

Von Braun Symposium Panel:

# **National Institute of Rocket Propulsion Systems (NIRPS)**

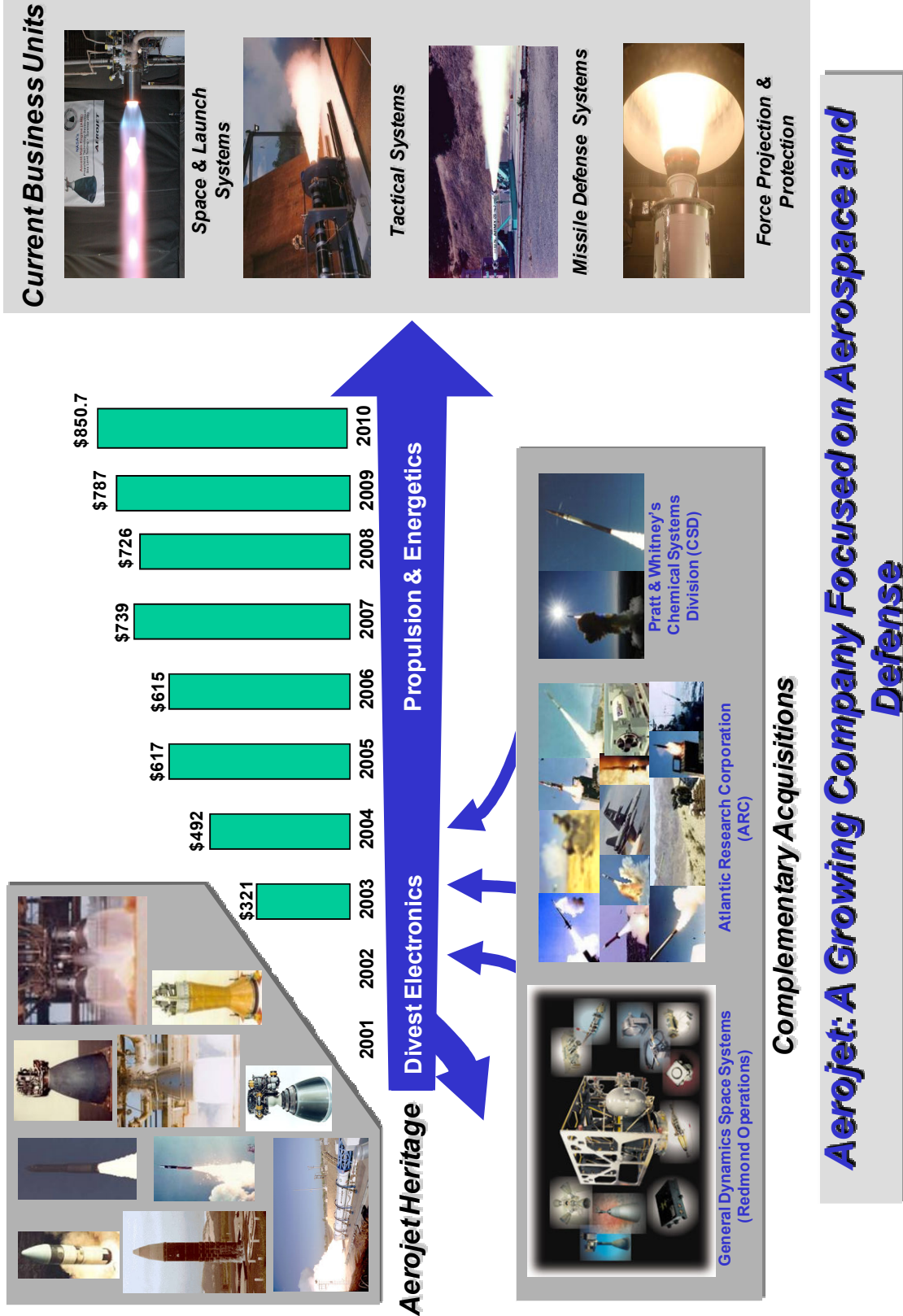
*Aerojet's Perspective On Issues Facing the  
U.S. Propulsion Industry*

