

TRITON

Advanced Deployable Compact Rotorcraft

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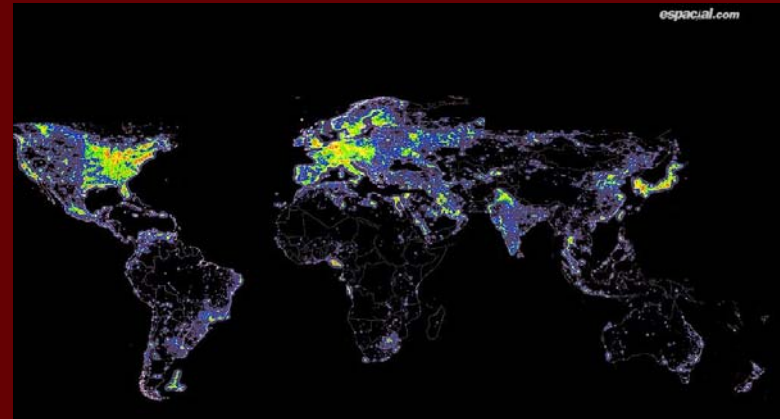


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Introduction

Human population concentrated in coastal regions



SOF missions necessitate submersible deployment



Current deployment method requires ad-hoc land transport

Seek Advanced Deployable Compact Rotorcraft



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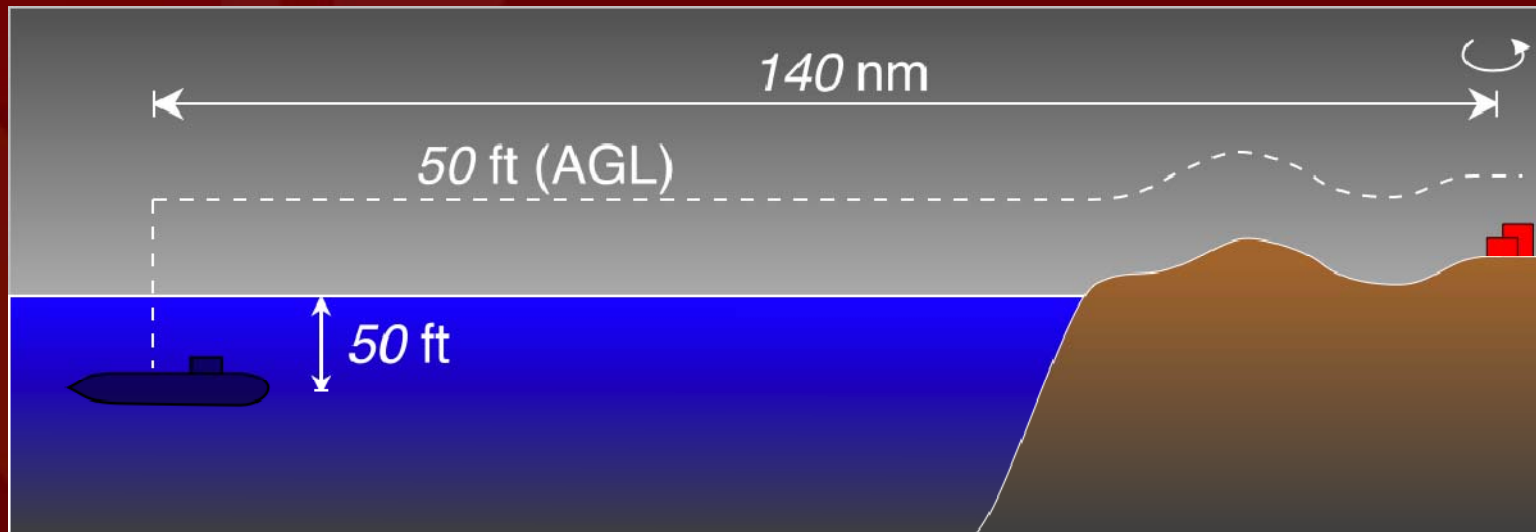
Mission Profiles

