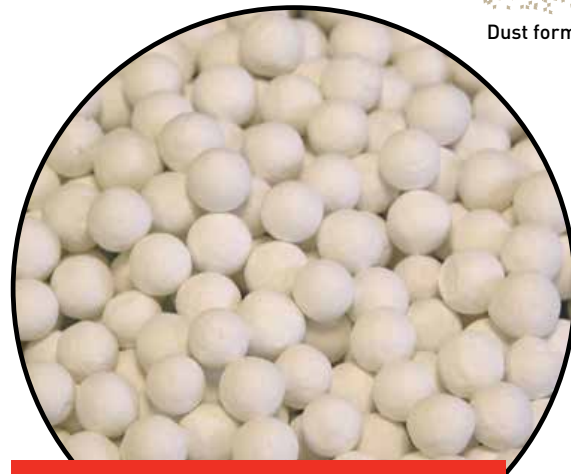
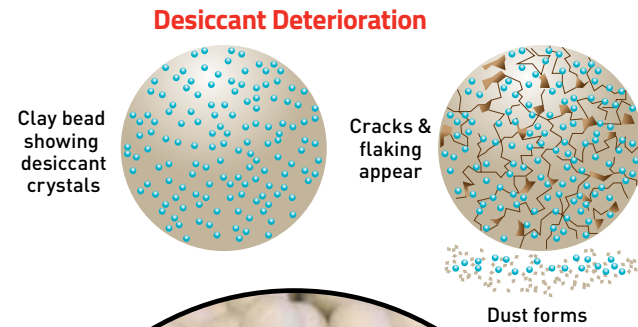
Drying for Injection Stretch Blow Molding processes have traditionally used Desiccant based drying systems, positioned either beside the process or on a mezzanine above the throat of the process.

Desiccant Dryers use either a twin tower or desiccant wheel that uses desiccant media to remove moisture from the drying process air to a dewpoint of  $-40^{\circ}\text{C}$ . The process air is then heated to the materials drying temperature and circulated through the material hopper and then processed back again via the desiccant to remove moisture removed from the raw material in the drying hopper. Given the nature of desiccant the desiccant becomes saturated with moisture and requires regeneration. This means the desiccant has to be heated up to temperatures in excess of  $220^{\circ}\text{C}$ , which is energy intensive and requires blowers and process heaters. In addition, it also requires services such as chilled water for heat exchanging to cool the desiccant before going back into production.

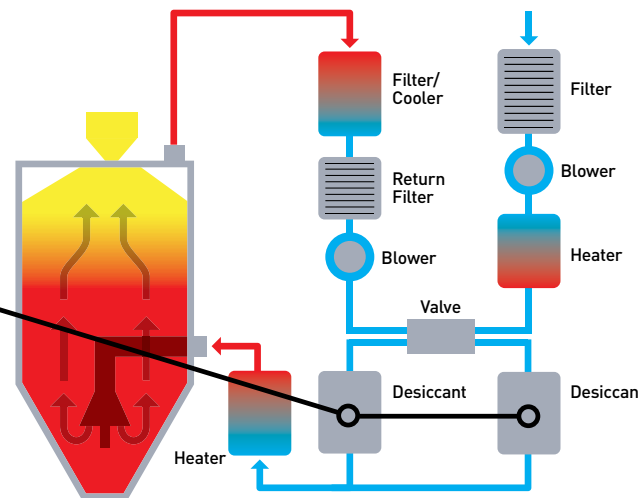
## Issues of Desiccant Drying

- 1 Drying System Hardware**  
Desiccant dryers require more heaters and process blowers for regeneration - more controls, multiple moving parts and maintenance
- 2 Energy Consumption**  
Regeneration is energy intensive
- 3 Desiccant Life**  
Desiccant Media requires replacing every 18 to 24 months on twin tower systems due to breakdown of desiccant media
- 4 Dewpoint Consistency**  
As desiccant efficiency falls Dewpoint consistency can become variable
- 5 Material Heat Distribution**  
Heat distribution in the hopper can be less efficient
- 6 Mechanical Maintenance**  
Blowers, filters, heaters, heat exchangers, control cards and valves

**the desiccant has to be heated up to temperatures in excess of  $220^{\circ}\text{C}$ , which is energy intensive**



**Desiccant media always requires regeneration, affecting energy efficiency, plus long term maintenance requirements**



# NOVADRIER™ THE ALTERNATIVE METHOD OF DRYING

The NovaDrier drying system offers Injection Stretch Blow processors multiple benefits over conventional desiccant drying systems.

