



SNS COLLEGE OF TECHNOLOGY
(An Autonomous Institution)
COIMBATORE-35



DEPARTMENT OF AEROSPACE ENGINEERING

SPACE PROPULSION – Unit III
CRYOGENIC ENGINEERING

SNSCT/P.KALPANADEVI/AP-
AERO/19AST301-SP

APPLICATIONS AREAS OF CRYOGENICS

- **Cryogenics in Space Industry**
 - Exploration of Space in solar system
 - Current space launching systems make use of cryogenic chemical propellants such as liquid hydrogen and liquid oxygen as rocket fuel.
 - This energy is used to move in the space orbit and escape the bounds of Earth's gravity.
 - Imperative to have a proper design for propulsion systems in addition for efficient liquefaction system fro cryogenic propellants
 - Used in Miniaturisation, Physical robustness, efficiency and effectiveness of system.
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APPLICATIONS AREAS OF CRYOGENICS

- **Cryogenics in Aviation and Aerospace Industry**
- Used in production and reconditioning of static storage tanks and some bearing metal components.
- Military aircraft uses argon in space over fuel in tanks and fill aircraft tyres with nitrogen
- Liquid oxygen is stored as lightweight source of breathing gas for pilot.
- Helium gas is used in large volumes for filling balloons and airships.

APPLICATIONS AREAS OF CRYOGENICS

- **Cryo-Metallurgy**
- Cryo processing has emerged to increase wear resistance and life of all the metals.
- The retained stresses cause uneven expansion, increased dimensional stability etc
- Cryogenic tempering transforms structure into more durable, stronger and stable.
- Cryogenic processes has been proved for improving performance, reliability, durability of racing engines.
- Also used for improving the strength of drive lines, machine parts, punching dies.

APPLICATIONS AREAS OF CRYOGENICS

- **Cryobiology**
- Cryobiology is the study of effects of freezing and low temperatures on living organisms.
- Cryobiology is known to have the potential for improving the quality of lives in future.
- Practice of freezing humans who are not curable by current medical technology in future to bring them to life. It is known as suspended animation.
- Ways of repairing the damage caused by freezing process are developed, as well as when cures of diseases.

APPLICATIONS AREAS OF CRYOGENICS

- **Cryosurgery**
- Cryosurgery are for treatment of certain types of skin lesions, for benign and dysplastic mucosal lesions.
- Involves different techniques to achieve selective necrosis of tissues, by freezing at extremely low temperatures through precise cooling.
- Each technique involves specific procedure in order to cater requirement of surgery for specific purpose.
- Uses a pre-cooled metal accessory that is directly applied to lesion.
- Has added more benefits which includes lack of need of general anesthesia, Optional need for local anesthesia, Simplicity and Safety

APPLICATIONS AREAS OF CRYOGENICS

- Cryopreservation of tissue and blood
- Cryopreservation of foods
- Cryo transport