

AMT Rail Dryer

UP TO 6 YEARS MAINTENANCE FREE LIFE
 (18,000 usage hours)

TOTAL FLEXIBILITY IN MOUNTING ORIENTATION

FAIL-SAFE

Provides reliable and effective air drying

Improved drying performance

VIBRATION TESTED TO EN 61373:2010

Reduced air purge consumption

Significant weight reduction

-50°C ... +80°C

OUTSTANDING DEW POINT SUPPRESSION

ROBUST, DURABLE AND COMPACT SOLUTION

Up to 25% more energy efficient

INTRODUCING THE REVOLUTIONARY AMT RAIL DRYER



Engineering
GREAT Solutions

Improved reliability and durability
 for rail compressed air applications

Contents

03 Delivering expertise, solutions and value to the rail sector

04 The importance of clean, dry compressed air in the rail industry

05 The problem with current air drying solutions

06 Introducing compressed air dryer systems with AMT technology

07 Adsorbent media tube (AMT): breakthrough technology

08 Filtration: offering a complete air preparation solution

09 On-board solutions

10 Performance, validation & testing

11 New York City Transit – New technology keeps compressed air dryer longer case study



Engineering GREAT solutions through people, products, innovation and service

IMI Precision Engineering is a world-leader in fluid and motion control. Building close, collaborative relationships with our customers, we gain a deep understanding of their engineering needs and then mobilise our resources and expertise to deliver distinctive products and solutions.

Wherever precision, speed and engineering reliability are essential, our global footprint, problem-solving capability and portfolio of high performance products enables us to deliver GREAT solutions which help customers tackle the world's most demanding engineering challenges.

> Reliability

We deliver and support our high quality products through our global service network.

> High performance products

Calling on a world-class portfolio of fluid and motion control products including IMI Norgren, IMI Buschjost, IMI FAS, IMI Herion and IMI Maxseal. We can supply these singly, or combined in powerful customised solutions to improve performance and productivity.

> Partnership & Problem Solving

We get closer to our customers to understand their exact challenges.

Delivering expertise, solutions and value to the rail sector

For over 30 years, we have delivered robust, reliable and custom solutions to the rail sector: for metro, intercity, high-speed, freight and permanent-way rail.

Our products range from air preparation equipment, to components for braking systems; door & step systems; coupling, pantograph and water control; plus freight control & actuation.

They continue to give millions of miles of reliable service across the world's most punishing environments, from the extreme cold of Eastern Europe to Australian outback heat.

We are well used to designing for the precise needs of the rail industry, at:

- > Temperatures ranging from -40°C (-40°F) to $+80^{\circ}\text{C}$ ($+176^{\circ}\text{F}$)
- > Voltage tolerances of $\pm 30\%$
- > EN61373 category 1 class A and B vibration resistance

We always listen to the improvements and savings you want to make, in terms of cost of ownership, energy efficiency, reduced maintenance and more.

Drawing on this first-hand insight, we have developed the AMT air dryer system that represents a step change in the efficiency and durability of compressed air applications for the rail sector, offering levels of reliability never seen before.



The importance of clean, dry compressed air in the rail industry

The safe, cost-effective and trouble-free operation of so many critical rail applications – such as braking systems, pneumatically operated doors, self-levelling air suspension, pantographs and the train's horn – depends on a reliable supply of clean, dry compressed air, free from moisture and contaminants.

The challenge

Compressors, generally mounted underneath the body of the train, draw in large volumes of air from the surrounding atmosphere. This air typically contains water vapour and airborne contaminants.

As the air is compressed, vapour and contaminants are heated up and compacted. After subsequent cooling by an after-cooler, water vapour condenses within the air system to form liquid.

With oil-lubricated compressors, the lubricating oil degrades with the heat of compression and combines with the condensing liquid to form acid condensate of varying viscosities.

Dryers and filters are used to remove this wet and dirty 'liquid emulsion' before it reaches downstream applications, such as door and brake systems, where it can cause erosion, corrosion, reduced performance, costly maintenance and safety implications – all of which affect the quality of rail service.



Brakes



Horns



Doors & Steps



Pantographs



Suspension



Sanding Systems



The problem with current air drying solutions

There are two types of upstream air dryers suitable for use in rail applications. These are desiccant dryers and membrane dryers. They offer different approaches to the issue of removing moisture and contaminants from the air.

