

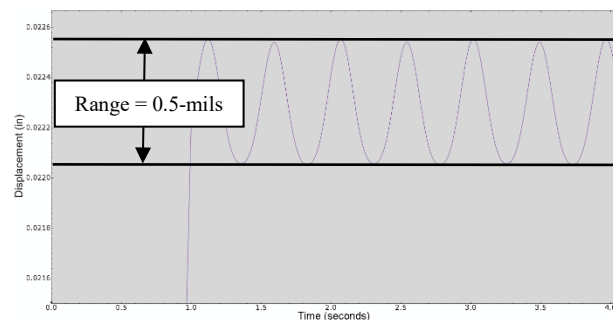
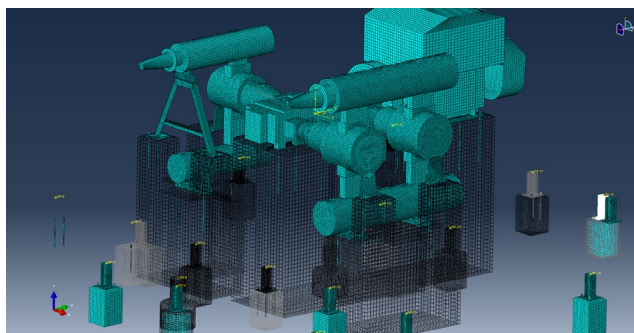
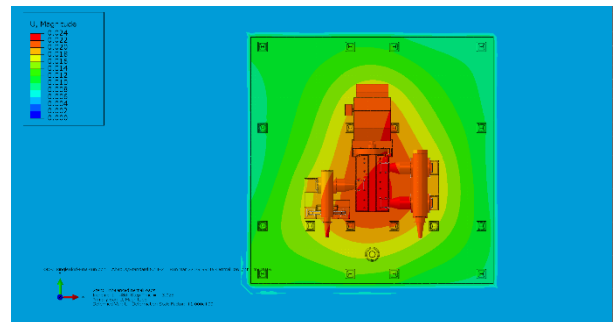
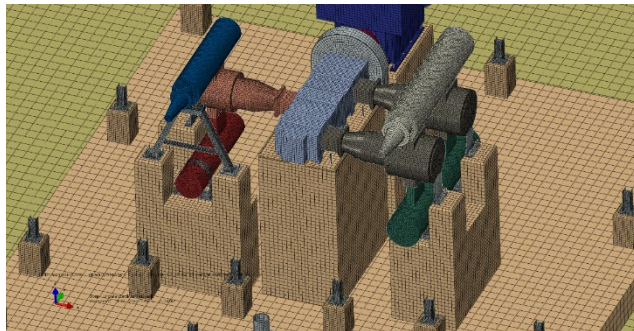
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Compressor Foundation Dynamic Analysis – Mechanical New Design Evaluation (Finite Element Analysis, Non-Linear Transient Vibration)

Project Description: Mechanical/pressure components were modeled approximately, each with individually assigned modified densities to produce exactly matching component weights. Pedestals and the mat were modeled, along with the underlying soil. Anchor bolts and rebar are modeled and embedded in the concrete. A soil report was used which provided modulus of elasticity as derived from the shear modulus and Poisson's ratio. Rayleigh damping was applied to the soil based on similar soil projects. The FEA model was analyzed using cycle-by-cycle analysis. Manufacturer provided unbalance inertia forces were applied over 20 cycles. Various locations were evaluated for peak-to-peak vibration, along with overall general deflections.

FEA Model and Results: The FEA model/mesh is shown in the images below to the left. Notice the detail of all rebar modeled and included in the concrete pedestals as embedded constraints. Displacement overview and one vibration plot is shown below on the right. The worst-case peak-to-peak vibration magnitude was below manufacturer design limits. The design was indicated to be acceptable; however, recommendation was offered to increase the cylinder head supports based on results and experience of cracking of the cylinder at the discharge valve port of similar equipment.



All rebar modeled uses embedded constraints in the concrete pedestals.