## Primary Method of Drying

The key to these benefits is the technology in which the NovaDrier operates to dry raw material. Unlike desiccant dryers that utilise the Desiccant media to remove moisture from the drying process air, the NovaDrier uses a patented compressed air membrane to provide constantly dry air for the drying process.

It does this by taking standard plant compressed air and passes this through the proprietary membrane. The membrane contains thousands of filaments that strip water molecules from the compressed air flow, venting them to the atmosphere away from the process.

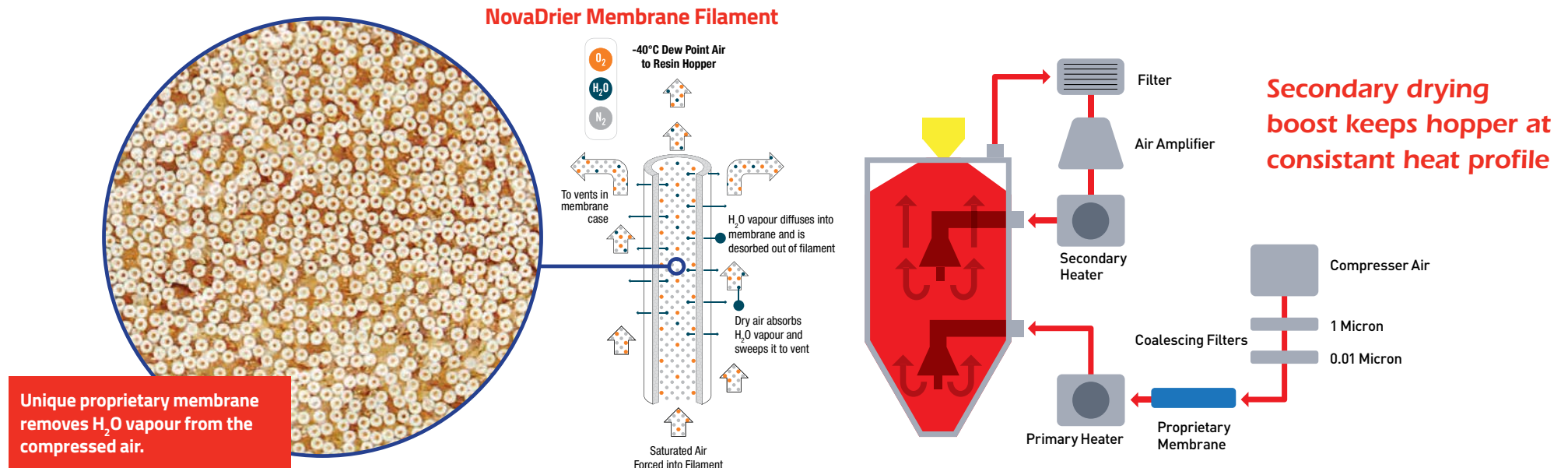
By the time the compressed air reaches the top of the membrane the air is extremely dry. Then by expanding the air and dropping the pressure of the air the Dewpoint instantly achieves a Dewpoint of  $-40^{\circ}\text{C}$  or even greater.

The dry air is then heated to the drying process requirements and then passed through the hopper.

## Secondary Drying Boost

Once the process air reaches the top of the material drying hopper the Dewpoint is reduced due to removing moisture from the raw material, however the Dewpoint is still good – from  $-40^{\circ}\text{C}$  at the beginning to  $-20^{\circ}\text{C}$  at the top of the drying hopper.

The design of the NovaDrier therefore lets users take advantage of the relatively dry process air and allows it to be re-circulated for the top third of the drying hopper, acting as a pre dryer or dryer booster, improving process performance as new raw material constantly replenishes the drying hopper.



# KEY BENEFITS OF NOVADRIER™

The patented compressed air membrane provides consistently dry air for the drying process in a compact, space saving unit. NovaDrier's desiccant free process achieves a constant  $-40^{\circ}$  dewpoint in less than 4 minutes from switching the unit on.

## Constant dewpoint

The pressure of the air instantly achieves dewpoint and is maintained consistently between  $-40^{\circ}\text{C}$  and  $-20^{\circ}\text{C}$  to provide accurately dried materials in all environments.

## Savings

Desiccant has to be heated up to temperatures in excess of  $220^{\circ}\text{C}$  and is energy intensive. The NovaDrier avoids this by using a patented membrane to provide constantly dry air during the drying process.