ARV

Transport SOF crew
Payload: 800 lbs
4-min HOGE drop-off

UEV

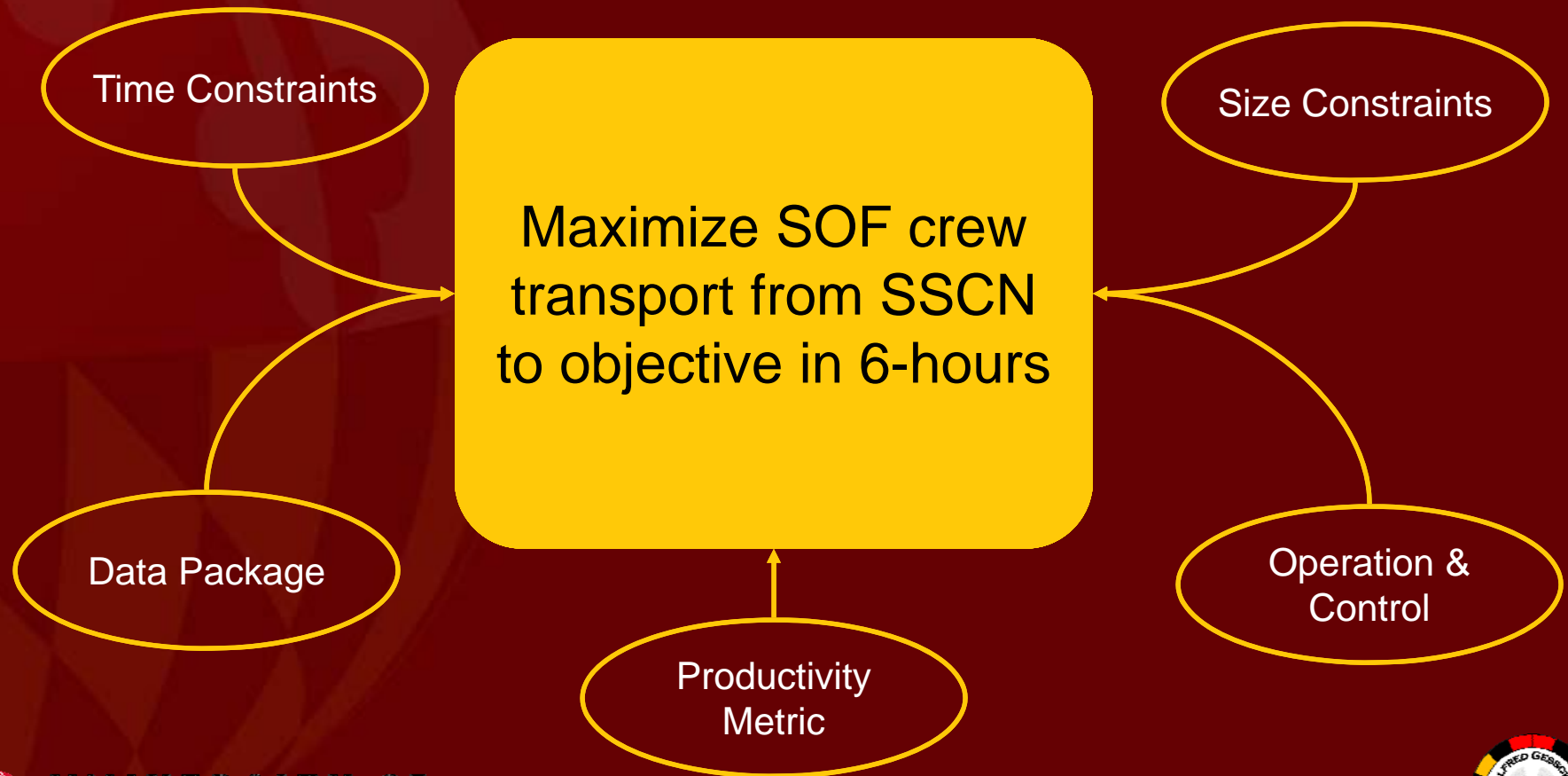
Unmanned “eye in the sky”
Payload: 600 lbs
3-hour loiter



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RFP Requirements



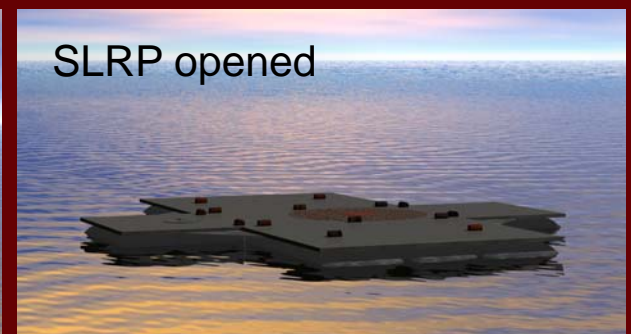
Design Methodology

- Design performed in conjunction with ENAE 634 Helicopter Design
- Students developed own analysis tools and software to support component selection and sizing
- All graphics developed using CATIA V5 CAD software and Deep Exploration V5

Launch & Recovery Strategy

Submersible Launch and Recovery Pod (SLRP)