Presented by

Julie Van Kleeck

26 October 2011

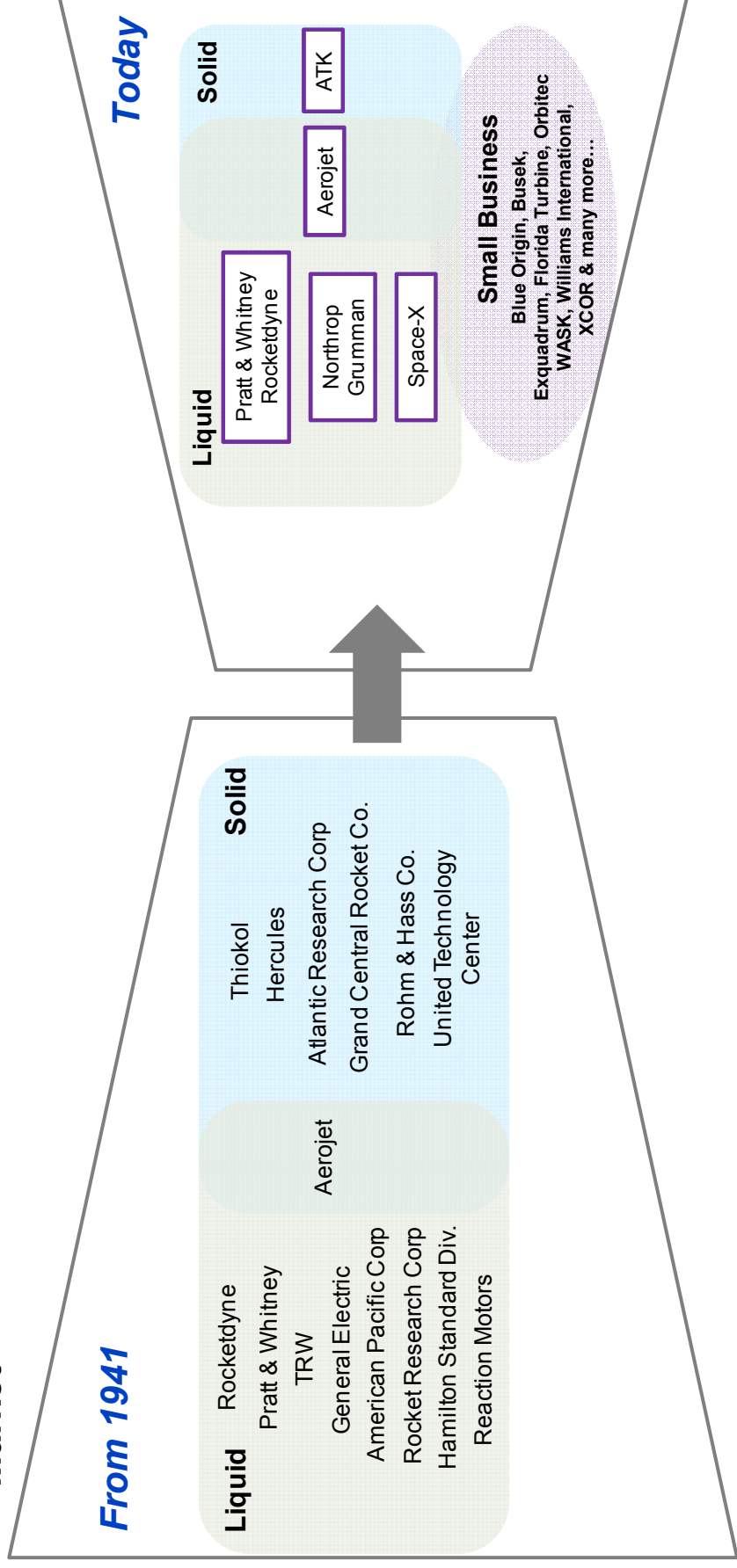
# Aerojet Today



# U.S. Rocket Propulsion Industry

## **AEROJET**

- Since 1941, more than a dozen U.S. companies had been involved in rocket propulsion business
- Only a few major U.S. companies are active today, however various new commercial space entities are emerging
- Retirement of shuttle and Historically low launch rates; Increasingly a “World Market”