## Maintenance

The only scheduled maintenance required is for operators to change 2 coalescing filter elements once per year. No moving valves to replace and no dewpoint spikes, deviations or contamination.

## Ease of operation

Operators need only turn the power on and set the temperature for production to start. You have  $-40$  dewpoint in 4 minutes, compared to traditional desiccant dryers than can take up to 45 minutes to an hour to reach dewpoint.

## Compact design

All supplied in a one compact, space saving unit.

## Reduced service requirements

The NovaDrier uses a desiccant free process so eliminates any servicing required from monitoring the condition of desiccant constantly or replacing it on a regular basis.

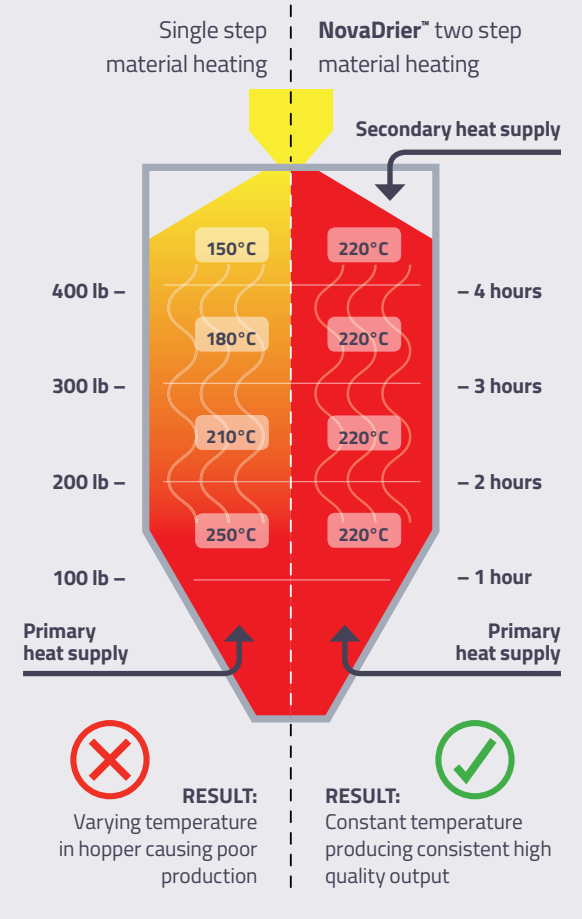
## Chilled water

Desiccant dryers require services such as chilled water for heat exchanging to cool the desiccant before going back into production. These costs are not incurred with the NovaDrier given it does not utilize desiccant media. Our NovaDrier achieves  $-40^{\circ}\text{C}$  dewpoint in all kinds of weather, using unrefrigerated compressed air, saving on energy costs.

## Running on captured process air

Our NovaDrier uses 33% less compressed air to conventional dryers or add-on models. By capturing factory compressed air during production, it dramatically reduces kW usage in the factory, in turn providing significant energy and cost savings.

## Hopper Temperature Comparison



# NOVADRIER™ MEMBRANE DRYER COMPARED TO COMPRESSED AIR DRYER

The patented NovaDrier membrane provides consistently dried materials at half the investment and cost of a compressed air dryer.

## Performance

### The Membrane Dryer:

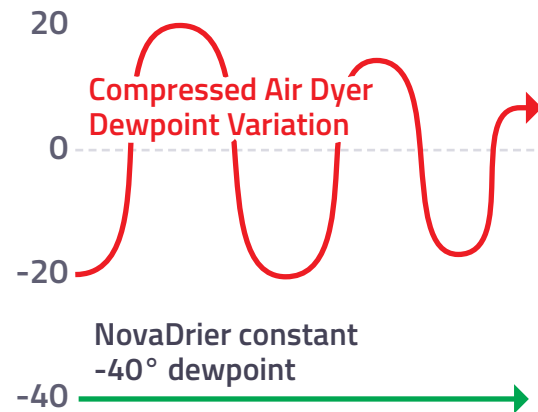
- Operates at full capacity on normal compressed air.
- Always produces -40° dewpoint (or less) process air.

✓ **The result: Properly dried material.**

### Compressed Air Dryer

- Require cool, pre-dried incoming air at 6.9 bar.
- NEVER produce -40° dewpoint process air.