Desiccant dryers

- > Collect and absorb water using special canisters filled with beads, held together with a clay substance
- > The beads absorb moisture and contaminants from the air, so dry air flows out to the vehicle
- > However, vibration can cause the beads to rub together, producing dust that contaminates the air
- > As the beads erode, they become less tightly packed, allowing more moisture to pass into downstream equipment
- > Over time the substance in the canister can become over saturated, and a chemical reaction causes irreparable damage to the beads, which means they cannot be used again

Membrane dryers

- > Use special fibre tubes suspended between two potted ends to form a semi-permeable membrane
- > Water vapour passes through the membrane wall via plasmolysis and is swept into a small vent, which releases it back into the atmosphere
- > Contamination, such as oil, can clog and damage the fibres, causing them to break
- > Membrane dryers suffer badly from shock and vibration and the fibres are easily broken
- > If one breaks, the others usually follow shortly after, causing a catastrophic failure

Each technology has its strengths, but it's also acknowledged that neither option currently offers a wholly satisfactory or reliable solution.

Introducing compressed air dryer systems with AMT technology

Working closely with customers in the rail industry, we can see the pressing need for robust, durable solutions that improve reliability, increase energy efficiency and reduce weight, emissions and downtime.

The IMI Norgren's patented Adsorbent Media Tube (AMT) technology takes the best of the current desiccant and membrane systems, and eradicates the flaws associated with their short lifecycles, and the costs of regular replacement.

- > It dries better than any current solution, no matter how extreme the environment
- > It lasts up to 6 years, compared to 6-24 months, in most applications
- > It's more reliable and means rolling stock needs far less maintenance
- > Less servicing means reduced downtime

A result of our expertise and deep experience in air preparation solutions, the AMT air dryer system is a far more effective, robust and reliable way of removing moisture and contaminants from compressed air in rail applications.

Patented technology for improved performance

- > Service life of up to 18,000 hours (six years)
- > Compact and flexible design, horizontally or vertically mounted
- > Typical dew point suppression of 40°C
- > Superior moisture uptake
- > High energy efficiency
- > Unaffected by saturation
- > Faster regeneration
- > Resistant to vibration
- > No by-products produced

Adsorbent media tube (AMT): breakthrough technology

The AMT air dryer system uses Adsorbent Media Tube (AMT) technology.

Not to be confused with semi permeable membranes they are totally resistant to bulk water and there's no by-product or chemical reaction when saturated.

The open structure of the AMT allows maximum surface area for moist air to permeate, compared with the clay binder found in a regular desiccant dryer allowing faster adsorption and a more efficient drying performance.

The AMT is tightly packed into a canister, where their uniform shape means they are unaffected by the vibration of rolling stock. This ensures a consistent flow of air through the dryer with minimal drop in pressure.

The AMT's performance does not degrade over time, and as there's no clay component, there's no dust – a huge advantage over previous desiccant air dryer solutions.

The key features of AMT patented technology

- > Adsorbent material packaged into a tube structure
- > Unaffected by water saturation, whereas conventional clay beads dissolve if contaminated by bulk water
- > Improved moisture uptake compared with standard beaded technology
- > Complete air dryer system includes multi-stage filtration

AMT dryer



Conventional dryer

Multi stage
filtrationCarbon
filter
element

5 micron

Coalescing
filter
element

40 micron

Single AMT
systemTwin AMT
system

Filtration: offering a complete air preparation solution

The IMI Norgren's AMT dryer system is a complete air filtration and drying solution designed for the harsh environment of the global rail industry.

Capable of operating within a range of -50°C to +80°C, the full system consists of:

- > 40 micron and 5 micron filters for bulk water and solid particulate removal
- > Coalescing filter for oil/water aerosol removal and sub micron particulate removal
- > Carbon filter for oil vapour removal
- > Single or Twin column AMT dryer

Compressed air travels through the high efficiency filtration system where particles, moisture and oil are removed from the air before it reaches the AMT dryer itself, which is then free to remove the water vapour for an extended period of time.

Single AMT system generally used on low duty applications

After flowing through the AMT, dry air flows through the outlet, supplying clean and dry compressed air to the train air systems. Once the reservoir is full and the compressor is off load, the system will purge and regenerate.