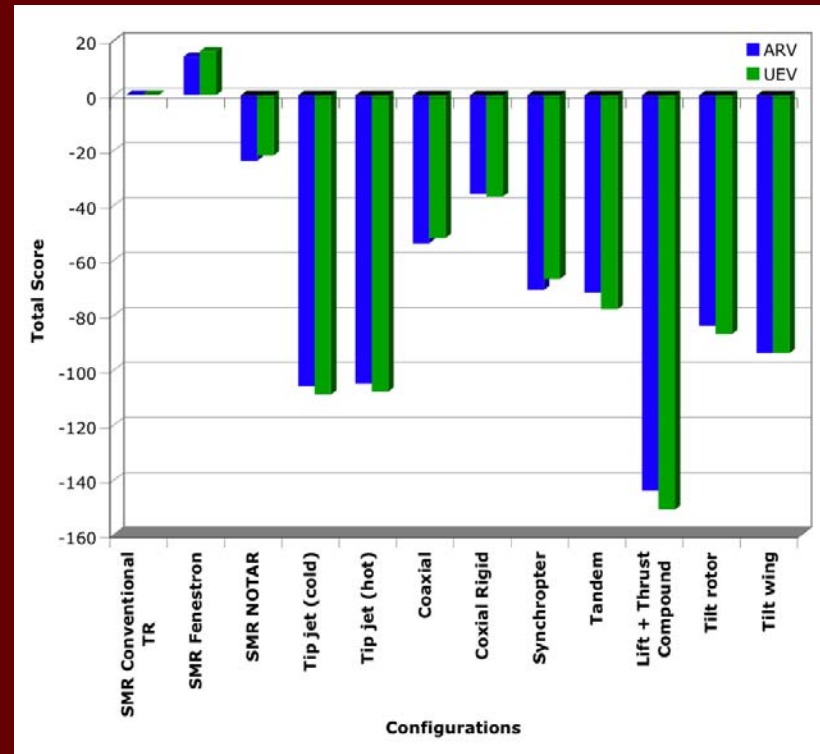
- TRITON ARV/UEV helicopters transported via submersible pod
- ARV crew transported in SLRP with ARV
- Life support provided via umbilical between SSCN and SLRP
- Interior of pod maintained at 1 atm to mitigate decompression sickness
- Submersible pod transforms to floating helicopter pad at surface
- Cable tether provides controlled ascent and descent of SLRP



Configuration Selection

Selection Criteria:

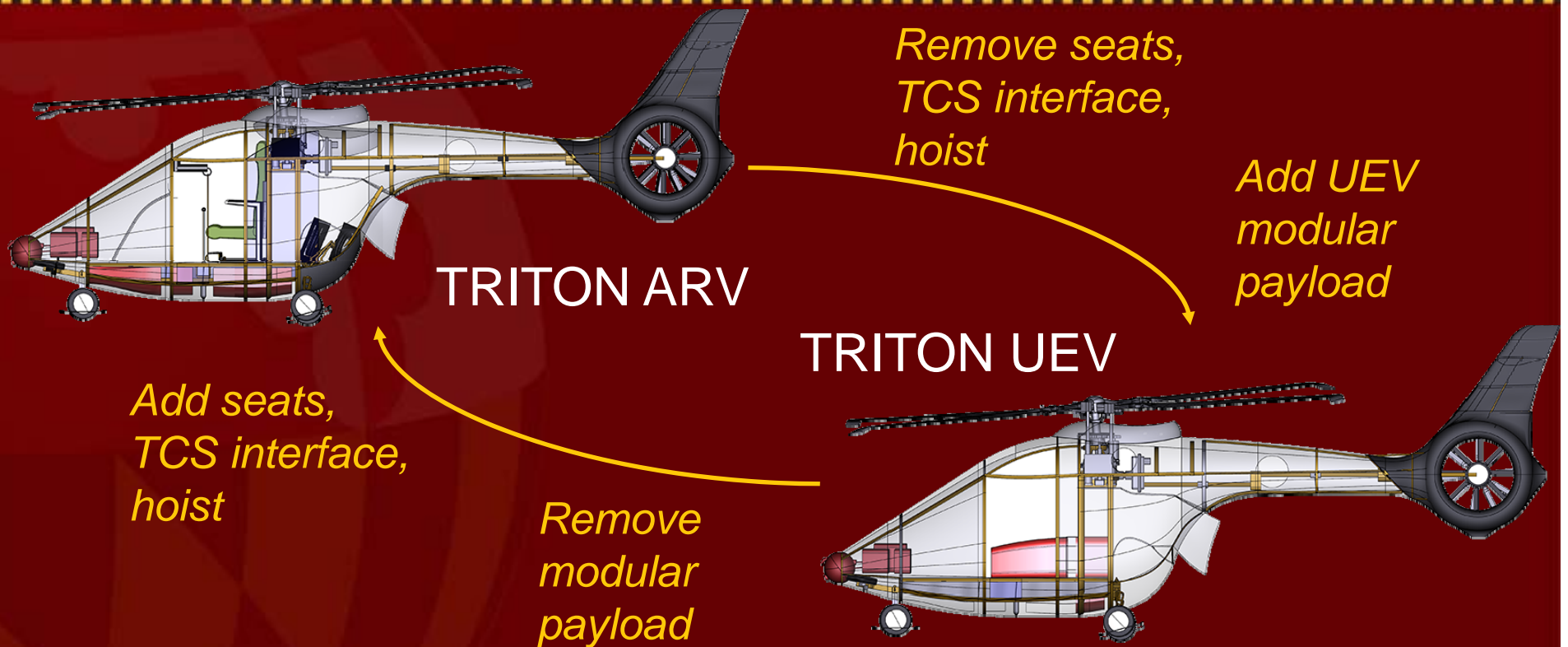
- Compact
- Cruise-speed
- Low noise
- Safety
- Reliable