✗ **The result: Variation in resin dryness and product characteristics.**



## Energy Usage

### The Membrane Dryer:

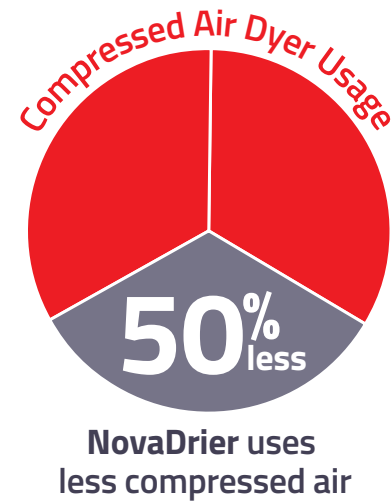
- Reduces compressed air consumption with patented design.
- Requires only 5.5 bar for full capacity operation.

✓ **The result: Reduced energy costs.**

### Compressed Air Dryer

- Use nearly 2 times the compressed air compared to the NovaDrier.

✗ **The result: Much higher energy costs.**



## Operational Costs

### The Membrane Dryer:

- 10 year running cost, based on US domestic cost 2014 = \$25,230.\*
- Dryer price comparison = \$10,105.\*

\*Model ND50 comparison.

✓ **The result: Investment = \$35,335.00.**

### Compressed Air Dryer

- 10 year running cost, based on US domestic cost 2014 = \$62,590.\*
- Dryer price comparison = \$6,732.\*

\*Model comparable sized leading compressed air dryer.

✗ **The result: Investment = \$69,322.00.**



# ENERGY USAGE COMPARISON

The patented, exclusive air flow design and proprietary membrane guarantees  $-40^{\circ}$  dewpoint process air year round and uses 1/3 the compressed air of conventional compressed air dryers or add-on membrane models.

## Compressed Air

- Requires cool, pre-dried incoming air at 6.9 bar.
- Variation in resin dryness and product characteristics – often downtime in summer due to improperly dried resin.
- High energy costs.
- Uses nearly 2 times the compressed air compared to the NovaDrier.
- Conventional single-pass design wastes compressed air and increases energy costs.

## Desiccant Twin Tower

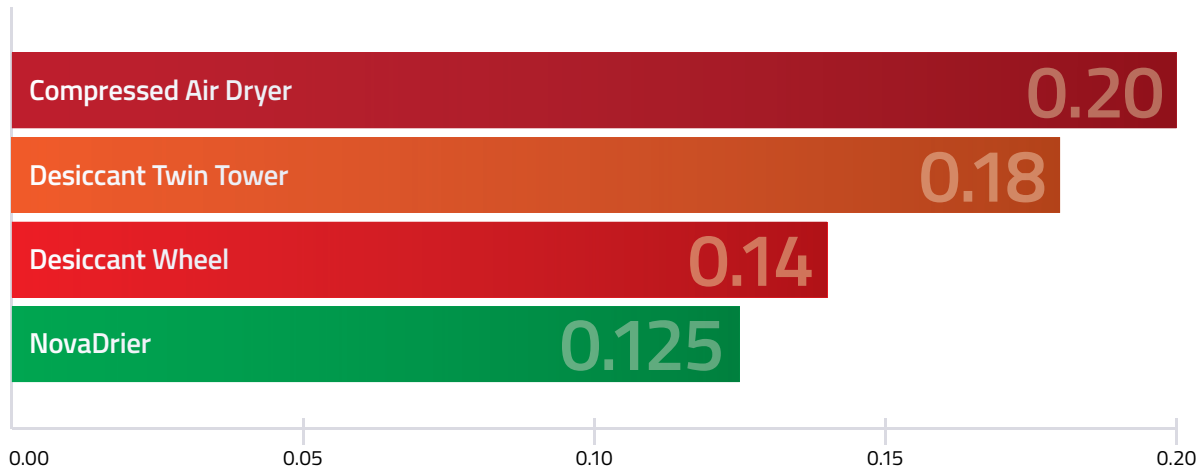
- A multitude of moving parts to be replaced.
- Uses desiccant which requires constant vigilance and replacement.
- High maintenance and downtime costs.
- High cost of ownership.
- Uses 3 times the compressed air compared to the NovaDrier.

## Desiccant Wheel

- Dewpoint spikes and variation.
- Desiccant begins to disintegrate as soon as it is put into service.
- High maintenance and downtime costs.
- High cost of ownership.
- Medium energy costs.
- Uses up to 3 times the compressed air compared to the NovaDrier.