# U.S. Rocket Engine Development History

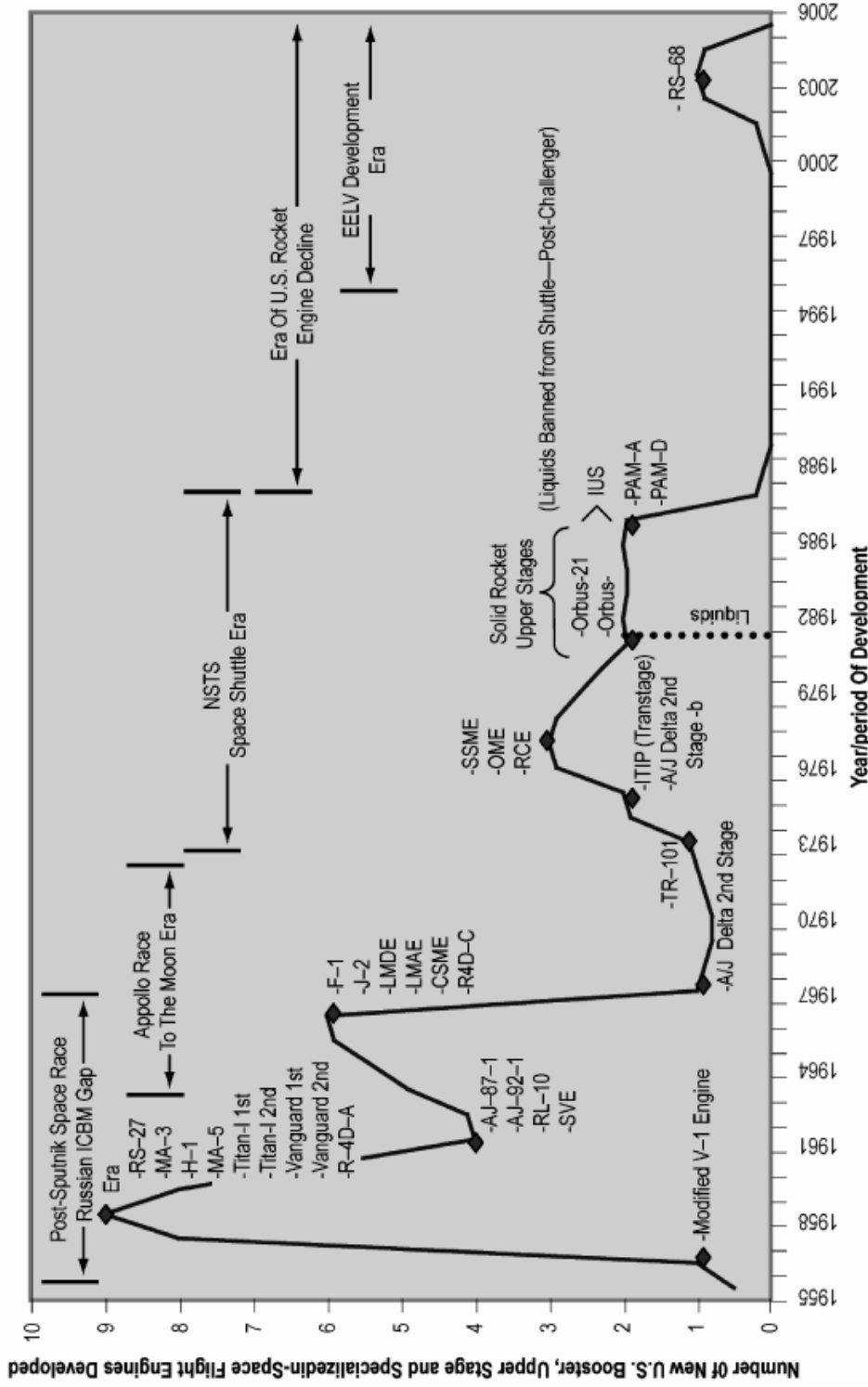


Fig. 2 U.S. rocket engine developments from 1955–2005.

