NASA-JSC Technology Opportunity

MSC 22757-1, -2 Automated Propellant Blender

Innovators at NASA Johnson Space Center have developed a safer, more consistent and economical way in which to blend propellants. Used mainly for the production of Zirconium Potassium Perchlorate (ZPP) propellant, this automated blending apparatus and process has produced compositions that exhibit faster burn rates and are more dependable than mixtures from other methods. This invention could be used to improve the mixing of commercial propellants such as the ones used in airbags or oil exploration. It could also be used in the chemical industry in solvent precipitation processes.

Potential Commercial Uses

- Automobile Industry: This technology can be used to produce the charge used in airbag initiators.
- Aerospace Industry: This blender system can be used to produce the pyrotechnics used in explosive bolts for vehicle separation, emergency egress, and various initiators.
- Fireworks and Hobby Rockets: The igniter material used in fireworks and model rocket engines can be produced using this system.
- Chemical Manufacturing Industry: Use this technology to produce any variety of mixtures that require a solvent precipitation process.
- Military: The Automated Propellant Blender can be used to produce igniter and pyrotechnic compositions for use in munitions and propellants used in rockets.
- Oil and Gas Exploration: This blender can be used to produce ZPP and other propellants required for seismic prospecting.

Benefits

- Safety: The manufacture of propellants is an extremely dangerous task. Fire and explosion have occurred in the past while using hand-blending techniques. The Automated Propellant Blender will greatly decrease both the chance and danger of explosion by removing the human proximity element involved in mixing, allowing propellant production to be performed from a remote location.
- Consistency: Human error associated with manual blending is avoided. Computer controlled automation reduces the inconsistency involved in conventional evaporation and precipitation blending. Manual methods are dependant on the skill and experience of

the person blending the propellant which often results in variances in the degree of mixing and homogeneity of the blend resulting in less dependable batches.

- Time Savings: The Automated Propellant Blender can produce consistent, effective propellants in a much safer manner at a rate of approximately 400g/hr (excluding drying time). An added time saver is that several of these blending systems can be operated simultaneously.
- Versatility: This technology can be extended to produce other pyrotechnic mixtures that require a solvent precipitation process. It can also be used to uniformly coat particles with a polymer.
- Cost Savings: Due to the increase in efficiency from automation, this blender system can reduce the amount of costly solvents necessary when producing large amounts of powders. This results in a reduction in disposal costs.
- Environmental Impact: The automation process reduces the amount of time a solvent is handled, thereby reducing the chance for an accidental spill or other hazardous situation to occur.

Development Status

This technology is completely developed and test runs have been successful on the prototype.

Options for Commercialization

This technology opportunity is part of the NASA Technology Transfer Program, the goal of which is to stimulate development of commercial applications of NASA developed technology. NASA is seeking industrial partners to license the technology for commercialization.

The invention, "Automated Propellant Blending," is protected under U.S. patent number 5,879,079 issued on March 9, 1999, and 6,132,536 issued on October 27, 2000. The patents are owned by the United States of America and were developed by the National Aeronautics and Space Administration.

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