## NovaDrier

- Change filter elements only once per year.
- No moving parts.
- No desiccant to change or to contaminate resin, resulting in higher part quality.
- No complications – turn the power on, set the temperature and you have  $-40$  dewpoint air in 4 minutes.
- Minimal cost for parts and near-zero maintenance.
- Operates at full capacity on normal compressed air.
- Uniform  $-40^{\circ}$  dewpoint year round.
- Requires only 5.5 bar for full capacity operation.



ENERGY USAGE: Kw/Kg/h @ 50kg/h @ 80°C



# COST SAVINGS BY UTILIZING RECOVERED PROCESS AIR

Compressed air dryers are one of the most commonly used dryers in the plastics molding industry. Advancements with our patented NovaDrier membrane dryer has reduced the energy costs significantly.

## Greater efficiency

Our patented membrane dryer, NovaDrier, has reduced the compressed air consumption versus traditional membrane air dryers, savings on average \$30,000 per year less in energy.

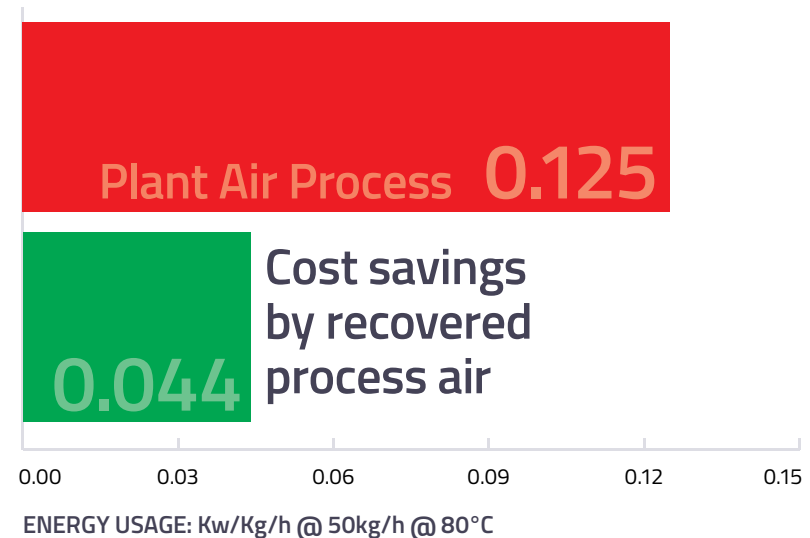
Compressed air is filtered by two coalescing filters in series, to remove all aerosols as well as any particles, all down to 0.01 micron. This takes a part of the air stream to pre-dry the resin in the upper part of the hopper, as well as introducing heated air to the bottom of the resin hopper to remove moisture. The patented recirculation loop is what keeps the compressed air consumption to a 1/3 that of traditional membrane resin dryers.

- No refrigerated or pre-dried air required, this system works with any source of compressed air.
- Processed air from the factory is captured, rather than being let go to the atmosphere, and fed into the drying process.
- The membrane filters out the water vapor which is continuously exhausted through vents in the side.
- NovaDrier is made of stainless steel and its hoppers are insulated for better temperature control and to reduce the amount of heat generated into the atmosphere.

## Lower maintenance

There's no process motor, regeneration motor or regeneration heater. There are no valves and no cooling coils on high temperature applications. This mean that the only maintenance requirements are the need to change filters periodically.

