Manufacturing & Prototyping

Antimicrobial-Coated Granules for Disinfecting Water

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Methods of preparing antimicrobial-coated granules for disinfecting flowing potable water have been developed. Like the methods reported in the immediately preceding article, these methods involve chemical preparation of substrate surfaces (in this case, the surfaces of granules) to enable attachment of antimicrobial molecules to the surfaces via covalent bonds. A variety of granular materials have been coated with a variety of antimicrobial agents that include antibiotics, bacteriocins, enzymes, bactericides, and fungicides. When employed in packed beds in flowing water, these antimicrobial-coated granules have been proven effective against gram-positive bacteria, gram-negative bacteria, fungi, and viruses. Composite beds, consisting of multiple layers containing different granular antimicrobial media, have proven particularly effective against a broad spectrum of microorganisms. These media have also proven effective in enhancing or potentiating the biocidal effects of in-line iodinated resins and of very low levels of dissolved elemental iodine.

This work was done by James R. Akse, John T. Holtsnider, and Helen Kliestik of Umpqua Research Co. for Johnson Space Center. Further information is contained in a TSP (see page 1). *MSC-23468-1*

Range 7 Scanner Integration With PaR Robot Scanning System

Models of complex objects can be developed even if the objects are large and featureless.

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An interface bracket and coordinate transformation matrices were designed to allow the Range 7 scanner to be mounted on the PaR Robot detector arm for scanning the heat shield or other object placed in the test cell. A process was designed for using Rapid Form XOR to stitch data from multiple scans together to provide an accurate 3D model of the object scanned.

An accurate model was required for the design and verification of an existing heat shield. The large physical size and complex shape of the heat shield does not allow for direct measurement of certain features in relation to other features. Any imaging devices capable of imaging the entire heat shield in its entirety suffers a reduced resolution and cannot image sections that are blocked from view. Prior methods involved tools such as commercial measurement arms, taking images with cameras, then performing manual measurements. These prior methods were tedious and could not provide a 3D model of the object being scanned, and were typically limited to a few tens of measurement points at prominent locations.

Integration of the scanner with the robot allows for large complex objects to be scanned at high resolution, and for 3D Computer Aided Design (CAD) models to be generated for verification of items to the original design, and to generate models of previously undocumented items.

The main components are the mounting bracket for the scanner to the robot and the coordinate transformation matrices used for stitching the scanner data into a 3D model. The steps involve mounting the interface bracket to the robot's detector arm, mounting the scanner to the bracket, and then scanning sections of the object and recording the location of the tool tip (in this case the center of the scanner's focal point).

A novel feature is the ability to stitch images together by coordinates instead of requiring each scan data set to have overlapping identifiable features. This setup allows models of complex objects to be developed even if the object is large and featureless, or has sections that don't have visibility to other parts of the object for use as a reference. In addition, millions of points can be used for creation of an accurate model [i.e. within 0.03 in. (≈0.8 mm) over a span of 250 in. (≈635 mm)].

This work was done by Bradley Burns, Jeffrey Carlson, Mark Minich, and Jason Schuler of Kennedy Space Center. Further information is contained in a TSP (see page 1). *KSC-13489/95*

Methods of Antimicrobial Coating of Diverse Materials

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Methods of coating diverse substrate materials with antimicrobial agents have been developed. Originally intended to reduce health risks to astronauts posed by pathogenic microorganisms that can grow on surfaces in spacecraft, these methods could also be used on Earth — for example, to ensure sterility of surgical inserts and other medical equipment. The methods involve, generally, chemical preparation of substrate surfaces to enable attachment of antimicrobial molecules to the substrate surfaces via covalent bonds. Substrate materials that have been