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Breaking operations of a vacuum test interrupter setup using a common servo drive with belt transmission

Abstract-- For interruption operations at higher voltage levels sulfur hexafluoride (SF_6) is the dominating insulation and interruption medium. In medium to high voltage levels vacuum has advantages compared to SF_6 . In order to expand the operation voltage levels of vacuum circuit breakers (VCB) two approaches are possible. The first is the enlargement of the single contact gap and second is the series arrangement. In both cases the Time-Distance-Curve of the contact travel is one factor that influences the interruption performance of VCBs. The usage of a single gap for higher voltage levels requires an increased contact distance. In dependence of different interruption operations, like short circuit- or capacitive interruption, a controlled Time-Distance-Curve could be useful. For experimental investigations a vacuum single break test setup using a brushless servo motor with a frequency converter is built. The electrical control of the drive enables parameter variations of the Time-Distance-Curve. The velocity, acceleration, deceleration and final contact gap can be adjusted as required for testing and later in field application. For fine control a mechanical simulation considering the regulation loop between frequency converter and drive as well as the mechanical components is employed. Finally, tests of the setup for interruption operations are presented.

Index Terms-- Belt drive, Breaking, Double contact break, Servo drive, Vacuum circuit breaker