**“The NovaDrier saves on average \$30,000 per year on energy versus traditional compressed air dryers”**



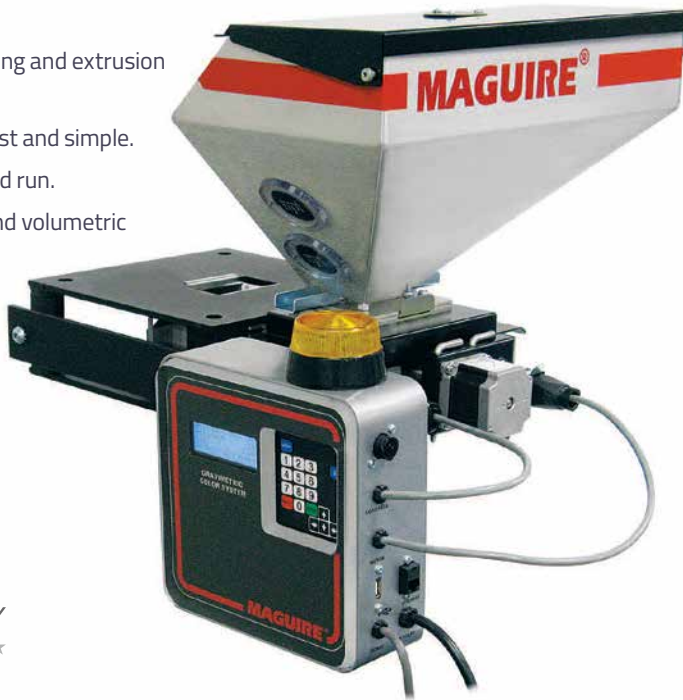
# DOSING ADDITIVE & MASTERBATCHES ON MACHINES

We develop equipment for accurate conveying, loading, drying, blending and dosing of polymer raw materials, compounds, additives and masterbatches along with systems that provide real-time data on material consumption to regulate the production process and ensure product consistency.

## MGF – Gravimetric Feeding

The compact loss-in-weight additive gravimetric feeder precisely measures the amount of additive that is fed directly into the machine throat to eliminate costly waste.

- **Advanced accuracy** – 2 load cells are better than 1.
- **Higher resolution** – only the material and hopper are weighed, not the complete feeder.
- **Choice of screw sizes** – molding and extrusion application focus.
- **Intuitive setup & control** – fast and simple.
- **Self-priming control** – Set and run.
- **Clear ROI** – vs. comparable and volumetric systems.
- **Precision** – Consistent stepper motor control.



## Peristaltic Dosing

The MS4 patented Maguire pumps are designed to accurately meter precise amounts of liquid color into the main flow of natural material directly for both molding and extrusion applications.

- **Positive displacement pump** – self priming liquid color pump with no seals, check valves or clearances to avoid even the slightest internal leakage.
- **3 tubing sizes available** – 3 tube diameters and assemblies are available to provide a wider range of dosing outputs.
- **Automatic speed control** – self-adjusting accuracy provides dosing control.
- **Precise metering** – high quality of the coloring process due to precise metering at low rates.
- **Easy maintenance** – liquid delivery tubes are quick and easy to change when color changes are required and can be re-used.
- **Robust design** – the solid, compression rollers never lose their tube compression tolerance.
- **Run modes** – The MS4 Pump will run in Continuous, Injection Molding or Extrusion Following Mode.
- **Easy disassembly** – Split Head access is easy via the detachable cover.
- **3 steps to easy operation** –
  1. Set shot weight.
  2. Set liquid color percentage.
  3. Set density of the liquid color.The MS4 calculates the rest.



# BLENDING SOLUTION FOR REGRIND, VIRGIN, PET, RPET, ADDITIVE AND MASTERBATCH

Total control of a processors most expensive operational cost – raw materials.

## FlexBus – Materials Conveying

Maguire's FlexBus Lite software is ideal for local systems. For larger plant-wide systems, Maguire FlexBus can operate up to 5 vacuum pumps and 240 receivers using one central control. Automate materials movement, reduce handling and gain maximum efficiency.

### FlexBus Receivers

- **Wide choice of receivers** – from 2 liters up to 160 liters for both free flowing granules and poor flowing, low density flake and regrind.
- **Quick set up** – connecting up to the control system is easy with our quick connect junction box.
- **Material and Vacuum inlet** – easily change the size to accommodate pipework.

### FlexBus Pumps

- **Wide range of single and twin pumps** – ranging from 0.85kW (1.14Hp) up to 11kW (14.5Hp), our pumps are efficient, compact and emit low noise.
- **Double filter option** – the pressure differential automatically switches to filter number 2 when full, ensuring no downtime while cleaning.
- **Filter cleaning by implosion** – the valve opens and lets fresh air into the filter, freeing any fines and moving them into the fines collector.

Our central system controls are intuitive, icon driven and simple to operate via a touchscreen.



## WSB – Gravimetric Blending

Our most popular blender, the Gravimetric Weigh Scale Blender, is capable of blending up to 12 components, covering throughputs from 2 kg/hr up to 5,500 kg/hr.

**Typical complete Return on Investment** – within 6-9 months of installation.

**Complete data on materials blends** – 24 hours a day, 7 days a week.

**High consistent accuracy** – on every material with  $\pm 0.1\%$  on a 1% setting.

**Over 120 models** – many configurations to choose from for every application.

Every gram of material measured by weight and controlled.



