DOWNLOAD PDF GLASS FIBERBOARD, SRM 1450C, FOR THERMAL RESISTANCE FROM 280 K TO 340 K

Chapter 1 : How To Build a School in 30 Days! by Sally Lamie - Issuu

thermalresistanceforSRMc,FibrousGlassBoard. The measurementshavebeenconducted in accordancewith a randomized full factorial experimental design withtwo variables, bulk density and.

X 3 X 3 For defects that open to the surface For thin structure 3 plies or less The procedures for this type of inspection are being developed This procedure is not recommended Figure Comparison of NDI testing equipment. Hand tools for laminating. Air tools used for composite repair. Air Tools Support Tooling and Molds Air-driven power tools, such as drill motors, routers, and grinders, are used for composite materials. Electric motors are not recommended, because carbon is a conductive material that can cause an electrical short circuit. If electric tools are used, they need to be of the totally enclosed type. A variety of materials can be used to manufacture these tools. The type of material depends on the type of repair, cure temperature, and whether it is a temporary or permanent tool. Support tooling is necessary for oven and autoclave cure due to the high cure temperature. The parts deform if support tooling is not used. There are many types of tooling material available. Some are molded to a specific part contour and others are used as rigid supports to maintain the contour during cure. Plaster is an inexpensive and easy material for contour tooling. It can be filled with fiberglass, hemp, or other material. Plaster is not very durable, but can be used for temporary tools. Often, a layer of fiberglass-reinforced epoxy is placed on the tool side surface to improve the finish quality. Tooling resins are used Caul Plate A caul plate made from aluminum is often used to support the part during the cure cycle. A mold release agent, or parting film, is applied to the caul plate so that the part does not attach to the caul plate. A thin caul plate is also used on top of the repair when a heat bonder is used. The caul plate provides a more uniform heated area and it leaves a smoother finish of the composite laminate. Complex parts are made from metal or high-temperature tooling boards that are machined with 5-axis CNC equipment to make master tools that can be used to fabricate aircraft parts. Excess resin is collected in the bleeder. The structural repair manual SRM indicates what type and how many plies of bleeder are required. As a general rule, the thicker the laminate, the more bleeder plies are required. Peel Ply Figure Five-axis CNC equipment for tool and mold making. Peel plies are often used to create a clean surface for bonding purposes. A thin layer of fiberglass is cured with the repair part. Just before the part is bonded to another structure, the peel ply is removed. The peel ply is easy to remove and leaves a clean surface for bonding. Peel plies are manufactured from polyester, nylon, flouronated ethylene propylene FEP , or coated fiberglass. They can be difficult to remove if overheated. Some coated peel plies can leave an undesirable contamination on the surface. The preferred peel ply material is polyester that has been heat-set to eliminate shrinkage. Layup Tapes Vacuum bag sealing tape, also called sticky tape, is used to seal the vacuum bag to the part or tool. Always check the temperature rating of the tape before use to ensure that you use appropriately rated tape. Perforated Release Film Perforated parting film is used to allow air and volatiles out of the repair, and it prevents the bleeder ply from sticking to the part or repair. It is available with different size holes and hole spacing depending on the amount of bleeding required. Solid Release Film Figure A mold of an inlet duct. Vacuum Bag Materials Repairs of composite aircraft components are often performed with a technique known as vacuum bagging. A plastic bag is sealed around the repair area. Air is then removed from the bag, which allows repair plies to be drawn together with no air trapped in between. Atmospheric pressure bears on the repair and a strong, secure bond is created. Several processing materials are used for vacuum bagging a part. These materials do not become part of the repair and are discarded after the repair process. Release Agents Release agents, also called mold release agents, are used so that the part comes off the tool or caul plate easily after curing. Solid release films are used so that the prepreg or wet layup plies do not stick to the working surface or caul plate. Solid release film is also used to prevent the resins from bleeding through and damaging the heat blanket or caul plate if they are used. Breather Material The breather material is used to provide a path for air to get out of the vacuum bag. The breather must contact the bleeder. Typically, polyester is used in either 4-ounce or ounce

