High Frequency Oscillation (HFO) was developed with the ideal of providing “gentle breathing” for every patient from newborn infants to seniors.

Metran, a leader in the development and manufacture of HFO ventilators and respiratory care related medical equipment.

METRAN Co., Ltd.
About US

Ever since its establishment in 1984 as a company specializing in the development and manufacture of high frequency oscillation (HFO) mechanical ventilators, Metran has developed ventilators and respiratory care related products using state-of-the-art technology to meet the needs and demands of hospitals and other healthcare institutions. Today, the company continues to grow with a focus on three areas: (1) mechanical ventilators for neonates and infants, (2) mechanical ventilators for adults, and (3) mechanical ventilators and anesthesia machines for veterinary use.

Our mechanical ventilators for neonates and infants, which require technology that is both refined and advanced, have earned the overwhelming trust of the international community. This trust stems from a 1984 “HIFI trial” sponsored by the United States National Institutes of Health (NIH) where Metran’s HFO product was the only one chosen among numerous other US and European manufacturers entered in the competition.

In the 10 years until 1996, our mechanical ventilators achieved increasing popularity in neonatal intensive care units (NICUs), which demand the highest levels of safety and reliability. Because of the trust and recognition gained in this period, our ventilators are now considered standard equipment in NICUs across Japan.

As well, in 2001, we received government funding for the development of a HFO ventilator for adults. The result was our success in the development of the “R100” model.

From NICUs to hospital wards and to home care, we are aiming to expand into new markets through our development of distinctive equipment that outclasses that of our competitors. Our advanced technology has been tested and refined through years of use in NICUs where both sensitivity and reliability are vital to the survivability and comfort of neonates and infants. We will leverage this technology into innovative and timely new products used for daily health maintenance and management.
Message from the president

We are extremely grateful for your continued support, which has enabled us, over the 20 years since our establishment, to develop and provide medical equipment that is recognized and respected throughout the world. Our corporate philosophy comprises the following three points, and we practice them on a daily basis to improve and expand our corporate activities:

• We are a “Development-Focused Company” closely attached to the front line of the clinical field. We actively exchange relevant and timely intelligence with medical institutions and the medical community at large.

• We concentrate on “Developing One-and-Only technology” to develop and offer one-of-a-kind products.

• All of our staff members are united as partners, working as one in the same spirit, aiming for continued contributions to healthcare and society.

Our development-centric philosophy is founded on Japanese makers’ sophisticated development and manufacturing processes which are based on close interaction between skilled workman and the front line of the clinical field. Our company has reached the level at which the development and manufacturing of our equipment is acceptable by international standards due to the utilization of American-style in-depth data collection methodologies and development paradigms based on unified protocols.

Metran’s management philosophy is to make contributions as a corporation that cherishes its spirit through advanced technology. Since our founding, we have developed ventilators for neonates and infants based on the ideal of providing gentle breathing for not only such children, but for all generations including adults and seniors. My creed is to contribute to the future of healthcare as a paramedical by devoting time and effort to the research and development of devices that ensure health and well-being.

We will continue to develop the world’s leading technologies and to develop and provide medical equipment contributing to broad areas of society. Our employees enjoy nothing more than seeing patients who are happy thanks to Metran’s products.

Kazufuku Nitta (Tran Ngoc Phuc)
President
Metran’s mechanical ventilators are used in more than 90 percent of neonatal intensive care units (NICU) in Japan.

Principal Users in Japan
- Major national teaching hospitals
- Major private teaching hospitals
- Major national medical institutes
- Major medical institutes for children
- Major foundation hospitals
- Japanese Red Cross hospitals, others
Metran’s mechanical ventilators, which use high frequency oscillation, are reputed for their “gentle breathing method” that does not strain the lungs. For that reason, ever since their development, they have been the overwhelmingly preferred devices in critical care medicine for neonates and infants, whose pulmonary function is insufficiently developed.

The premature infant (350 grams at birth) in the photo suffered from undeveloped pulmonary function. This infant was saved without damage to the lungs through the use of a Metran HFO ventilator.
Critical Components Developed by Metran

Piston:
For Calliope. A magnet-joint-type transverse piston that greatly reduces noise compared to conventional pistons.

Linear Motor and Piston:
For the Humming V. A linear motor, the driving force, and a piston for high frequency oscillation (HFO).
Rotary Valve:
The heart of the R100. This switching valve, which converts linear airflow into oscillatory airflow, makes it possible to apply high-capacity HFO to adults.

Breathing Circuit for Hummax:
(heated humidification system)
This uses a porous hollow fiber polyethylene membrane. It eliminates the problem of insufficient moisture content in inhaled gas by providing humidified gas at a uniform relative humidity of 100% in proportion to the temperature in the breathing circuit.