# CASE STUDY – COMPLETE SYSTEM SOLUTION

A review of the complete Maguire system solution for conveying, loading, drying, blending and dosing of polymer raw materials for producing PET bottles.

## Scenario:

### Product requirement:

- A blending system with 3 receivers to blend: Recycled PET, Virgin and Regrind
- Feeding from a day bin
- Vacuum Pump to convey material into the materials dryer.
- Line cleaning valve so no material is left in the pipe.

### Food manufacturer in South Africa:

- RCL Foods.

### Process:

- Injection stretch blow molding.

### Throughputs:

- Up to 100kg/hr.

### End product:

- Mayonnaise bottle.

## Maguire product installed:

- WSB-140R Gravimetric Blender
- 5 x MREC Receivers
- FlexBus Three Phase Vacuum Pump with Central Cyclonic Filtration
- Line Cleaning Valve
- 3 x ND-225 NovaDrier



“We’ve been using the Maguire NovaDrier’s for the past three years and it’s given us the flexibility to respond to customer demands quicker. We’ve seen dramatic cost savings from faster start-up times, reduced scrap and lower energy usage of the system. We’re so happy that we’re soon to be installing new NovaDrier’s into our plant”

Plant Manager, RCL Foods, South Africa, 2017.

## Solution:

By weighing all the materials, the WSB blender was able to maximize on regrind usage.

The NovaDrier is an ideal match for the technical drying requirements of PET, ensuring product quality and consistency.

Low energy costs per kilo conveyed achieved with our FlexBus pump.

## Result:

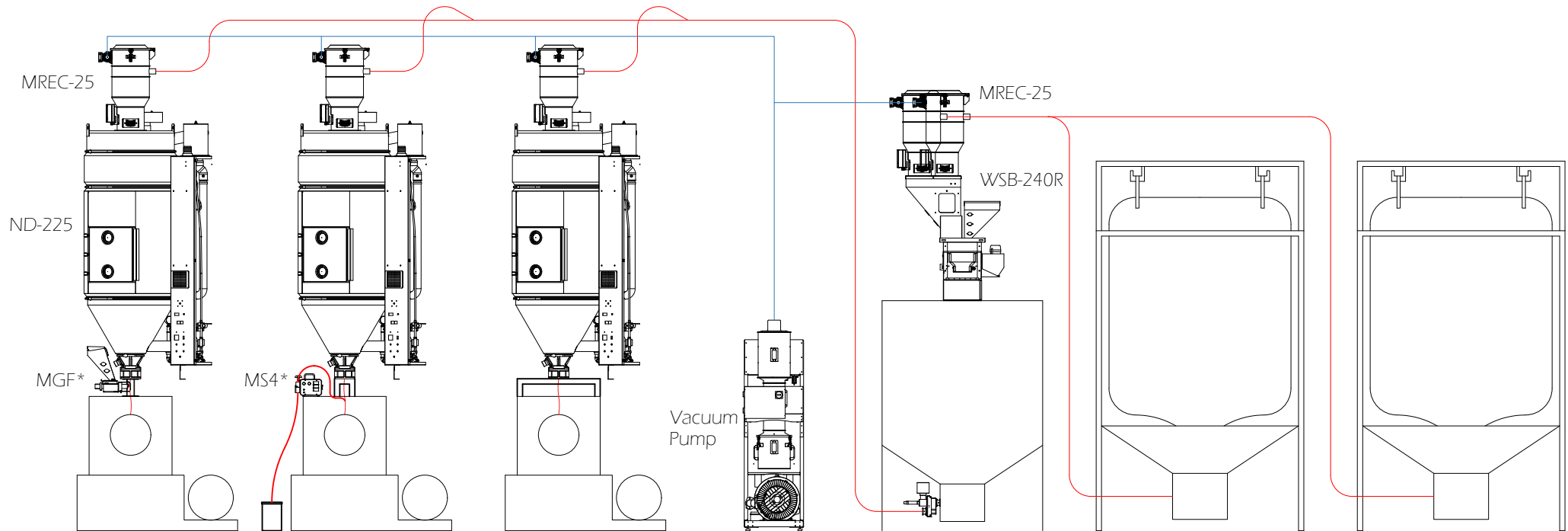
The blender immediately provided control over raw materials.

Effectively and efficiently dried PET properly as the NovaDrier always produces  $-40^{\circ}$  dewpoint (or less) process air.

Reduced energy usage / compressed air usage / scrap.

Reduce floor space due to compact NovaDrier design, all supplied in one space saving unit.