weights. Vacuum Bag The vacuum bag material provides a tough layer between the repair and the atmosphere. The vacuum bag material is available in different temperature ratings, so make sure that the material used for the repair can handle the cure temperature. Most vacuum bag materials are one time use, but material made from flexible silicon rubber is reusable. Two small cuts are made in the bagging material so that the vacuum probe valve can be installed. The vacuum bag is not very flexible and plies need to be made in the bag if complex shapes are to be bagged. Sometimes, an envelope type bag is used, but the disadvantage of this method is that the vacuum pressure might crush the part. Reusable bags made from silicon rubber are available that are more flexible. Some have a built-in heater blanket that simplifies the bagging task. Self-sealing vacuum bag with heater element. Vacuum Equipment A vacuum pump is used to evacuate air and volatiles from the vacuum bag so that atmospheric pressure consolidates the plies. A dedicated vacuum pump is used in a repair shop. For repairs on the aircraft, a mobile vacuum pump could be used. Most heat bonders have a built-in vacuum pump. Special air hoses are used as vacuum lines, because regular air hoses might collapse when a vacuum is applied. The vacuum lines that are used in the oven or autoclave need to be able to withstand the high temperatures in the heating device. A vacuum pressure regulator is sometimes used to lower the vacuum pressure during the bagging process. Vacuum Compaction Table Figure A vacuum compaction table is a convenient tool for debulking composite layups with multiple plies. Essentially a reusable vacuum bag, a compaction table consists of a metal table surface with a hinged cover. The cover includes a solid frame, a flexible membrane, and a vacuum seal. Repair plies are laid up on the table surface and sealed beneath the cover with vacuum to remove entrapped air. Some compaction tables are heated but most are not. Heat Sources Oven Composite materials can be cured in ovens using various pressure application methods. Another method of pressure application for oven cures is the use of shrink wrapping or shrink tape. The oven uses heated air circulated at high speed to cure the material system. Ovens have a temperature sensor to feed temperature data back to the oven controller. The oven temperature can differ from the actual part temperature depending upon the location of the oven sensor and the location of the part in the oven. The thermal mass of the part in the oven is generally greater Figure Bagging of complex part. The major elements of an autoclave system are a vessel to contain pressure, sources to heat the gas stream and circulate it uniformly within the vessel, a subsystem to apply vacuum to parts covered by a vacuum bag, a subsystem to control operating parameters, and a subsystem to load the molds into the autoclave. Modern autoclaves are computer controlled and the operator can write and monitor all types of cure cycle programs. The most accurate way to control the cure cycle is to control the autoclave controller with thermocouples that are placed on the actual part. To deal with these differences, at least two thermocouples must be placed on the part and connected to a temperature-sensing device separate chart recorder, hot bonder, etc. Some oven controllers can be controlled by thermocouples placed on the repair part. Autoclave An autoclave system allows a complex chemical reaction to occur inside a pressure vessel according to a specified time, temperature, and pressure profile in order to process a variety of materials. The bag allows the part to be subjected to differential pressure in the autoclave without being directly exposed to the autoclave atmosphere. The vacuum bag is also used to apply varying levels of vacuum to the part. Heat Bonder and Heat Lamps Typical on-aircraft heating methods include electrical resistance heat blankets, infrared heat lamps, and hot air devices. All heating devices must be controlled by some means so that the correct amount of heat can be applied. This is particularly important for repairs using prepreg material and adhesives, because controlled heating and cooling rates are usually prescribed. Heat bonders also have a vacuum pump that supplies and monitors the vacuum in the vacuum bag. The heat bonder controls the cure cycle with thermocouples that are placed near the repair. Some repairs require up to 10 thermocouples. Modern heat bonders can run many different types of cure programs and cure cycle data can be printed out or uploaded to a computer. It is also difficult to control the heat applied with a lamp, and lamps tend to generate high-surface temperatures quickly. If controlled by thermostats, heat lamps can be useful in applying curing heat to large or irregular surfaces.

DOWNLOAD PDF GLASS FIBERBOARD, SRM 1450C, FOR THERMAL RESISTANCE FROM 280 K TO 340 K

Chapter 2 : Chapter 7: Advanced Composite Material - FAA by Editor, Patrick Panzera - Issuu

Add tags for "Glass fiberboard, SRM c, for thermal resistance from K to K". Be the first.

The papers are in the public domain and are not subject to copyright in the United States. Articles from J Res may contain photographs or illustrations copyrighted by other commercial organizations or individuals that may not be used without obtaining prior approval from the holder of the copyright. The uncertainties are reported in a format consistent with current NIST policy on the expression of measurement uncertainty. The report describes a procedure for determination of component uncertainties for thermal conductivity and thermal resistance for the apparatus under operation in either the double-sided or single-sided mode of operation. An extensive example for computation of uncertainties for the single-sided mode of operation is provided for a low-density fibrous-glass blanket thermal insulation. Although these uncertainties have been developed for a particular insulation material, the procedure and, to a lesser extent, the results are applicable to other insulation materials measured at a mean temperature close to K The analysis identifies dominant components of uncertainty and, thus, potential areas for future improvement in the measurement process. For the NIST mm Guarded-Hot-Plate apparatus, considerable improvement, especially at higher values of thermal resistance, may be realized by developing better control strategies for guarding that include better measurement techniques for the guard gap thermopile voltage and the temperature sensors. Introduction In October , NIST officially adopted a new policy [1] for the expression of measurement uncertainty consistent with international practices. The uncertainty assessment presented herein elaborates on a previous effort [3] presented in for the production of NIST Standard Reference Material SRM c and supersedes the previous error analysis prepared by Rennex in [4]. Technical details of the apparatus design and fabrication have been described previously [5 â€” 6] and, therefore, are only briefly presented here. Essentially, the method establishes steady-state heat flow through flat homogeneous slabsâ€”the surfaces of which are in contact with adjoining parallel boundaries i. The method is considered an absolute measurement procedure because the resulting heat transmission coefficients are directly determined. That is, the test results are not determined by ratio of quantities. In principle, the method can be used over a range of temperatures but, in this report, the mean temperature is limited primarily to K This report discusses the measurement principle and presents a procedure for the assessment of uncertainties for a particular lot of low-density fibrous-glass thermal insulation maintained by the NIST Building and Fire Research Laboratory BFRL. Reference Material The reference material of interest in this report is a low-density fibrous-glass blanket having a nominal bulk density of 9. The material lots were manufactured in July in the form of large sheets 1. Recently, however, in order to satisfy more stringent energy efficiency requirements mandated in U. In accordance with test guidelines in the R-value Rule, measurements for customers are usually conducted at a mean temperature of K and a temperature difference of either