Diaphragm:
This converts the oscillatory airflow from the rotary valve into a smooth sinusoidal pressure waveform that becomes the basis for HFO.
Today the survival rate for neonates in Japan is the highest in the world at 99.7% (the neonatal mortality rate is about 3 in 1,000). It can be said that this high neonatal survival rate is due to the high level of critical care medicine for premature infants.

One of the pillars of critical care medicine for premature infants in Japan is the high frequency oscillation mechanical ventilator. It is used in about 90% of neonatal intensive care units (NICU) in Japan, and plays a very important role in the critical care and treatment of premature infants. As a leading manufacturer of high frequency oscillation mechanical ventilators, Metran plays a critical role in contributing to this extremely low neonatal mortality rate.

A Comparison of HFO and CMV (the conventional method)

Compared with the negative pressure ventilation in the lungs during spontaneous breathing, intermittent forced positive pressure ventilation by a device places high pressure on the pulmonary alveoli, with a correspondingly large impact on circulatory dynamics and the brain. High frequency oscillation, by applying vibration to the constant-pressure gas that opens the pulmonary alveoli, raises the diffusion effect of oxygen and carbon dioxide by a factor of about ten thousand times while keeping the pressure swing to a minimum, thereby enabling high-efficiency ventilation with minimal traumatic effects on the lung.

What are the main reasons HFO can save a premature infant’s life?

Premature infants are born with hypoplasia of the lungs, and are unable to breathe properly on their own as the alveoli are closed and extremely hard because of a deficiency of alveolar surfactant.

In the conventional method of intermittent forced positive pressure ventilation, high pressure is applied to send oxygen in inhaled gas to the alveoli, but this leads to a vicious cycle in which the bronchial tubes become deformed (bronchial dysplasia) before oxygen reaches the lungs, which in turn leads to an increase in suction pressure. In order to prevent this, an approach of lowering the pressure and raising the oxygen density is sometimes used, but this result in the risk of blindness in exchange for saving the baby’s life. It has also been indicated that substantial pressure can damage the structure and blood vessels around the lungs.

The mechanical ventilation method utilizing HFO is able to reduce dependence on pressure and assist ventilation by raising the dissipation efficiency of oxygen. This overcomes problems faced in conventional mechanical ventilators and keeps the pressure placed on the alveoli and surrounding blood vessels to a minimum.

This is a mechanical ventilator that is easy and gentle on the lungs, and doesn’t force the patient to “fight” with the machine.
Common points and unique features of the various models

The HFO ventilation method is already widely recognized in Europe and the United States, and the devices have become irreplaceable in neonatal medicine.

HUMMING BIRD
This is the prototype of the device that was selected in 1984 in the "High Frequency Oscillation Mechanical Ventilator Competition", a neonatal care project of the US National Institutes of Health. Metran’s history begins with this mechanical ventilator equipped with a highly reliable linear motor drive piston-type HFO.

Humming V
Metran’s best-selling model. The Humming V uses a piston-type HFO generator driven by a precision linear motor. This combination provides exceedingly accurate and stable HFO performance that can be safely used for even the most premature infants with undeveloped lungs.

Calliope α
This widely used model is the epitome of HFO’s cost performance and user friendliness. There are only two active parameters while in HFO mode. Calliope α succeeds in using piston HFO features while reducing vibration and noise. It can even be comfortably used in neonatal intensive care units that require low noise emissions from devices.

R100
A rotary valve and cartridge diaphragm were successfully developed to bring the benefits of HFO to adults. This is the only product that has made HFO possible for adults. This single machine can be used for everything from HFO to weaning by using its HFO, normal ventilation, and CPAP modes.

Next Generation Mechanical Ventilator
This improved next generation model is the result of redesigning the conventional HFO mechanical ventilator from scratch. It is more powerful, with a wider range of oscillation frequencies, and features an intuitive, easy-to-use 12-inch touch-panel LCD user interface. This model currently under development is also packed with other new features.

COMPOS β-EV
This mechanical ventilator for animals is capable of switching from using a one-touch pressure limit/time cycle system to jet ventilation. The photograph shows a system used in combination with the COMPOS β-E. The compact system can be installed anywhere, and is used in many veterinary hospitals.

SL-5 solid-state electric scalpel
This solid-state electric scalpel for veterinary use has an excellent design including monopolar and bipolar functions in a compact body, consistently providing stable output and delicate control under a variety of operating conditions.