Clearer & simpler production – planning, flexibility, control and labor.



\*Options for the complete system solution.

# NOVADRIER™ RANGE SUMMARY

|  |                     | ND-7 | ND-25 | ND-50 | ND-75 | ND-100 | ND-150 | ND-200 | ND-225 |
|--|---------------------|------|-------|-------|-------|--------|--------|--------|--------|
| PC @ 4hrs BD = 0.7 g/cm <sup>3</sup>   | kg/h                | 3.2  | 11.3  | 22.7  | 34    | 45.5   | 68     | 91     | 102    |
| PC @ 3hrs BD = 0.7 g/cm <sup>3</sup>   | kg/h                | 3.2  | 11.3  | 25    | 40    | 70     | 105    | 140    | 170    |
| PET @ 5hrs BD = 0.85 g/cm <sup>3</sup> | kg/h                | 2.5  | 7.5   | 18.6  | 27.3  | 42.2   | 63.3   | 84.4   | 106    |
| Compressed Airflow                     | NM <sup>3</sup> /hr | 4.1  | 9.2   | 19.1  | 28.1  | 39.9   | 64.2   | 93     | 105    |
| Electric                               | Demand* kw          | 1.8  | 1.8   | 6.1   | 6.1   | 10.6   | 13.3   | 18.6   | 13.7   |
|  | Usage** kw          | 0.21 | 0.46  | 1.0   | 1.5   | 2.0    | 3.2    | 4.1    | 4.8    |
| H***                                   | mm                  | 940  | 1168  | 1219  | 1626  | 18.3   | 1956   | 2159   | 2500   |
| W                                      | mm                  | 533  | 584   | 711   | 711   | 965    | 1168   | 1168   | 1208   |
| D                                      | mm                  | 660  | 711   | 787   | 787   | 940    | 1016   | 1016   | 999    |
| Shipping Weight                        | kg                  | 107  | 147   | 168   | 236   | 305    | 360    | 386    | 423    |
| Hopper Volume                          | litres              | 14   | 52    | 120   | 173   | 292    | 446    | 595    | 744    |

\*Total connected load \*\*Usage at 82°C \*\*\*Without stand

Maguire reserves the right to cancel product or change product, product specifications and data without notice to improve reliability, function, design or otherwise.



ND-150



Stand: FS-ND-1

## Accessories

### Hopper extension

Part#: HX9-10 for ND-7, HX12-25 for ND-25, HX16-70 for ND-50, HX24-200 for ND-100

### Floor stand

Part#: FS-ND-1 for ND-7 through ND-100

Part#: FS-ND-2 for ND-150 and FS-ND-3 for ND-200

### Casters, 130mm, set of 4

Part#: ashm13

### Vacuum Take-off Box & Vacuum Purge Valve

Request information

### Dry/Convey Packages

Available as ND-25-DC, ND-50-DC, ND-75-DC, ND-100-DC.

**ND-150-DC & ND-200-DC include:** VR-12 machine-mount vacuum receiver, regenerative blower, VL-12 Loader, line purge device, 40mm probe, floor stand w/ 130mm casters and LOGO! controls.



Casters: (set of 4) ASHM13

## Options

### 7-Day timer

Part#: ae7dtND

### Short Run Diffuser Tube

ND-7: Part #: SRD-1

ND-25 and ND-50: Part #: SRD-2

### Dewpoint Meter

Part #: ae7dpND



ND-25



**MAGUIRE WORLDWIDE DISTRIBUTION LOCATIONS**



**Maguire USA**

Aston, PA, USA  
 T: +1 610 459 4300  
 F: +1 610 459 2700  
 E: info@maguire.com

**Maguire Canada**

Ontario, Canada  
 T: +1 905 879 1100  
 F: +1 905 879 1101  
 E: info@maguirecanada.com

**Maguire Europe**

Staffordshire, UK  
 T: +44 1827 338 280  
 F: +44 1827 338 285  
 E: info@maguire-europe.com

**Maguire IMEA**

Dubai, UAE  
 T: +971 4 881 6700  
 E: info@maguire-imea.com

**Maguire Asia**

Singapore  
 T: +65 6848 7117  
 F: +65 6542 8577  
 E: magasia@maguire-products.com.sg

**Maguire China**

Shanghai  
 T: +86 21 5882 3410  
 F: +86 21 5882 3420  
 E: amber@maguirechina.com

[www.maguire.com](http://www.maguire.com)

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