Selected single main-rotor with fan-in-fin as optimal trade between cruise speed, noise and compact design



Modular ARV/UEV Design



Modular ARV/UEV design

Design ensures CG position within rotor limits for all configurations and fuel levels



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TRITON Design Features

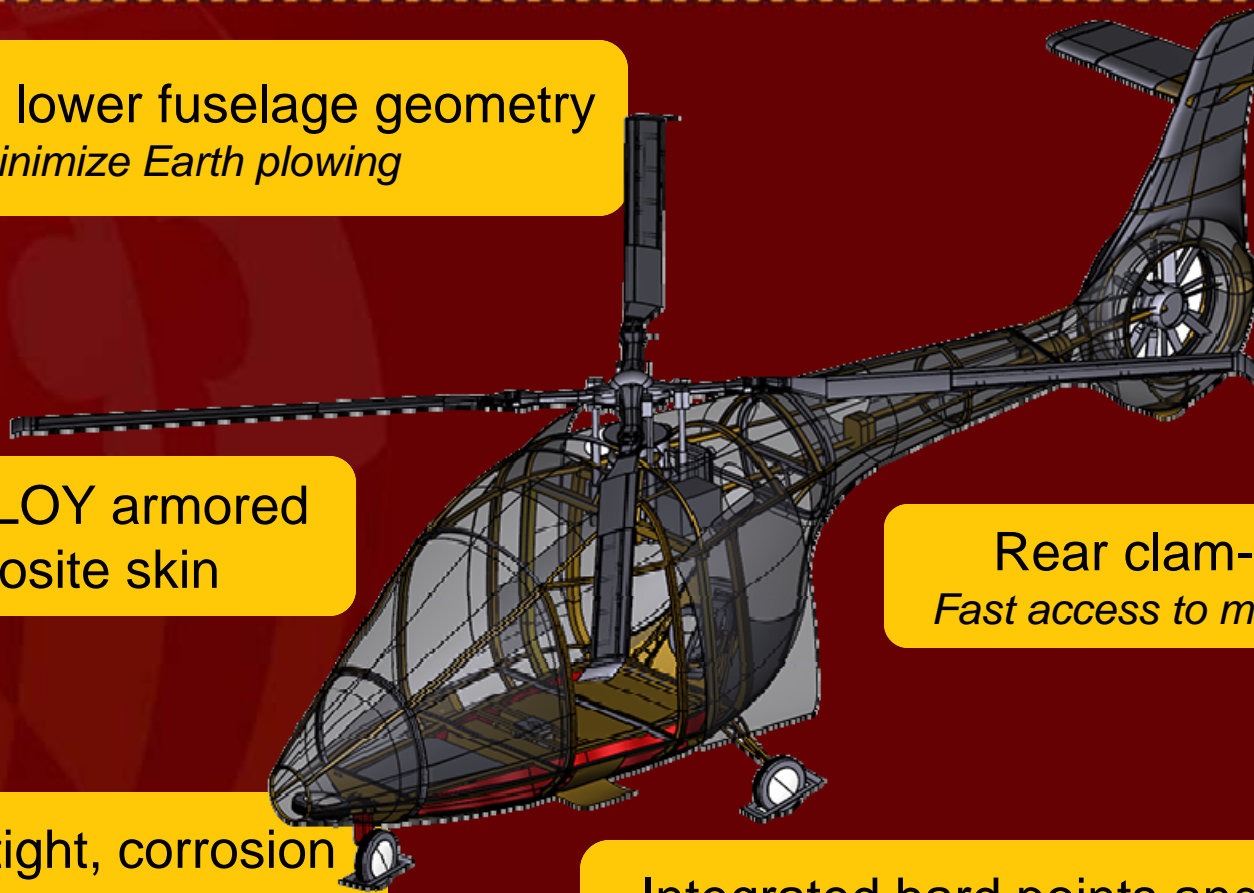
Advanced lower fuselage geometry
Minimize Earth plowing

