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**STM-SCREEN™** refers to a style of vibratory equipment where one mass (the exciter, i.e. “Drive”) is used to mobilize a second mass (the trough, i.e. “Screen Body”). The exciter mass is the total weight of the vibratory motor(s) plus the steel structure designed proportionally to the total trough weight in addition to the amount of the material load. The exciter mass is connected to the trough structure through a network of springs distributed evenly between the two. Connecting the two masses through the spring network creates a responsive sub-resonant system. This system responds to changes in load without dampening screen-

ing performance and efficiency. The STM-SCREEN™ is also much less costly to operate and maintain, as belts, large motors, and bearings are eliminated. The STM-SCREEN™ technology is scalable for maximum size and capacity. The STM-SCREEN™ can easily exceed 3000 tph without concentrated drive forces on the screen body or stress from resonant isolation frequencies. The screen is capable of reaching such high tonnages without negative affects due to the unique center spline and the modular design of the screen body.

The standard single mass screen as depicted by Figure 1 is generally recognized in the mining industry. It is characterized by the screen body – labeled as the single mass ( $m_T$ ) that is supported by isolation springs ( $K_{iso}$ ). The stroke needed to process material is obtained by incorporating large eccentric wheels and/or drive boxes ( $F_b$ ) directly mounted to the screen body via a drive tube. Less well known in the industry is the STM-SCREEN™ or sub-resonant screen as depicted in Figure 2. The body ( $m_T$ ) and isolations springs ( $K_{iso}$ ) are similar to their single mass counterpart. This design then incorporates a secondary mass ( $m_e$ ) and reactor spring system ( $K_r$ ) strategically designed to resonate at speeds near the running speed of the machine. Because of this resonance, the same stroke and process capacity is accomplished with smaller wheels and drive systems ( $F_2$ ). Many of the benefits of this design center around the lower driving forces and close proximity of the natural frequency to the running speed.

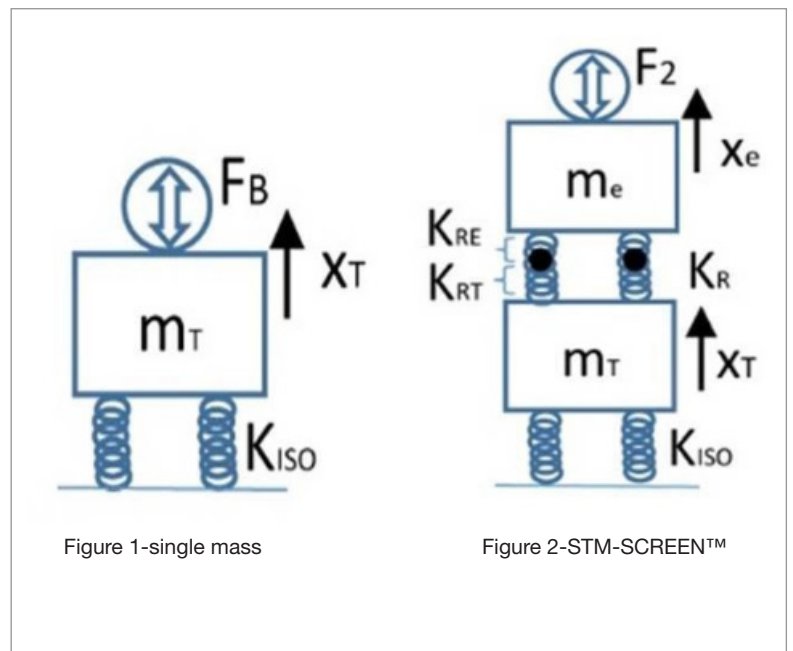
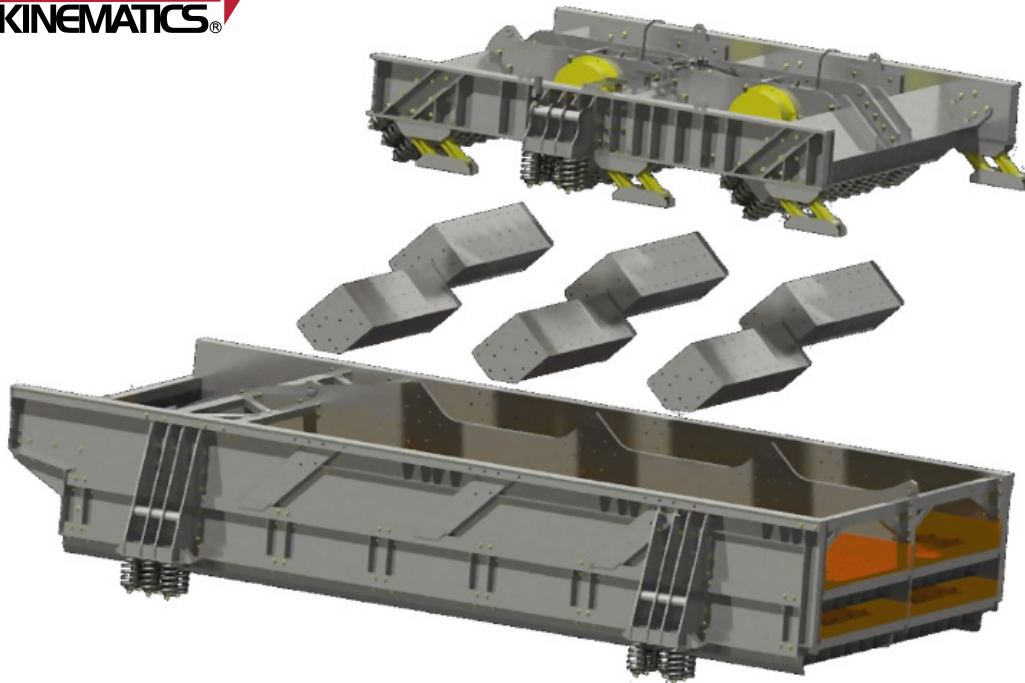