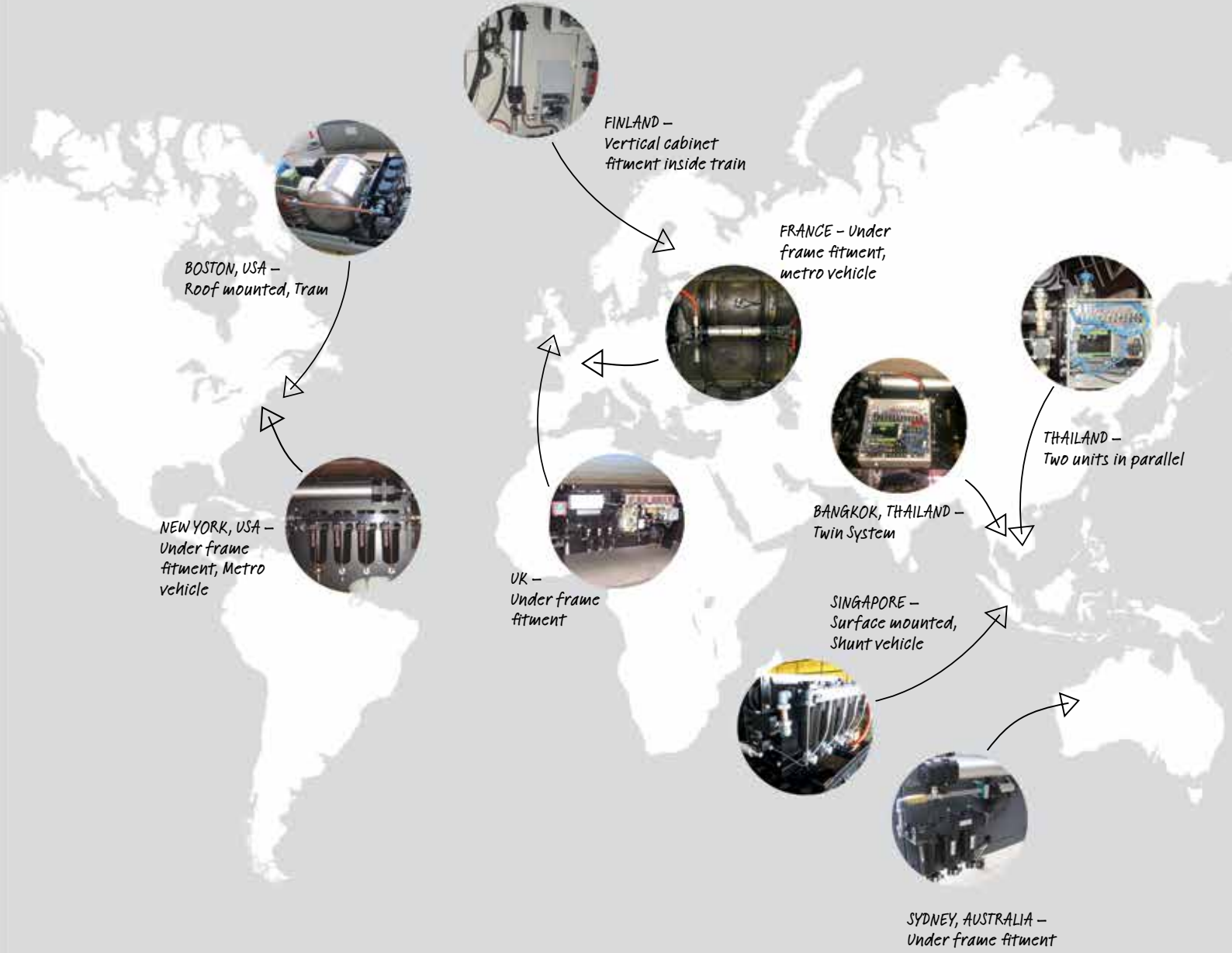
Twin AMT system Generally used on high duty applications

The twin AMT dryer system has two AMT columns that operate simultaneously on a timed cycle. Moisture is collected in one while the other is purged, offering a continuous supply of clean, dry air.

On-board solutions

Another product of our innovation and technical excellence, the AMT compressed air dryer system is compact and flexible, and can be designed to your specification.

