



Indian Space Congress -2024 New Delhi

Leveraging Industrial capabilities for India's Next Gen Launch Vehicles

Dr. V Narayanan

Distinguished Scientist (Apex Scale)

Director, LPSC/ISRO

director@lpsc.gov.in

28-06-2024

Space Transportation Fleet - India



**RH-200
RH-300
RH-300 MK II
RH-560 MK II**

**Lift off Mass:
8 to 1600 kg
Height: 3.6 to 9.7 m**

SLV-3
1980



**150 Kg - LEO
LOM : 40 t
Height : 23.5m**

ASLV
1992



**1200 Kg to GTO
LOM :320 tons
Height:44.4 m**

PSLV
1993



**2250 Kg to GTO
LOM :414 tons
Height: 51.7 m**

GSLV
2001



**4000 Kg to GTO
LOM: 640 ton
Height:43.5 m**

LVM3
2017



**500 Kg to 500 km Orbit
LOM :120 t
Height:34 mn**

SSLV
2022

Evolution of launch capability

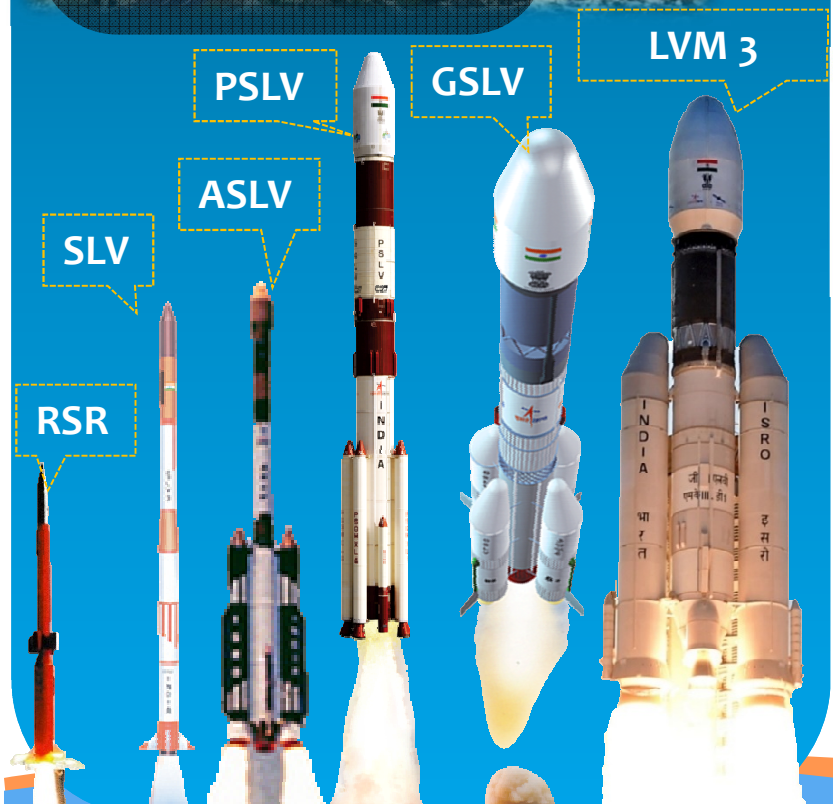


Accomplishments of ISRO

[End to End Mission and Application Capability]

