**Introduction:**
In transmissions the drive torque is transferred through a set of planetary gears that provide the required torque to the output. The gear shifts are usually controlled by activating different combinations of clutches within a power transmission. These mechanisms are conventionally actuated with a hydraulic system. This system has inherent drawbacks such as head losses due to fluid flow in hydraulic channels, leakage, and the need to continuously supply pressure to the clutch pack, thereby generating energy sinks in the power train. An electromechanical actuation system eliminates the need for hydraulic clutch actuation, thus improving the power flow.

**Objective:**
To improve the efficiency of a power transmission by replacing the hydraulic clutch actuation system with an electromechanical mechanism.

**Method:**
The electromechanical clutch (EMC) uses a power screw to convert torque supplied from an electric motor to compress a set of clutch disks. After the clutch pack is compressed, a pawl and ratchet mechanism locks the screw in place and the electric power can then be cut from the motor. For clutch disengagement the pawl is removed, the motor applies torque in the opposite direction and compression springs push the apply plate away from the clutch disks.

**Apply Plate:**
This component transmits the axial load coming from the screw to the clutch disks. It was a critical component in the assembly and was designed to withstand a distributed force of 8.8kN. Fourth and eighth order Lamé curves were used to round sharp edges. Their smoothness and continuity properties helped reduce the maximum stresses in critical regions of the component.

**FEA Analysis:**
A comprehensive FEA structural analysis was performed for every component of the assembly to be machined. Then, based on maximum stress and deflection results, materials were chosen to have a minimum safety factor of 2 with respect to their respective yield strengths.

**Next Steps:**
- CNC Machining of components.
- Complete assembly of the testbed.
- Motor and servo tuning and control.
- Load Cell calibration.
- Lead-screw variant implementation.

**Testbed:**
The purpose of the EMC testbed is to measure the axial force transmitted from the ball-screw assembly to the clutch pack as well as to experiment with the control and input from the actuators.

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