Various filtration and mounting options are available depending on specific environmental and application requirements.





Performance, validation & testing

Performance

- > Air dryer service intervals: 18,000 operating hours (6-year service intervals)
- > Significant weight reduction compared with conventional dryer
- > Up to 25% more energy efficient
- > Reduced pressure drop across the dryers
- > Reduced air purge requirement
- > Total flexibility in mounting orientation – horizontal or vertical
- > Robust and durable
- > Vibration tested to BS EN 61373:2010
- > Operating pressure range: 6 bar (72 psig) to 12 bar (188 psig)
- > Ambient operating temperature range: -50°C to +80°C (-58°F to +176°F)
- > Typical dew point suppression: 40°C (104°F)
- > On-going continuous testing has resulted in better than 40°C (104°F) suppression

Validation & Testing

> Shock and Vibration (BS EN 61373:2010 CLASS1 CATB)	> Salt Spray (BS EN 60068-2-11 or BS EN 60068-2-52)
> Cold Temp (BS EN 60068-2-1:2007) -50°C. 80cc/min external leakage @ 10 bar	> Over Pressure (16 Bar for 1 hour then return to 10 bar and function)
> Cold Temp (BS EN 60068-2-1:2007) -20°C. 10cc/min external leakage @ 10 bar	> Life Cycle 18,000 hours – assuming 2 mins flow. 2 mins purge. (@ 15 cycles/hr this equates to 270,000 cycles)
> Dry Heat (BS EN 60068-2-2:2007) +80°C. 10cc/min external leakage @ 10 bar	> Ingress protection (BS EN 60529) to IP65
> Damp Heat (BS EN 60068-2-30:2005) +55°C. @ 95% RH. 10cc/min external leakage @ 10 bar	> Low Temperature Park Test (7 day @ -50°C)



New York City Transit – New technology keeps compressed air dryer longer **case study**

Customer challenge

Maintenance engineers at New York City Transit had seen conditions where moisture in compressed air caused mechanical problems on subway cars downstream, including preventing the brake trip valve from resetting. The engineers found that the OEM pressure swing dryers on the compressor skids removed damaging moisture when they were first installed on the subway cars, but performance declined, especially during hot, humid New York City summers. To extend dryer life and increase vehicle uptime, New York City Transit asked for a dryer that would:

- > Maintain peak performance
- > Reduce change outs
- > Increase vehicle uptime

The solution

The IMI Norgren Adsorbent Media Tube (AMT) dryer uses a patented technology radically different from conventional desiccant beads. Once clay beads are water-saturated, the dryer fails and cannot be regenerated. The AMT dryer uses a polymer to form hollow tubes that are impervious to moisture. This design delivers higher moisture uptake and faster purging without degrading the dryer media, improving both performance and longevity.

A test unit was designed consisting of a multi-stage filtration system that removes particulate contaminants, liquid water and oil aerosols, as well as the water vapour removed by the AMT dryer. New York City Transit replaced the conventional pressure swing dryers with these AMT test units on a complete train – three compressor skids – and ran them under normal conditions. After 12 months of regular operation, which includes the summer months of extreme temperature and humidity typical of New York City, the test results showed that the air leaving the dryers was as dry as when the system was first installed, demonstrating there was no decay or reduction in the dryer's water removal capabilities. Now New York City Transit has a dryer that is:

DURABLE – the AMT dryer is projected to last up to 6 years, or 18,000 service hours, significantly exceeding the desired two-year maintenance cycle. In addition, the AMT dryer is certified to meet demanding rail industry standards for temperature extremes, electrical shock and vibration.

EFFECTIVE – the tube structure of the AMT dryer media means water is removed more quickly and reliably from the air stream and can be purged more efficiently when the dryer is drained. The AMT dryer maintains this effectiveness over time, unlike conventional dryers where performance degrades as the desiccant becomes saturated.

FLEXIBLE – unlike desiccant bead dryers, the AMT dryer can be oriented either horizontally or vertically for greater design flexibility and space optimization.

IMI Precision Engineering operates four global centers of technical excellence and a sales and service network in 50 countries, as well as manufacturing capability in the USA, Germany, China, UK, Switzerland, Czech Republic, Mexico, Brazil, and India.

For information on all IMI Precision Engineering companies visit www.imi-precision.com

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