Figure 1-single mass

Figure 2-STM-SCREEN™



### STM-SCREEN™ DESIGN REVIEW:

In the model above, the top section is the drive mass of the STM-SCREEN™ that has two vibratory motors with yellow end caps. Below the drive mass are three cross member frames with springs attached. The lower section is the second mass, the STM-SCREEN™ body. The brackets in the center are part of the screen body but separated in the model to better demonstrate the uniqueness of the STM-SCREEN™ design.

**Starting at the top:** The vibratory motor HP, the weight of the fabricated structure, and number/ location of the springs are designed to drive the combined screen body weight and maximum material flow weight. The motor drive forces are amplified by the springs and spread evenly through multiple spring brackets to the screen body. Notice the center spine wall on the lower screen body. The STM-SCREEN™ has 6 drive brackets attached to 9 locations on the screen body, greatly reducing stress. Brute force

vibratory screens only have one drive bracket directing all forces at 2 locations on the screen body, one on each side bracket increasing stress levels. In comparison to brute force vibratory screens, the STM-SCREEN™ drive energy is evenly spread across the structure resulting in mostly blue coloring with a very little yellow, orange, and red stress levels. The center spine wall, with extensive cross member fastening to the sidewalls, greatly restricts any torsional moments inherent to brute force vibratory screens.

The STM-SCREEN™ vibratory motor HP requirements are typically 1/3rd that of brute force vibratory motors for equivalent screen capacities. In addition to the superior design benefits, dramatically increasing service life, the STM-SCREEN™ reduces energy and maintenance costs while increasing return on investment.

### BRUTE FORCE DESIGN REVIEW:

Brute force vibratory screens have stresses from the drive motors and/or shafts concentrated at one area on each sidewall of the screen body. These stresses increase as machine and drive motor sizes increase. Their screening action dampens as material load increases. The drive motor energy must handle the combined weight of the screen body and the material weight. As the size/capacity of a brute force vibratory screen increases so will the motor/drive size and screen structure. This further increases the stress concentrated on the sidewalls of brute force vibratory screens.

Studies demonstrate that brute force vibratory screens undergo tremendous stress as they go through resonant isolation frequency with every start and stop. Resonant isolation frequency is typically a low frequency which is excited when the motors ramp up in speed. Large brute force vibratory screens with large motors and eccentric weights take a longer time to ramp up to operating speed. Therefore, the larger the brute force vibratory screen, the greater the resulting stress from the resonant isolation frequency every time the machine is operated.