The cost of failure

Substations are key elements in power systems and consequently, the financial impacts of any failure or outage can easily exceed their actual asset value. By choosing the most appropriate maintenance strategy, the financial risks can be minimized. The challenge lies in implementing the right action at the right time. Hence, maintenance managers are moving from traditional time-based maintenance (TBM) to condition-based maintenance (CBM) or even reliability-centered maintenance (RCM). This implies that maintenance is no longer based on a rigid timeframe derived from past observations and experience, but instead takes into account the actual condition of the equipment and the level of reliability required to fulfill its function.

ABB offers all of these maintenance strategies for substations:

**Time based maintenance (TBM)** – Periodic maintenance to ensure high availability and reliability of equipment. This may include provision of wear and tear parts, consumables and replacement of components or systems at the end of their service life.

**Condition based maintenance (CBM)** – Checking and maintaining of components according to a schedule based on the condition of the equipment. Prerequisite is a detailed assessment of the installed equipment.
Reliability centered maintenance (RCM) – This includes the evaluation of the consequences of a failure and ensures the right amount of maintenance for the right equipment at the right time.

Setting up a reliability-centered maintenance strategy entails the following steps:

1. Detailed analysis of the operational needs
   In order to perform RCM efficiently, it is essential to analyze the following aspects – record of malfunctions, ABB operational experience regarding the installed equipment, operational procedures, technical competencies of the operation and maintenance personnel, and current maintenance plans.

2. Substation assessment
   The RCM strategy focuses on performing the right actions on the right equipment – ie, only carrying out necessary measures based on the careful prior assessment of the condition and importance of each component and evaluation of the consequences of its failure. Our global experience and know-how enable us to precisely identify the risks related to each substation component.

3. Definition of the required maintenance actions
   Following the thorough assessment of the substation systems and components, ABB can provide recommendations for the maintenance actions required for each specific component to ensure the highest level of reliability.

4. Performance of recommended maintenance actions
   The maintenance actions scheduled according to a reliability strategy should always be revised to take into account any additional information provided by advanced diagnosis methods as well as any possible evolution of the equipment’s condition.

RCM offers various benefits including
- Reduced scheduled maintenance down time
- Enhanced reliability and prolonged service life of substation assets
- Optimized benefits from maintenance investments
- Effective risk evaluation supporting decision-making on the timing of investments in new equipment or retrofits
- Dependable equipment operation in critical conditions

Conclusion
Comprehensive domain know-how and experience enables ABB to offer maintenance contracts and perform service operations efficiently. These ensure prolonged service life and high productivity of substation assets while minimizing risks.