CRYSTALLOY armored
composite skin

Watertight, corrosion
resistant fuselage

Rear clam-shell doors
Fast access to mission equipment

Integrated hard points and door
step for HOGE crew deployment



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TRITON Design Features

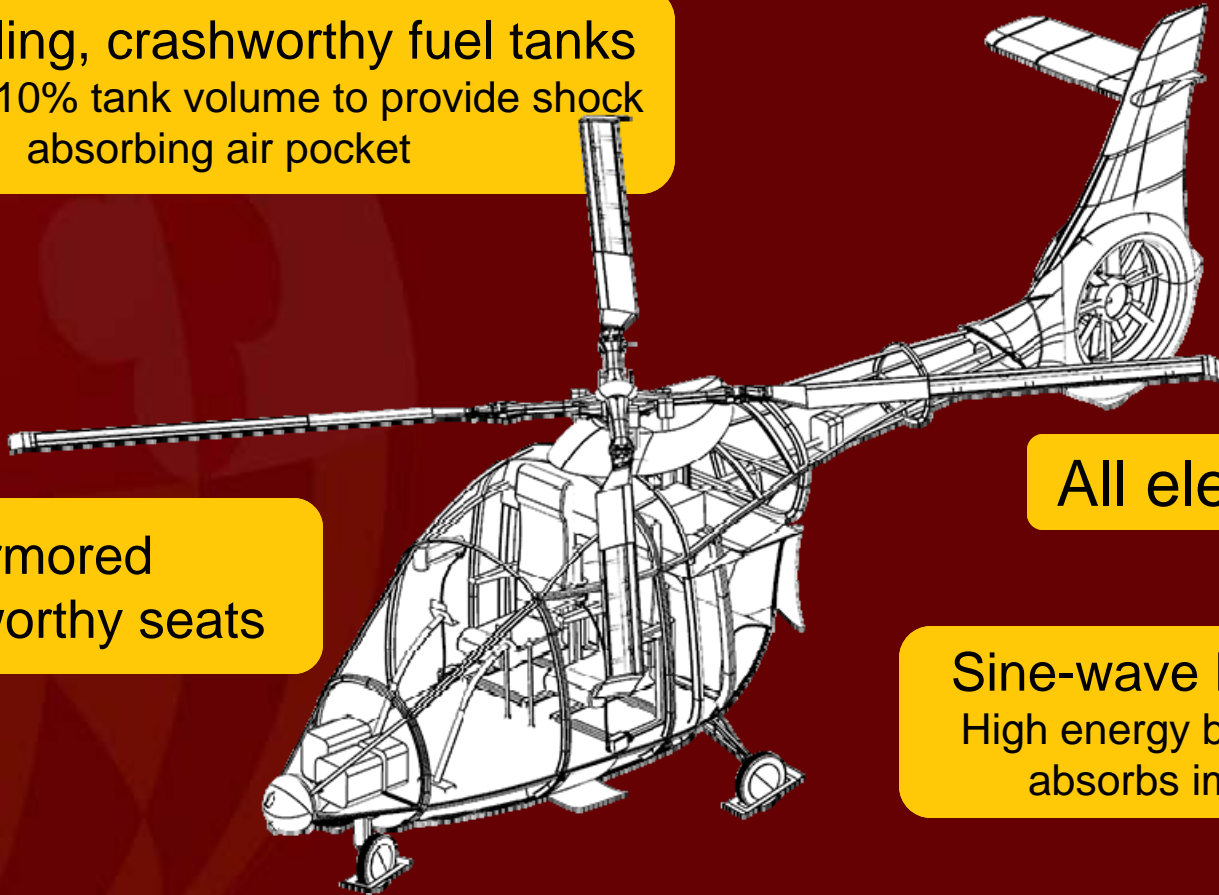
Self sealing, crashworthy fuel tanks
Additional 10% tank volume to provide shock
absorbing air pocket

