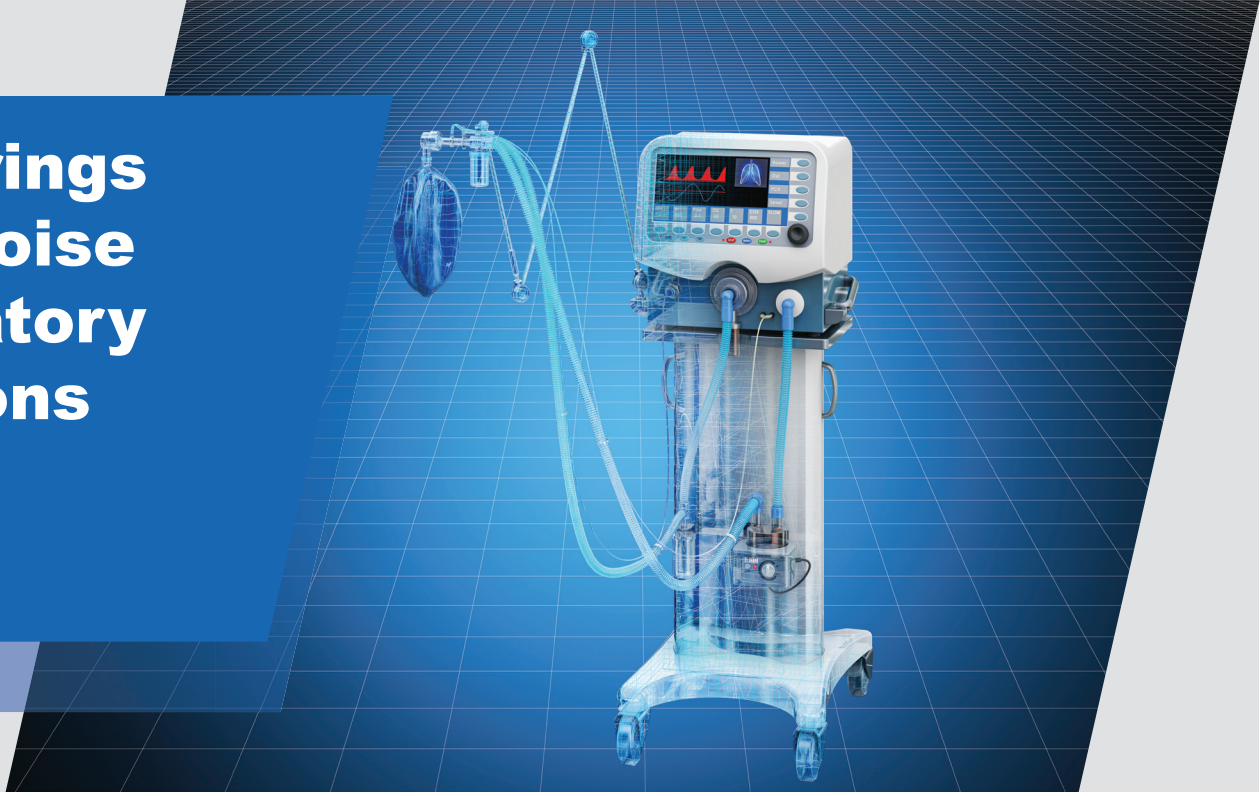
NMB Bearings Reduce Noise in Respiratory Applications



Respiratory device manufacturers can benefit from reduced equipment noise by incorporating NMB's high quality, high-precision miniature ball bearings into their design.

A mechanical ventilator is a device that assists or takes over the work of breathing when a patient is unable to breathe on their own. Ventilators that are used with masks and do not require intubation are considered non-invasive (i.e. CPAP, BiPAP). During invasive ventilation, a tube must be inserted into the patient's airway in order to assist with the breathing process. Recent advancements in the designs of respiratory equipment has enabled these devices to be used both within healthcare facilities and at home.