Ref: Sackheim, AIAA-23257-7531, Journal of Propulsion and Power, Nov. – Dec. 2006

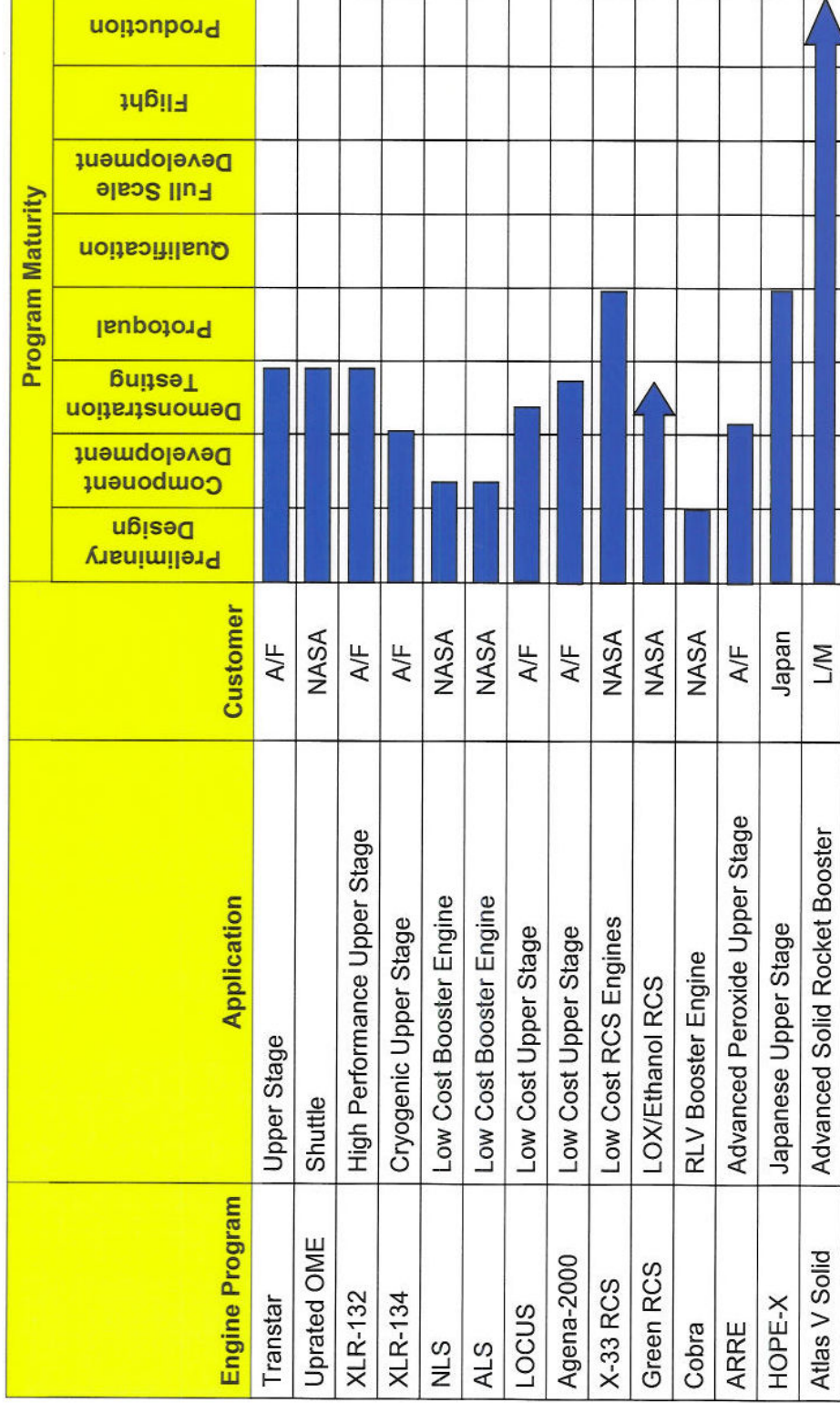
**There have been no competitive LRE developments for over 3 decades**

