General Kinematics VIBRA-DRUM®

General Kinematics’ VIBRA-DRUM® Sand and Casting Equipment has revolutionized high volume mold and sand handling for foundry applications. Proven in hundreds of applications around the world, this versatile Two-Mass system provides a shakeout system which prevents damage to castings, reduces sand lumps to grain size, and equalizes shakeout sand and casting temperatures — all in one continuous, energy-efficient operation.

The VIBRA-DRUM® delivers a high range of shakeout capacity from 30 TPH to 400 TPH, plus superior material motion for efficient sand and casting processing and achieves five key objectives:

1. Provides a gentle shakeout, gradually reducing surface defects from batter seen in other shakeout processes. This is accomplished by keeping the casting immersed in a bed of sand, never allowing the casting to drop thus eliminating impact between other castings or equipment surfaces.

2. Accomplishes a cooling environment. Achieved with evaporative cooling of moisture from the sand, and the conductive transfer of heat from the casting to the sand. Casting temperatures will be reduced to an average below 200°F (100°C).

3. Castings are cleaned in the VIBRA-DRUM® from the vibratory agitation of sand on the outer surface of the castings.

4. Sand lumps are broken down providing a homogenous mixture of sand. This is achieved through continuous agitation and drying of the sand from the transfer of heat from the casting to the sand.

The VIBRA-DRUM® is a natural dust containment system. The tubular body construction and non-rotating design allows cooling and evaporative air to be directed into the
material. Additionally this design is easier to feed and easier to unload. Designed with a rolled AR400 liner system, which is easy to inspect and replace if necessary. Lastly the drum design does not generate excessive casting noise as the parts are immersed in sand, preventing impact noise.

**Culmination of 50 Years in R&D**

The first VIBRA-DRUM® was installed in the 1980's and the design has been upgraded significantly over the last several decades. The original VIBRA-DRUM® units were designed as a shakeout style only. These were smaller units specifically used to break the sand lumps down. Generally, this took six to eight minutes of retention time in the drum body. After the realization of the casting cooling capabilities of the VIBRA-DRUM®, larger units were engineered that feature twelve to fifteen minutes retention time.

Other upgrades from the original 1980's design of the VIBRA-DRUM® design include:

- Motors mounted directly to the drum body, allowing the motors to stay aligned with any movement of the unit.
- Motors and belts are now independent of each other, no longer requiring timing belts or linkages between the drive shafts of the VIBRA-DRUM®.
- The VIBRA-DRUM® body and exciter construction has advanced with a new FEA stress analysis design to prevent any high stress concentration points.

With two key patents (5,591,074 and 6,237,749), the VIBRA-DRUM® is engineered around General Kinematics’ unique Two-Mass design. Two-Mass refers to a style of vibratory equipment where one mass (an exciter) is used to drive a second mass (drum body). The exciter mass typically contains a motor and is connected to a trough using a combination of springs. Combining the two masses and the springs, a responsive sub-resonant system is created which responds to changes in load. The unique Two-Mass sub-resonant tuned system only General Kinematics can engineer, means the VIBRA-DRUM® is designed to compensate for variations in load size and weight.

The natural frequency drums have few moving parts. Maintenance for the VIBRA-DRUM® is contained to bearing lubrication and monitoring of motor and drive components. The other key benefit of the Two-Mass VIBRA-DRUM® design is the dynamic balancing of the active drive side, preventing the transmittal of energy into foundations.
VIBRA-DRUM® In Process

World class installations around the world showcase the unique VIBRA-DRUM® process and capabilities this unit can offer. One such foundry is a producer of electric motors and motor housing components. Producing motors up to frame size 200, these castings are very fragile, getting chipped with the slightest impact. After testing many styles of Shakeout, from large Rotary Drums to flat deck shakeouts, they found the VIBRA-DRUM® to be the gentlest shakeout on the market.

General Kinematics designed the system so that the primary sand from the mold is blended with a recirculation sand system of up to 100%, thereby allowing the castings to tumble in an active, flowable bed of sand, preventing casting on casting damage. With this arrangement the sand to metal ratio in the VIBRA-DRUM® is 12:1 allowing castings to float within the bed of sand. This system also features a water addition system associated with the VIBRA-DRUM® which allows water volume to be added based on the part number. Castings discharge out of the VIBRA-DRUM® at 200-340° F (100 – 170° C) and move into a vibratory shakeout, then into a GK SPIRA-COOL® for elevation.

Another foundry, a producer of Ductile Iron Truck and Off-road components needed a shakeout system as a primary cooler. A large portion of this foundry’s production is differential/rear end housings. They selected the VIBRA-DRUM® as it was a versatile unit that would not damage castings. There is no water addition system provided in this VIBRA-DRUM®, thus the castings discharge out at 300-400° F (150-200° C). There is a secondary casting cooler located after the VIBRA-DRUM® to reduce the casting temperatures before continuous shot blast.

One foundry in Italy, a producer of Grey and Ductile Iron castings, needed a shakeout to handle very heavy section work with pour weights up to 700 lbs (320 kg). A large portion of their production is
gearboxes and cases. From prior experience with prevalent casting damage in a Rotary Drum, they chose the VIBRA-DRUM® for this installation as it would reduce heavy parts dropping and causing damage. In their system, the castings are discharged out of the VIBRA-DRUM® at 200-350° F (100-180° C) and there is a Shakeout and Sorting Table after the VIBRA-DRUM® which feeds directly into a continuous shot blast.

Lastly, a grey and ductile casting foundry in the oil industry installed a VIBRA-DRUM® to replace an existing competitive Media Drum. The customer was seeing upwards of 50% damage to their castings in their Rotary Drum, requiring them to remove castings prior to entering the drum. After installation of the VIBRA-DRUM® this customer was able to run all castings thru the unit. As they are a jobbing foundry, producing many types of castings from heavy pumps that have thick sections to large rangy parts that cannot take twisting or deformation, all these unique castings traverse the VIBRA-DRUM® without problems.

VIBRA-DRUM® In Conclusion

The General Kinematics VIBRA-DRUM® has revolutionized high volume mold and sand handling for world-class foundries around the world. GK continues to push the boundaries of physics and engineering with innovative designs and upgrades to do one thing: solve customer problems. Driven by our mission of customer satisfaction and high quality equipment is why today, installations of the VIBRA-DRUM® are still in operation for over twenty-five years.