Armored
crashworthy seats

All electric controls

Sine-wave keel beams
High energy buckling mode
absorbs impact load

Retractable landing gear



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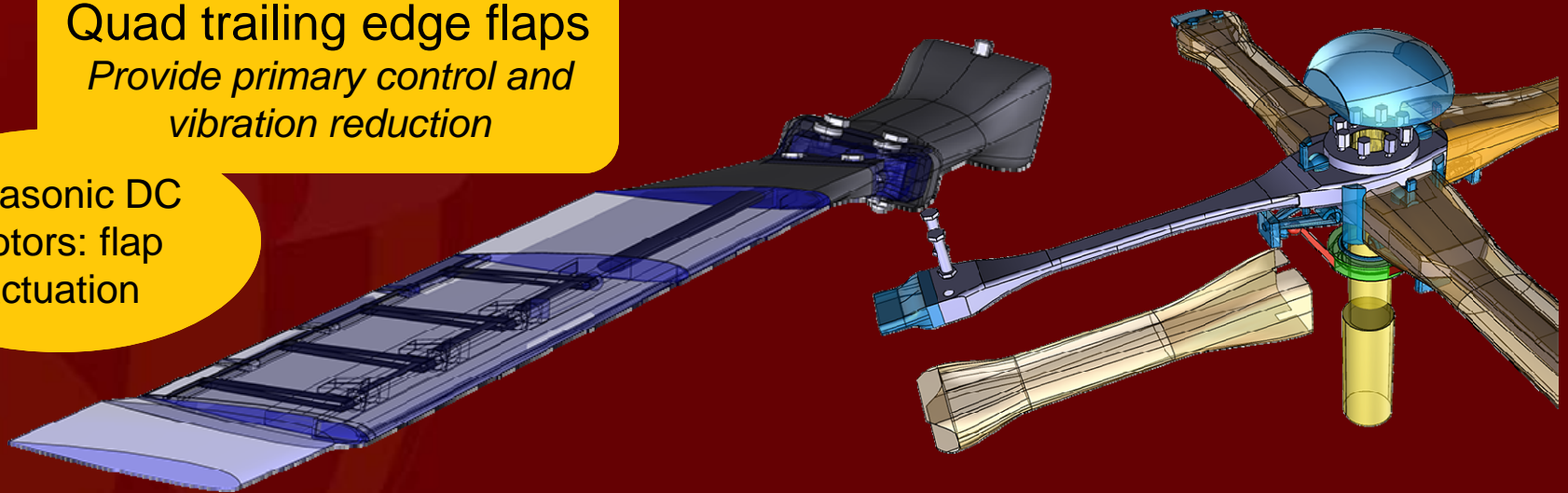


TRITON Design Features

Swashplateless, bearingless, composite-coupled rotor
Reduced weight, drag and maintenance

Quad trailing edge flaps
Provide primary control and vibration reduction

Ultrasonic DC motors: flap actuation



Advanced swept/anedral tip

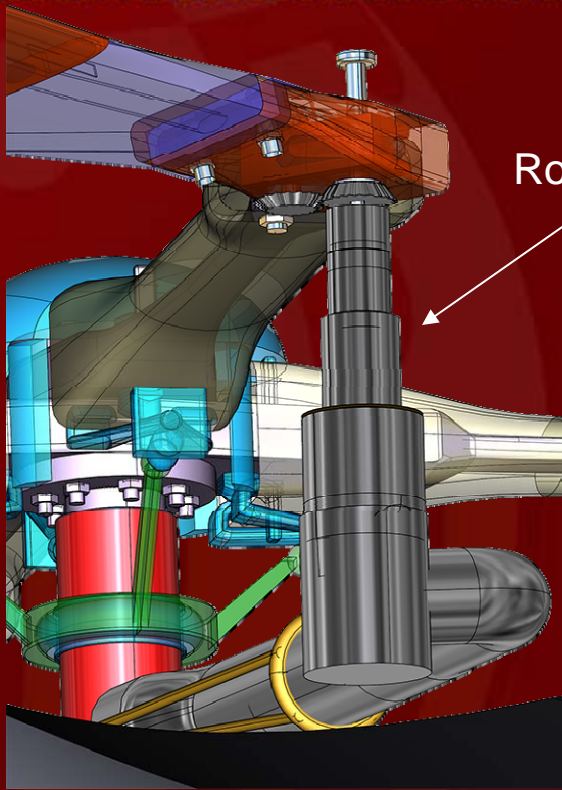
Opposing flexbeams constructed as single body
Reduces weight, drag, manufacturing cost and structural complexity



