SATA III SSDs for industrial automation

This article describes the requirements for mass storage devices used in industrial environments like Industry 4.0 and the emerging Internet of Things.

■ Through the recently launched SATA III series (2.5" SSD, M.2, mSATA, SlimSATA and CFast), ATP initiates the concept of Synergy 1+1 > 2 to bring out the Preventing, Reporting and Analyzing mechanism by integrating hardware, firmware and software for mission-critical industrial applications. As a result, the all-inclusive solution to power loss/failure protection, data integrity, health status management and long term reliability is the key to sustainable network operations.

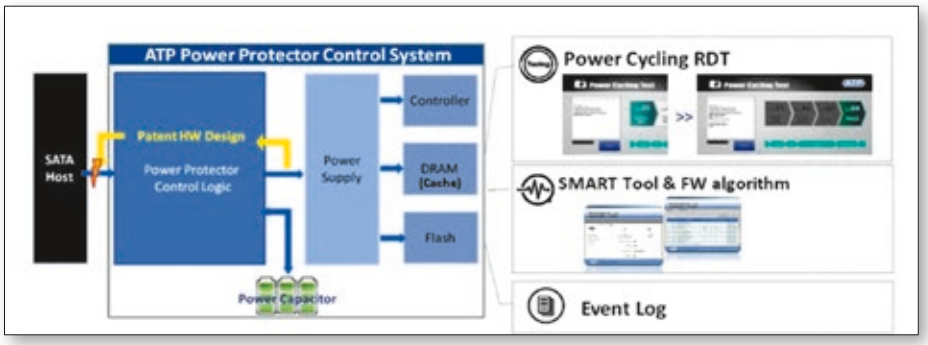
Uninterrupted and sustainable performance is typically imperative for the network of control systems and manufacturing-related instruments for automation application. The entire Power Protector Control System (figure1) with integrated supporting features in ATP SATA III drives, comprising a patented hardware design, special firmware and customized software (Event Log and S.M.A.R.T. Tool), is designed to supply sufficient power for the coverage (controller/DRAM/flash) and to ensure stable power condition. Proactively monitoring capacitor health and functionality could avoid the risk of a malfunction condition affecting the entire operation of the Power Protector Control System. The capacitor-charging identification mechanism explains the process and the corresponding measures taken once capacitor charging fails during power-on and during operation.

ATP adopts Power Cycling RDT with test pattern and event log features to identify root causes and to fine-tune for reliability of the whole Power Protector Control System. In addition, with the advantage of analysis capability by recording abnormal events (e.g. unstable power signal, high/low temperature operation, firmware update failure, etc), it is able to trace and investigate real issues and problems.

Industrial applications in automation industry demand both read and write-intensive optimization to achieve above-average reliability and endurance. Decreasing the possibility of flash storage life deterioration is key to sophisticated data management and preservation. S.M.A.R.T. Tool combined with a proprietary firmware algorithm can alert with an early warning to prevent wear-out and spare block exhaustion. To satisfy diverse real-world applications, ATP SATA III products undergo a comprehensive portfolio of simulation tests to optimize efficiency and reliability. Furthermore, S.M.A.R.T. Tool supports a variety of operating systems including Windows and Linux.

Comprehensive services, stability, and accredited product quality are all fundamental to the high level of reliability and long-term product life cycle required by the automation industry. One challenge of industrial automation applications is frequent small-file (e.g. log file) write operations accessed randomly resulting in high write amplification. Consequently, the endurance and service life of memory is negatively impacted. To solve this problem, optimization of the workload is the answer. ATP SATA III drives provide a variety of over-provisioning percentages. Higher over-provisioning allows random write operations to perform effectively and improves write amplification. Furthermore, the company evaluates WAF & DWPD (Drive-Writes-Per-Day) to simulate product life according to customer-specific workload requirements. Total Cost of Ownership (TCO) consists of the costs of product validation, field return, and replacement. The SATA III products of the company pass extensive validation processes (e.g. compatibility/function tests with customers' host systems and industry standard) for reliability in harsh outdoor environments.

To successfully sustain operations in integrated networks across the automation industry, solutions to various use cases have to comply with existing and potential challenges. The goal of ATP's SATA III SSDs feature set is not just to supplement existing industrial automation requirements, but to achieve Synergy with the Preventing, Reporting and Analyzing mechanisms of Industry 4.0. In addition, the technology and customized testing criteria of the company guarantee outstanding performance and longevity and underpin optimal solutions for mission-critical applications moving forward. ■



ATP Power Protector Control System