History of Metran’s mechanical ventilator development

<table>
<thead>
<tr>
<th>Year</th>
<th>Model</th>
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<tbody>
<tr>
<td>1980~</td>
<td>1984 HUMMING BIRD HFO</td>
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<tr>
<td>1990~</td>
<td>1988 Humming II HFO</td>
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<tr>
<td>1999 M6α</td>
<td>1993 Humming V HFO</td>
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<tr>
<td>2000</td>
<td>2000 R100 HFO</td>
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<tr>
<td>2007~</td>
<td>2007~ Next Generation Mechanical Ventilator HFO</td>
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METRAN
Metran believes that the most important requirement of equipment in the clinical field is to offer reliability and safety to both medical personnel — the providers, and patients — the receivers of treatment. Our own R&D forms the foundation for the high quality of our products. We have been making a large upfront investment in our R&D in order to meet the sophisticated needs of physicians at the front lines of clinical fields, to attentively respond to their requests, and to provide high-quality products in a timely manner.
Capturing Confidence in Metran’s Development Capabilities
– An Increase in Entrusted Development and Joint R&D

At Metran we emphasize and value in-house development as a Japanese domestic developer supporting cutting-edge healthcare. The know-how and technical capabilities that we have been accumulating because of our emphasis on in-house development are capturing the confidence of our own domestic market, and our market share is increasing more than ever. Furthermore, our accumulated assets allow us to stay competitive in relation to major foreign manufacturers and strengthen our international presence. As our technology gains us more trust, we receive more requests for outsourced development and joint R&D, increasing our capacity for R&D based on feedback from the front line of clinical fields, and enabling us to acquire funding for advancing innovative development.

R&D Based on the Latest Intelligence and Data from Clinical Fields

It is essential for our R&D activities to build close partnerships with leaders from clinical fields and collect fresh intelligence and opinions from fields that are actually using our equipment. The engineers on Metran’s R&D team actively participate in health-care-related international standards associations, medical societies and exhibitions, and invite physicians to hold medical seminars. In these ways our R&D team acquires the latest information from the front lines of the clinical field, and always ensures our R&D efforts are based on direct communication between the various clinical fields.

**Hummax** *(heated humidification system)*

This is an application of the porous hollow fiber polyethylene membrane’s physical features and the surface tension effect of water to create the effect of humidification. It curbs the generation of flocculated water and eliminates the problem of insufficient moisture content in inhaled gas by producing humidified gas at a uniform relative humidity of 100% in proportion to the temperature in the breathing circuit.

**Veterinary Ventilator** *(mechanical ventilator and anesthesia machine for animals)*

This ventilator utilizes a compact design combining a mechanical ventilator and anesthesia machine in a single unit. In addition to the functions of a normal mechanical ventilator, it is equipped with an assistor, a high-frequency ventilator, and a PEEP. It can be utilized for infants, adults and in the field of veterinary treatment.

**A CPAP** *(continuous positive airway pressure unit)*

Continuous Positive Airway Pressure (CPAP) is a state-of-the-art technology that maintains the expansion of the lungs and improves oxygenation by applying continuous pressure to a spontaneous-breathing patient. This device is equipped with Auto CPAP that automatically optimizes functions.

**Finger Pulse Oximeter**

This portable pocket-size device enables anyone to easily measure their oxygen saturation (oxygen saturation of arterial blood) and pulse rate. After many years of effort, Biotran, a US company in the Metran Group, developed the technology for this product, which is highly reliable, reproducible, and durable.
The Challenge for Metran

In the 21st century, we would like to disseminate technologies nurtured in advanced healthcare venues and offer many people access to our mechanical ventilators and healthcare services.

Aiming to Expand Applications: From the Hospital to the Home

In addition to aiming to increase market share for HFO ventilators in three areas (for neonates and infants, adults and animals), we are now advancing into research on the development and application of home-based medical equipment that will allow patients to receive sufficient treatment in their homes. Moreover, we are actively considering entering the home healthcare field using medical communication systems.

Global Expansion Centered on the “Pacific Triangle”

Metran has a three-country structure dubbed the “Pacific Triangle,” with business bases in three countries: the group’s headquarters in Japan, the United States and Vietnam. As our high frequency oscillation (HFO) mechanical ventilators were widely used for the treatment of bird flu, which has become epidemic in Asia, our products are expected to help and contribute in treating epidemic diseases throughout the world. Taking advantage of our international network developed since our founding, we aim for a global robust and wider expansion of our distribution network.
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URL: http://www.metran.co.jp
Established: 1984
Capital: 87.5 million yen
President: Kanafuku Nita (Tran Ngoc Phuc)
Principal Business: Development, manufacture, and distribution of respiratory equipment and other medical devices.
Employees: 24
Principal Customers: Iwaki (Japan), Respironics (USA), Medions (Korea), Tocontap Hanoi (Vietnam), Baliphar (Vietnam)
Principal Banks: Bank of Tokyo-Mitsubishi UFJ, Musashino Bank, Shekochekim, Saitama Resona Bank
We would like to widely disseminate technologies nurtured in the field of advanced healthcare and to provide many people with access to our mechanical ventilators, medical equipment, and medical services.