# U.S. Propulsion Programs Rarely Make It To Production



A GenCorp Company

## Aerojet Launch Vehicle Propulsion Programs Over the Last 20 Years



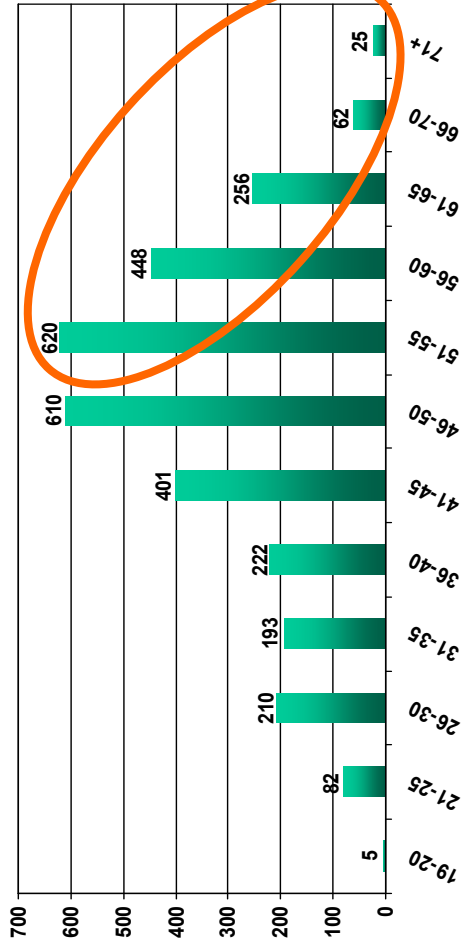
Commercially Funded

**We Need A Plan and Commitment to “Stick to It” and Finish What We Start**

# Aerojet Demographics Reflect U.S. Aerospace & Defense Workforce Issues

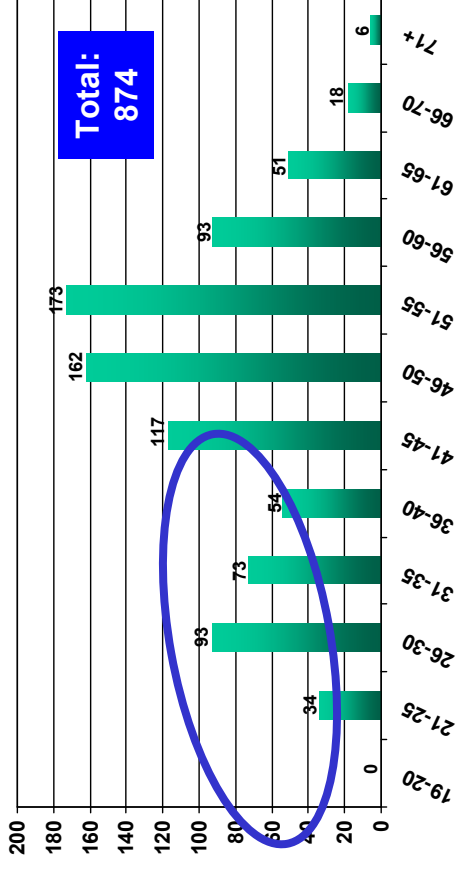


