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SPACE PROPULSION SYMPOSIUM (C4)
Propulsion System (2) (2)

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ADVANCED BIOLOGICAL TREATMENT FOR SOLID PROPULSION - LICORNE

Abstract

In the field of solid propulsion, impact on the environment has long been taken care of at Herakles, for which a coherent and complete methodology has been developed over time from the early design phase to disposal at the end of life of products. When considering solid propellants for space motors, selection of appropriate raw materials is only one aspect of the global environmental approach. Adaptation and improvement of facilities and processes used to manufacture solid grain are also interesting. For instance: continuous process to reduce wastes, suppression of toxic solvents in cleaning steps, and implementation of innovative methods to environmentally friendly eliminate propellant wastes... A typical example is the treatment of Ammonium Perchlorate (AP) waste waters. AP is the oxidizer and primary ingredient in solid propellant for most large rocket motors. For example, for the Ariane 5 launcher, about 3,000 tons of AP are manufactured each year. Quantities of wastes containing AP result from cleaning operations and manufacturing cycle: blending, grinding, transfer... Since the early 1990s, Herakles has developed a biodegradation process to treat waste waters containing AP. The first facility installed in 2005 in French Guyana to treat ammonium in waste waters is a direct application of this Herakles expertise. Subsequent studies performed by Herakles aimed at improving the reduction rate of perchlorate ion, catalyzed by bacterium activity. Latest works enabled to develop the process at a scale significant enough to optimize the process: bacterium identification, degradation rate increase and cost operate reduction... These improvements have been validated in a pilot at an industrial scale of 30 tons per year since 2009 at Herakles Saint-Médard-en-Jalles plant, near Bordeaux. Capitalizing on these technical and industrial results Herakles has built an industrial facility of 500 tons per year capacity now operational in order to dismantle decommissioned solid rocket motors and to treat propellants and AP production wastes.