The classic design of a tuned mass absorber is based on a simple two-mass analogy in which the tuned mass is connected to the structural mass with a spring and a viscous damper. In a flexible multi-degree-of-freedom structure the tuned mass absorber is typically introduced to provide damping of a specific mode. The motion of the point of attachment of the tuned mass absorber to the structure has not only a contribution from the targeted mode, but also a background contribution from other non-resonant modes. Similarly, the force provided by the tuned mass absorber is distributed between the targeted mode and the background modes. It is demonstrated how this effect can be included via a non-dimensional dynamic background flexibility coefficient, extracted from a classic modal analysis for the particular frequency of the selected mode. An explicit calibration procedure is developed starting with the desired maximum amplification, from which the device damper, mass and stiffness are determined, accounting for the background flexibility. Examples demonstrate the influence of the flexibility effect and the efficiency of the proposed procedure.