A NEW APPROACH TO STRUCTURAL HEALTH MONITORING

By Luke Carothers

ONE OF THE MOST FREQUENT TOPICS of conversation in the AEC industry is the collection and analysis of structural data. Engineers rely on a wide range of sensors to give them critical information about the performance of structures. When it comes to structural health monitoring, sensors show how forces such as strain are affecting a structure over time. The ability to collect reliable data has become critical to the work of engineers.

One of the companies with a long established tradition of working towards these ends is Phase IV Engineering. Scott Dalgleish is the CEO of Phase IV Engineering, which has been a pioneer in wireless sensor design and manufacturing for the last 30 years. Dalgleish has a strong background in engineering. After graduating with his degree in Mechanical Engineering, he spent the next 35 years working in different capacities in the engineering industry. Dalgleish's first job after graduating was on the manufacturing side, working for Procter & Gamble before moving to work for a robotics start up company. This robotics company designed and sold their own electrical and mechanical equipment.

When Dalgleish joined Phase IV Engineering 13 years ago, he says their primary focus was contract engineering work in the area of wireless sensing. Much of this work involved doing unique wireless sensing projects then passing them off to the customer. However, Dalgleish's background on the manufacturing side led him to the conclusion that Phase IV should be manufacturing their own products. To this end, Phase IV focused on structural and industrial health monitoring products.

Part of the decision to focus on structural health monitoring comes from the difficulties inherent to wirelessly monitoring structures. Not only do Dalgleish and his team "love the challenge" of developing sensors for structural health monitoring, but there is evidently a viable market for embracing the difficulty of developing this equipment. According to Dalgleish, many companies shy away from developing these sensors because of the difficulty. By leveraging the unique skill sets of their design team and embracing the challenge of a difficult problem, Phase IV has gained a bigger and bigger place in the AEC industry.

Phase IV was also spurred into structural health monitoring through interactions with customers. When Dalgleish first joined the company, he handled much of the technical and application engineering sales. This meant that he has had a lot of experience talking to customers about what they need and want in a product. One of the primary sectors that had needs and wants unmet was Civil and Structural Engineering. One of the first responses to these industry needs was the Leap Product Line.

The Leap is a wireless sensor system, and development began on the product around 3 years ago. There are a few reasons why the Leap system is unique, but chief among these is its modular design. Unlike other wireless sensors, almost every feature of the sensor is modular including the closure, electronics, firmware, software, user interface, and connection to their software. This system of design comes from Dalgleish's drive to give each customer exactly what they need. During his time talking to customers in the industrial and civil engineering sectors, products would be almost what was specified, but not quite. By building a product with a modular design, Dalgleish knew that individual components of the sensor could be switched out to make the product exactly what the customer needed for a specific project. Instead of completely engineering a sensor to meet the customer's needs, the Leap allows for smaller modifications that take only a few days.

While the Leap Sensor certainly isn't the only wireless sensor on the market, Dalgleish believes it has several features that set it apart and make it unique in the civil engineering market space. For example, Leap can interface with several "difficult types of sensors" such as full bridge strain sensors. Despite being one of the most widely used sensors in the civil engineering sector, it can still be difficult to gather valid strain data because of the relatively low output from the sensors. To account for this, the Leap is designed with a high precision strain input. However, the Leap is not just limited to strain data input. According to Dalgleish, it can be interfaced with any sensor a civil engineer would need to complete their job. It is this broad range of capabilities that set the Leap System apart from other sensors in the market.

The Leap Wireless Sensor System represents a paradigm shift towards a modular and truly wireless future. The system's unique features make it a valuable tool for not only engineers, but also for professionals working in the industrial sector. By coupling this modular design with a high-life battery system, the Leap Wireless Sensor system seems capable of helping tackle the many challenges of the AEC industry's future.

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