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Offering of fly wheel solutions to increase the inertia of synchronous condensers has been an interesting case to support higher inertia values.

By adding fly wheels to synchronous generators or synchronous condensers special focus shall be given to possible impacts during emergency or failure situations, i.e.

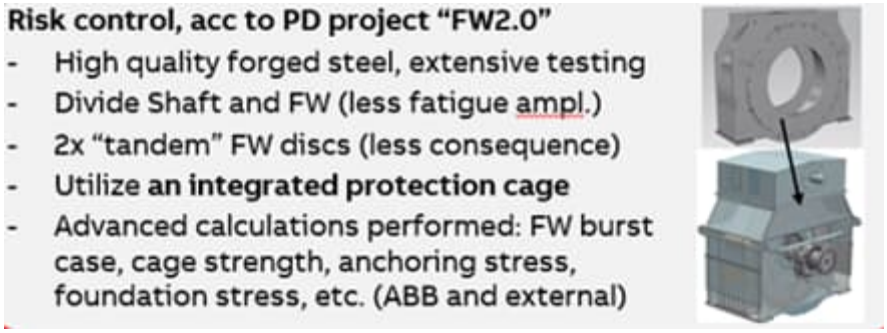
Mechanical damage fly wheel
During ABB´s R&D work detailed investigations were made.

Case: Mechanical damage fly wheel

ABB´s synchronous condenser with fly wheel includes high inertia (more than 465MWs), this is a big amount of energy stored.
Risk assessment was performed as per Machinery Directive, potential catastrophic failures were also considered.
Two main risks were identified in the risk assessment (reviewed by WSP):

1 Loose rotor event
2 Burst of fly wheel

Load cases:
Case 1: Heavy bump case (regardless enclosure or cage)
Case 2: Disc failure and create a missile



Even so the risk occasion for the two cases is very low, the consequences of a failure can be catastrophic.
As a result of the risk assessment ABB integrated a protection cage for the fly wheel, which protects against the two identified risks.