Novel type of tuned mass damper with inerter which enables changes of inertance

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We propose the novel type of tuned mass damper and investigate its properties. Characteristic feature of the device is that it contains a special type of inerter equipped with a continuously variable transmission and gear-ratio control system which enables stepless and accurate changes of inertance. We examine the damping properties of the proposed tuned mass damper with respect to one-degree-of-freedom harmonically forced oscillator. To prove the potential of introduced device we test its four different embodiments characterized by four different sets of parameters. We generalize our investigation and show that proposed device has broad spectrum of applications, we consider three different stiffness characteristics of damped structure i.e. linear, softening and hardening. We use the frequency response curves to present how considered devices influence the dynamics of analyzed systems and demonstrate their capabilities.