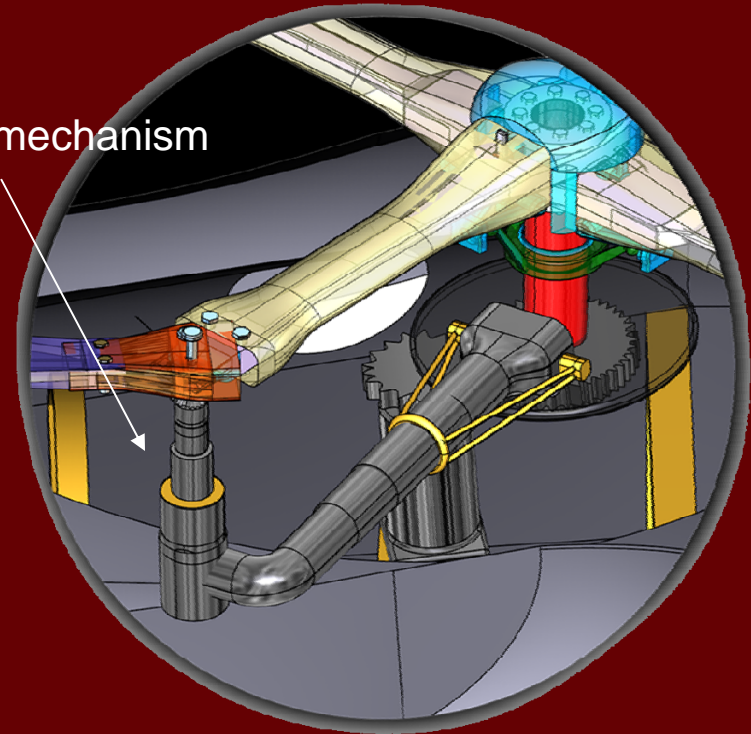
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TRITON Design Features



Robotic arm driving mechanism



Automatic blade folding with off-blade primary actuation



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TRITON Design Features

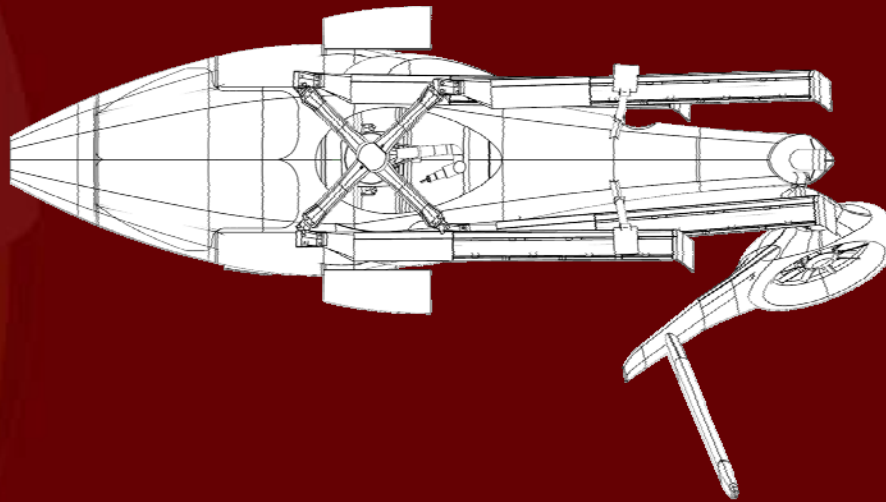
Folded Dimensions:

Length = 19.0 ft

Height = 7.5 ft

Width = 8.5 ft

Automatic folding tail



Transport 2 TRITONS in a single C130J transport
-NO DISSASSEMBLY REQUIRED-



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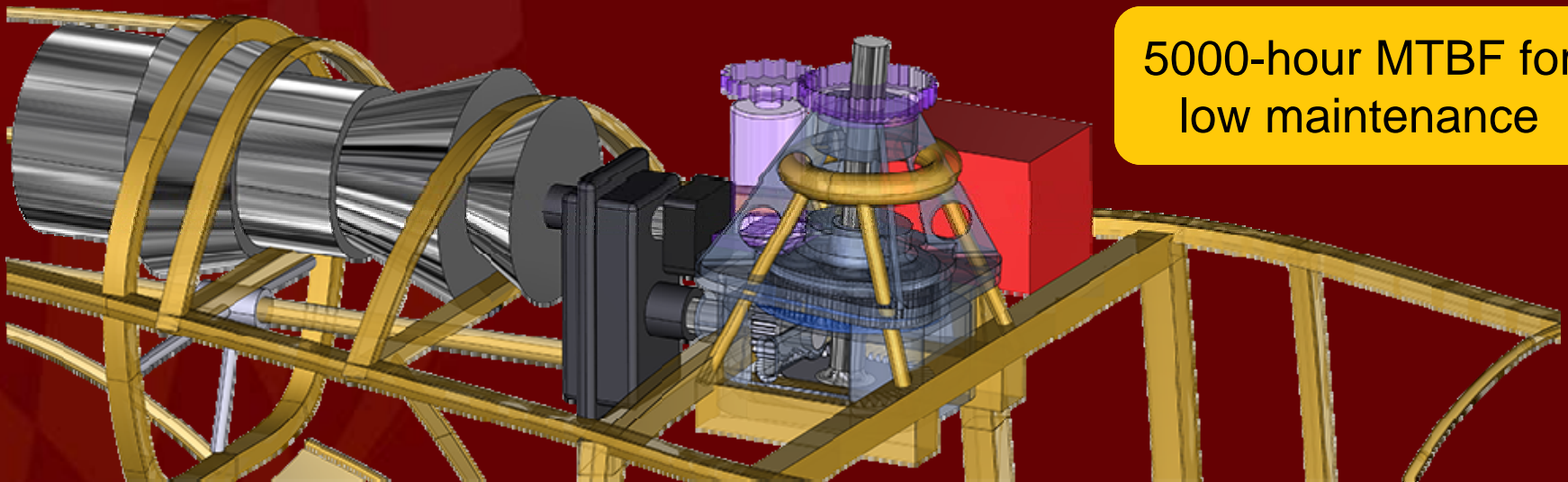
TRITON Design Features