All Employees By Age



Almost half within 5 years of retirement eligibility

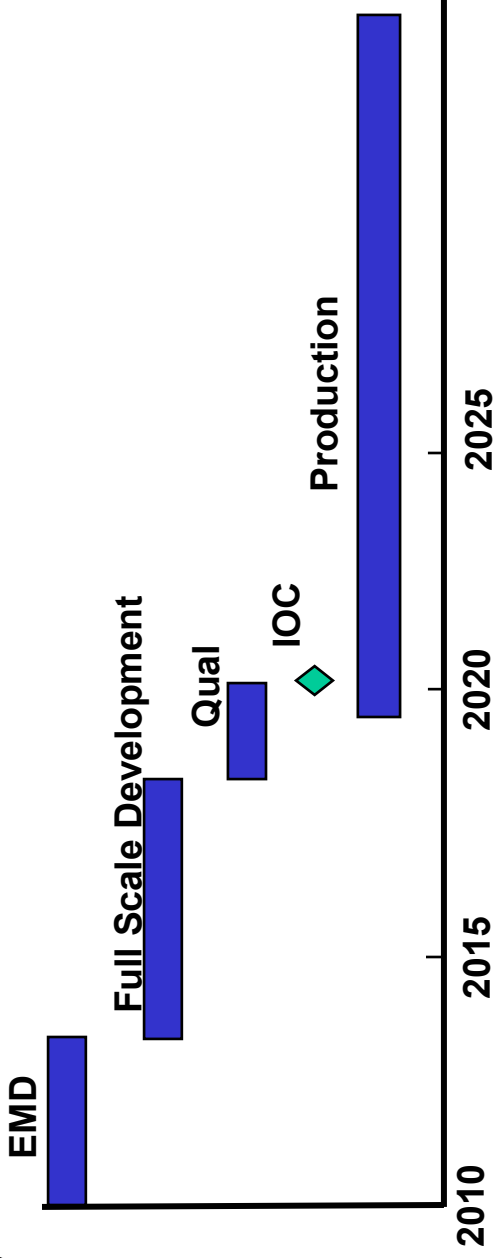
Age Distribution for Engineers



Recent focus on new grads is paying of Cross Training and Agile Business model is aiding in both attracting and retaining

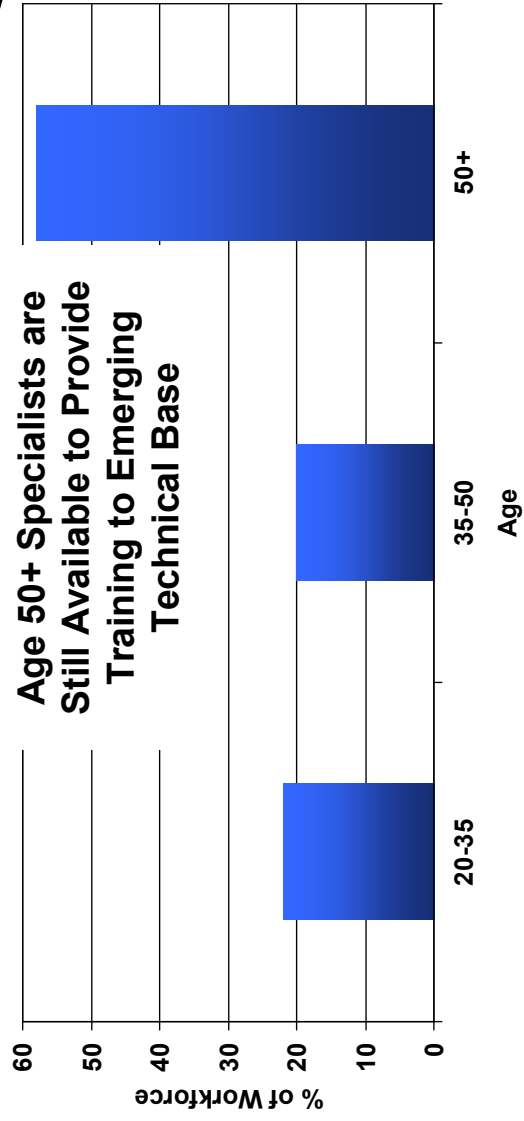
Approximately 30% of Workforce is Composed of Engineers & Scientists