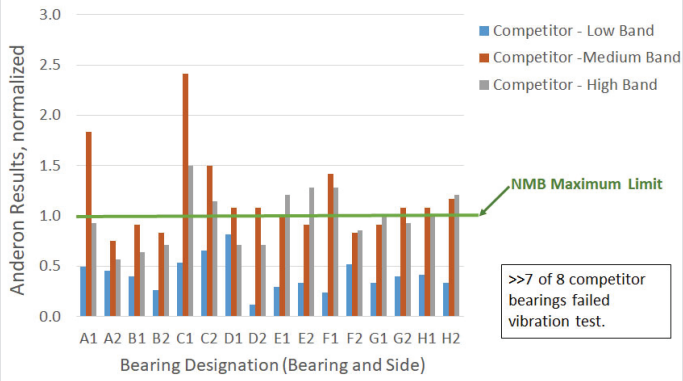
These devices use pressure to blow air into a patient's lungs and are known as positive pressure ventilators. Mechanical components such as bearings, fans and motors work together to generate a reliable pressure differential that is required for successful operation. However, the unwelcome side effect of mechanical operation is that it frequently generates substantial noise.

In both home and hospital settings, patients often complain about the high levels of ambient noise from medical devices that can make it hard to rest or sleep. Because this can affect the patient's recovery or overall quality of life, reducing equipment noise should be an important consideration during the design process. In order to reduce noise, design engineers may source high quality components from reliable manufacturers with stringent production controls and testing processes.

Anderon Meters are used to test vibration noise. All ball bearings manufactured by MinebeaMitsumi undergo vibration testing.

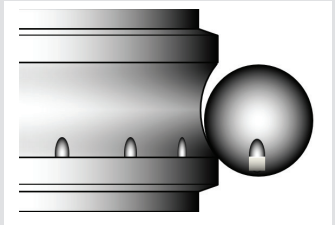
NMB Ball Bearings for Respiratory Equipment

NMB engineers developed a benchtop test chamber in order to perform acoustic order analysis – a technique for quantifying noise and vibration signals in rotating machinery. With this technique, we were able to isolate the patterns to analyze the performance and quality of each component individually, and also make recommendations for improvements to the overall unit.

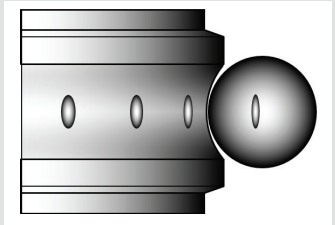


Anderon (Vibration) Competitor Test Results

After specifying the optimal ball bearing for a specific application, ensuring proper assembly can eliminate contamination or brinelling (permanent indentation) of the raceway which both cause excess vibration and noise.



Axial Brinell

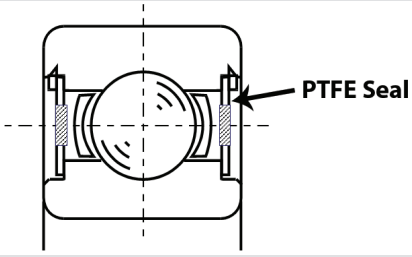


Radial Brinell

NMB bearings have been successful in reducing noise in medical devices such as respiratory equipment. Our ultra-quiet ball bearings achieve low vibration due to superior machining of the raceway finish and optimized fitting conditions.

Lubrication plays a key role in reducing noise as well – the ideal lubricant is formulated to be quiet, while also meeting the load requirements of the application.

In addition to lubrication, bearing enclosures such as shields and seals can help decrease vibration and noise by preventing ingress of foreign material. When debris gets inside a bearing and into the grease, the components constantly roll over that debris which can cause denting of the raceway. A low torque PTFE seal works well for respiratory applications to increase the protection from contamination.



Cross Section: Bearing with PTFE Seal

Through the practice of vertical integration, MinebeaMitsumi is able to control many of the variables in the manufacturing process, ensuring highly precise components with low tolerances. Our application engineers are able to provide guidance on correct handling and installation as well as mating component design, in order to reduce noise and other potential failures. Respiratory equipment manufacturers can rely on NMB to both specify the optimal bearing and recommend the proper installation in order to reduce vibration and noise.

NMB