- RSR - 3987
- SLV - 4
- ASLV - 4
- PSLV - 60
- GSLV - 16
- LVM 3 - 7
- SSLV - 2
- TV - 1

94 LV Missions



124 Satellites



Aryabhata

- Remote Sensing
- Communication
- Navigation
- Space Science



Chandrayaan-3

432 Satellites of 34 countries

17 Student satellites

9 Experimental Missions

Space Capsule Recovery Experiment



Crew Module Atmospheric Re-entry Experiment

Reusable Launch Vehicle Technology Demonstrator

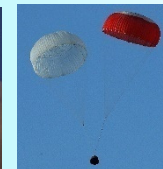


RLV-LEX -01, 02 & 03



Scramjet Engine Technology Demonstrator

Crew Escape System at Launch pad

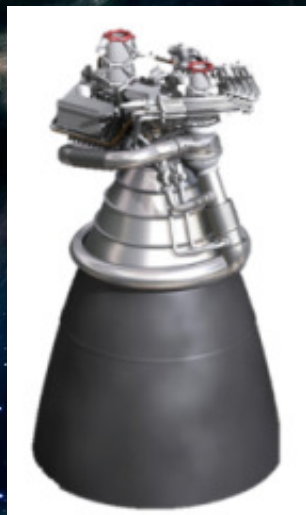


Space Technology Applications

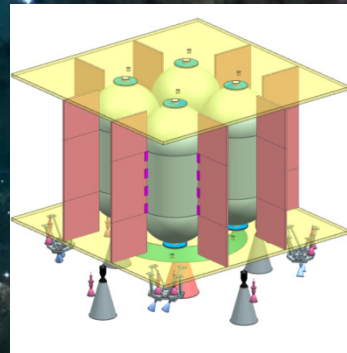


ISRO's Future Targets

- ❑ 2024 -Gaganyaan G1 mission
- ❑ 2025 - Gaganyaan G2, Gaganyaan H1 missions
- ❑ 2026 -Chandrayaan – 4 (Sample return mission)
- ❑ 2035 -Bharatiya Antariksh Station
- ❑ 2040 -Indian Landing on the moon and safe return



FFSC based 3000kN
LME for Heavy Lift
Launcher



LUPEX Mission: High Thrust
3.1kN and 1.5kN
Throtttable Engines



Next Generation Launch Vehicle (NGLV) - Soorya



NGLV -S

LM450 + LM120 + C32

Payload Capability	
23 t to 500km LEO	9.6 t to GTO*

*With active impact point mitigation

GLOM = 687 t

**LM450 (2XS160)+ LM120
+ C32**

32 t to 500km LEO



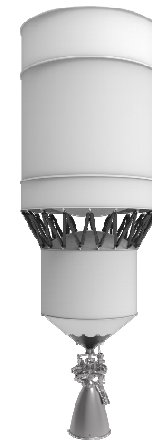
LM120 Stage



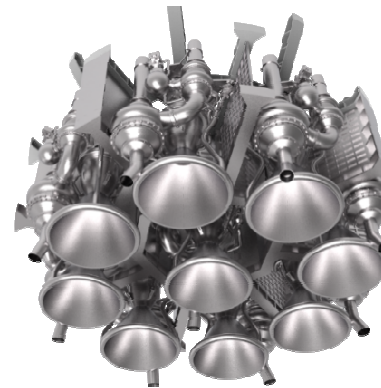
LM450 Stage



LME 1100



C32 Stage

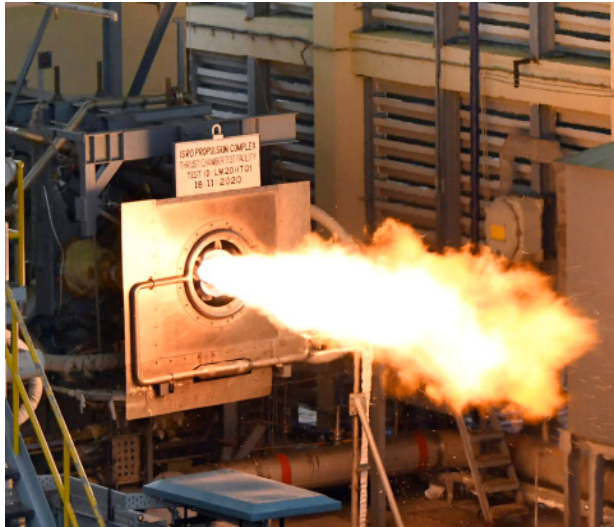


LM450- Engine Clustering



NGLV -H

LOX-Methane Engine (LME) Development



Development of a 1100kN engine is in progress.