# Engine Development Cycle is At Risk if Aging Workforce is Not Replenished



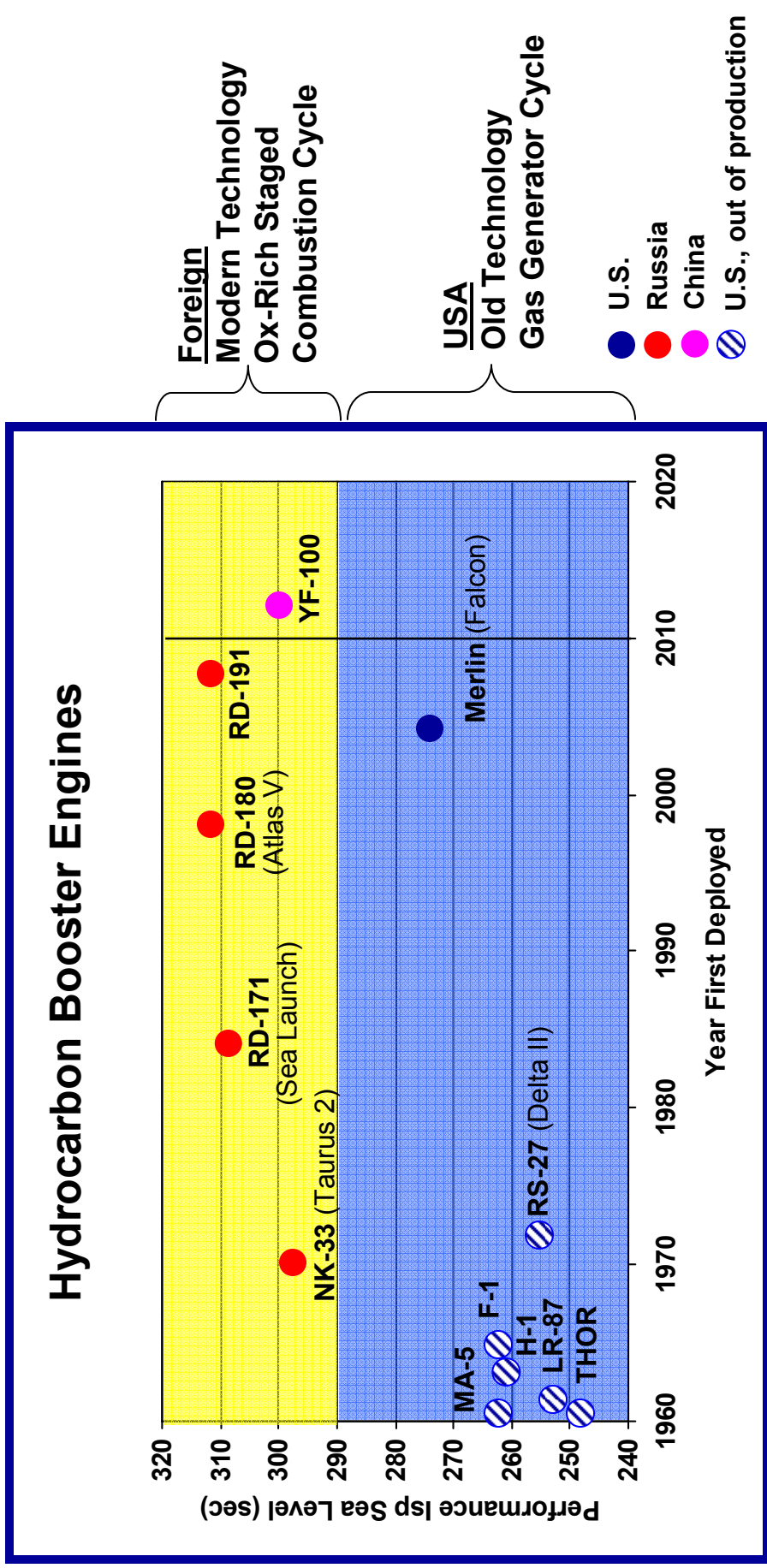
Workforce is Available NOW to Support New Development

Age Distribution in Aerospace & Defense\*



Age 50+ Specialists are Still Available to Provide Training to Emerging Technical Base

# U.S.-Made Hydrocarbon Engines Are Virtually Non-Existent Today and Have Never Approached Soviet/Russian Designs



**Many U.S.-Based Launchers (Atlas V, Sea Launch and Taurus 2)  
Now Rely On Hydrocarbon Booster Engines From Russia**

# Issues Facing the Propulsion Industry

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- **Decreasing demand and ever increasing budget pressures—overcapacity and obsolete business practices**
- **Risk averse culture – fear of new developments**
- **Minimal use of competition to drive affordability and innovation**
- **Lack of sustained research and development (30 years of stops/starts)**
  - **Minimal new development in last few decades – lack of new products and loss of ability to develop new products**
  - **Loss of US competitiveness in a world market**
  - **Also makes it hard to attract and retain people to industry**
- **Aerospace demographics – possible large exodus of remaining talent in near future**
- **Lack of a coordinated approach to propulsion by government**
  - **Less than efficient use of diminishing funds**
  - **Low production rates due to vehicle specific propulsion**
  - **Lack of commitment to a long term plan**