

Vibratory Drums: Two-Mass vs. Brute Force Drives

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Vibrating drums are designed using two drive designs, direct drive and two-mass. General Kinematics has had decades of experience designing both types of drive configurations, and is the exclusive manufacturer of two-mass vibratory foundry drums under US patent #'s 4,960,162, RE33,542, 5,512,008, and 5,591,074. Experience has shown two-mass vibratory drums out perform direct drive designs in all sizes and applications. Please reference the following key points.

VIBRA-DRUM® Natural Frequency Drums

Two-Mass System: 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. When the two mass system operates, it requires much less horsepower and provides the ability for accurate unit stroke under varying material loads, versus a single mass (brute force) system which has a direct ratio of horsepower to material mass ratio. By applying this two-mass technique, the VIBRA-DRUM can be driven using significantly lower horsepower than brute force designs, reducing energy costs and horsepower requirements by a factor of up to 5.



- **Upset Conditions:** The two-mass sub-resonant tuned system of the VIBRA-DRUM is designed to compensate for variations in load size and weight.
- **Springs:** GK vibratory springs are designed for 24/7 continuous duty, and require little to no maintenance over the life of the machine. GK heavy-duty springs do not break or wear out under normal operation.
- **Parts:** The natural frequency drums have few moving parts. Maintenance is contained to bearing lubrication and monitoring of motor and drive components.
- **Drive Force:** Natural frequency vibration of the VIBRA-DRUM produces a beneficial drum-like rotary motion that quickly reduces sand lumps without casting damage. High frequency agitation efficiently reduces sand to original grain size. The tumbling action of the VIBRA-DRUM scrubs the casting surfaces without castings sustaining damage.

DIRECT DRIVE BARRELS

- **Direct Drive System:** Vibratory assemblies are attached to the side of the barrel of the drum and use rotating eccentric weights to drive the barrel. For smaller sized drums, vibratory motors can be directly attached to the drum. For larger capacity systems, an elaborate system of eccentric weights, drive shafts, and bearings must be used to generate enough force to move the assembly (see picture of competitive drive system).
- **Upset Conditions:** Unlike natural frequency drums, direct drive drums cannot automatically compensate for overload conditions without manual adjustment of the counterweight assemblies. When the direct drive drum exceeds its designed capacity, conveyance is lost and jamming occurs.
- **Parts/Drive Design:** Direct drive drums have significantly more moving parts to enable their operation, increasing maintenance costs and the chance for drive failure.
- **Drive Force:** Direct Drive drums convey product with a forward drive force which results in positive conveying action, but little tumbling action. This reduces the efficiency and effectiveness in cleaning of the castings.



While the principle behind both direct drive and two-mass vibrating drums are similar, the physics behind each are, as shown, completely different. General Kinematics has over 100 VIBRA-DRUM installations worldwide in many of the leading metal casting facilities, and is proud to offer you this information in helping you select the best solution for your process.