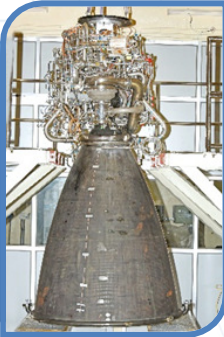
Cycle	GG Cycle
Thrust	1146 kN
Vac. Isp	332 s
Throttling	60%-110%

Advantages of LOX-Methane Engine

- Higher Specific impulse and better coking limits compared to LOX- Kerosene
- Possible to Synthesise(CH_4) in other planets

CUS & CE20 Engine

- M/s Godrej &
- M/s MTAR



Components & Modules

- M/s MTAR – PS2/GS2/L40/ S/c Valves
- M/s LTE – TVC/RCT/PS4/PAM; DC torque motor for TVC & DC motor for motorised valves



Propellant production

- (UH25, MMH, LH2 & N2O4)
- M/s ASL & M/s HOCL

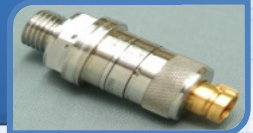
Satellite Thruster

- M/s Godrej &
- M/s VeeKay



Transducers

- M/s LTE
- M/s BrahMos



Umbilical System

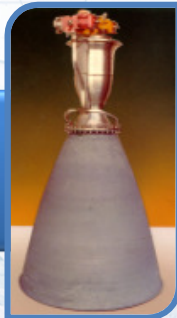
- M/s Microfine Bushings
- Metallic Bellows & flexible hoses-**
- M/s Metallic Bellows

PROPULSION DOMAIN - INDUSTRY PARTNERSHIP (Major)

- Collaboration with more than 100 industries

PS4 Engine

- M/s ASACO



Materials

- M/s MIDHANI
- M/s NFTDC



Vikas Engine

- M/s Godrej
- M/s MTAR
- M/s BrahMos



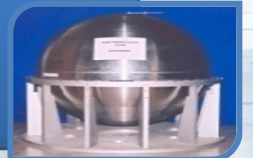
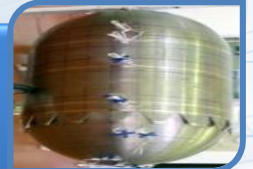
Propellant tanks

- M/s ASD HAL
- M/s BrahMos



S/C Propellant Tanks & Components

- M/s BHEL
- M/s KCP



L40 Stage Integration

- M/s ASD HAL



PSLV mass production -
Indian Industry consortium

Space Economy and Start-ups

World Space Economy

Current India's share (2%)
\$8.4 Bn (2022-23)

10 yrs



Target share (8%)
\$44.4 Bn (2032-33)

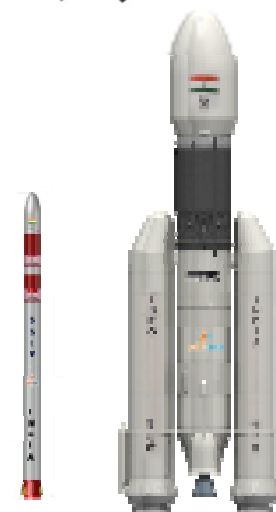
India to be among three important Space Power in the World

Enhancing role of New Space India Limited (NSIL)

- Strengthening of NSIL – additional manpower in various expert domains
- Global presence – branches at potential regions
- Procuring satellites from Indian private industries for national / international customers
- Orbital resource & frequency co-ordination by NSIL
- Promoting PPP & JV with Indian & international industries
- Act as a channel for FDI in India

Indian National Space Promotion and Authorization Centre (IN-SPACe)

Vision: To enable private sector participation in space activities, boost space economy within the country and develop space force frontiers, for a resurgent, Aatma Nirbhar Bharat.



Testing of engine at ISRO for M/s Skyroot

Indian space tech startups



Vikram-S launched successfully



Agnibaan launched successfully from SDSC-SHAR

Thank You