

Automated Out-Time Monitoring of TATS Materials

Industry Challenge

Carbon fiber prepreg manufacturers, composite processors, Original Equipment Manufacturers (OEMs), and any user of time and temperature sensitive (TATS) materials are audited by regulatory bodies, such as the Federal Aviation Administration (FAA), and OEMs, like Boeing, Airbus and Lockheed. Manufacturers and processors reference industry procedural and quality documents to establish methods of monitoring temperature and out-time of TATS materials. Control from fabrication through final manufacturing is required to ensure material is acceptable to use. Common technology used for traceability of environmental temperature conditions, are circular chart recorders and electronic data loggers. The drawback of these kinds of devices is that they require manual labor to collect, download, calculate and archive data, leaving room for human error. Records also need to be readily accessible for audits and inspections.

Introduction

This solution brief provides information and guidance concerning out-time monitoring of TATS materials during storage, it can be applicable to rolls of prepreg, carbon filers, fiberglass, Kevlar, potting materials, sealants, and a variety of other TATS materials manufactured for use in the aerospace, automotive, sporting goods, and wind energy industries.

Out-time is the amount of time TATS material can be at room temperature and still be useable without risking structural integrity of finished products. Allowable limits can range from a few minutes to 30 days or more. Whenever material is removed from cold storage, the out-time clock begins ticking. If the material is not completely used, it is returned to storage. A log must be kept for each unit (e.g. a roll), to reflect the total time it is exposed to envi-

ronments above the recommended storage temperature. Current industry practice is to manually calculate out-time using a paper log or chart for each unit or roll. Every time material comes out of cold storage, an employee must write down the total time it was out, then calculate remaining shelf life. Some manufacturers may have as many as 500 rolls of TATS material on hand, so manual calculation becomes a labor intensive, complex process. In addition, once a roll of material is shipped or depleted in process, its record must remain on file at the facility for audit purposes.



The Product

Composites are engineered materials made by combining two or more elements. For example: fiber-reinforced polymers are made from fibers (carbon, glass, Kevlar, etc.) and a polymer/plastic, such as epoxy. Resins or epoxies are used to bond the fibers together at a microscopic level, in order to achieve unique properties. When combined, it produces a very strong, but extremely light material. Rolls of prepreg fabric must be stored at or below 0°C (32°F) because resins begin to cure and

harden as temperature increases. The fibers are used in textiles, woven goods (i.e. plain weave fabrics) or in unidirectional products, such as tape.

Industries using prepreg materials call for strict adherence to engineering requirements, which involves stringent tracking, recording, and processing of the materials to ensure finished parts are defect-free. To meet demand, remain competitive, save time and costs, prepreg manufacturers must streamline storage, processing, and shipping within required temperature ranges.

OEMs, such as Boeing and Airbus, pass on their process standards to prepreg suppliers to ensure materials are delivered

according to quality specifications for their industry. An OEM also requires the prepreg supplier to show records confirming the product has been kept within their set parameters. Auditable documentation must detail total out-time, from fabrication until it is received by the OEM.

Manual Tracking

At the manufacturer's facility, prepreg rolls are typically kept at 0°C (32°F) in temperature controlled storage rooms. When an order is received, it may be for all or only a portion of a roll. The manufacturer must remove product from storage, cut the roll as needed, and return remaining product to storage. While the roll is out it is exposed to room temperature, causing progressive chemical transformation of the resin, which reduces shelf life. If the roll is continually exposed to room temperature, the manufacturer must eventually scrap the remaining product or spend considerable time retesting it to establish if there is additional shelf life. Careful tracking and recording of cumulative time out of 0°C (32°F) storage becomes a critical issue.

Automating Out-Time Monitoring

Out-time monitoring is usually a manual process, using a paper log and calculator. When prepreg materials come off the production line, they are assigned a tracking number. As it enters storage, time is noted on a chart and subsequently recorded each time the roll is moved in and out of storage, a calculator is used to determine remaining shelf life. This process can be extremely labor and time-intensive. Other problems inherent in this process

are human error, lost paperwork, and lack of traceability. Prepreg manufacturers and users can reduce losses and improve accuracy with an automated, traceable, error-free way to document out-time data.

FlashTrak Telematics® Out-Time Solution

DeltaTrak has streamlined TATS monitoring with FlashTrak Telematics Out-Time Solution. Implementing this system reduces the amount of materials that have to be scrapped due to expired shelf life, and it saves time and labor by automatically tracking cumulative time that TATS



materials are kept outside of cold storage. The FlashTrak Telematics wireless system monitors materials from fabrication to shipment and can also be used in facilities where custom products, kits and parts are manufactured.

When a roll of prepreg comes out of production, an electronic RFID tag is attached to it and the identification number of the roll is associated with the serial number of that RFID tag, which is then entered into a secure account on ColdTrak Data Central,

DeltaTrak's cloud-based service. The tag is a data logger that monitors temperature and time spent outside the user set thresholds. An RFID reader sends the data to ColdTrak via wireless network, and remaining shelf life is automatically calculated based on cumulative time a roll is out of cold storage. Two alarm thresholds can be set to let users know when a roll is getting close to end-of-life, and alerts are sent from ColdTrak via email, SMS text and voicemail.

Management has visibility and traceability of products at all times, for quality control, regulatory compliance and audits. Data is collected and stored 24/7 for each unit or roll of TATS material, and easily accessed remotely from ColdTrak, where remaining shelf life is viewed either in days, hours, and minutes, or by a percentage. Personnel can use this information to more effectively manage inventory based on calculated shelf life, rather than a manual monitoring system which can be prone to inadvertent errors

Conclusion

Any manufacturer or user of TATS materials would benefit from a

wireless tracking system with automated record keeping to document that industry standards are being met. Accurately calculating remaining shelf life saves hundreds of thousands of dollars of costly material from being scrapped. Furthermore, it eliminates the need for manual tracking on paper, which is labor intensive, prone to human error and loss of data. FlashTrak Telematics Out-Time Solution provides records for traceability and to ensure the quality and structural integrity of finished carbon fiber products..

DeltaTrak® is a leading innovator of cold chain management, environment monitoring and food safety solutions for the food, pharmaceutical, life sciences and chemical industries. Contact DeltaTrak by phone at 1-800-962-6776 or by email at marketing@deltatrak.com. Additional information can be found at www.deltatrak.com.