Composite housing
Low weight and impervious to sea water

Face-gear input train

Reduced acquisition and
maintenance cost
through use of common
and off-shelf components

5000-hour MTBF for
low maintenance

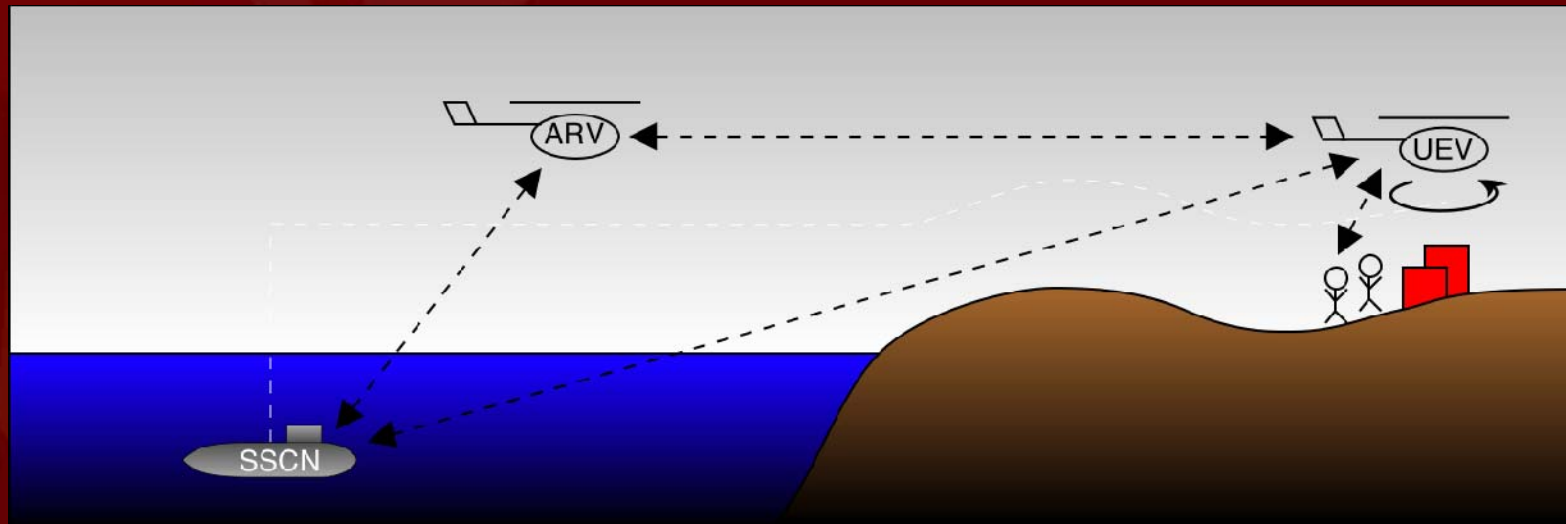


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TRITON System Networking

- ARV/UEV operated via Tactical Control System (TCS) software
- TCS provides seamless command and control transfer between operating stations in SSCN, ARV and ground soldier
- Primary data link through TCDL, secondary via UHF/VHF data link
- Portable TCS interface for remote ARV control



SLRP Design Features

UAV Common Automatic Recovery System

Harpoon capturing system

Emergency escape hatch



Turntable
Vehicle yaw correction

Hot refueling via
umbilical to SSCN



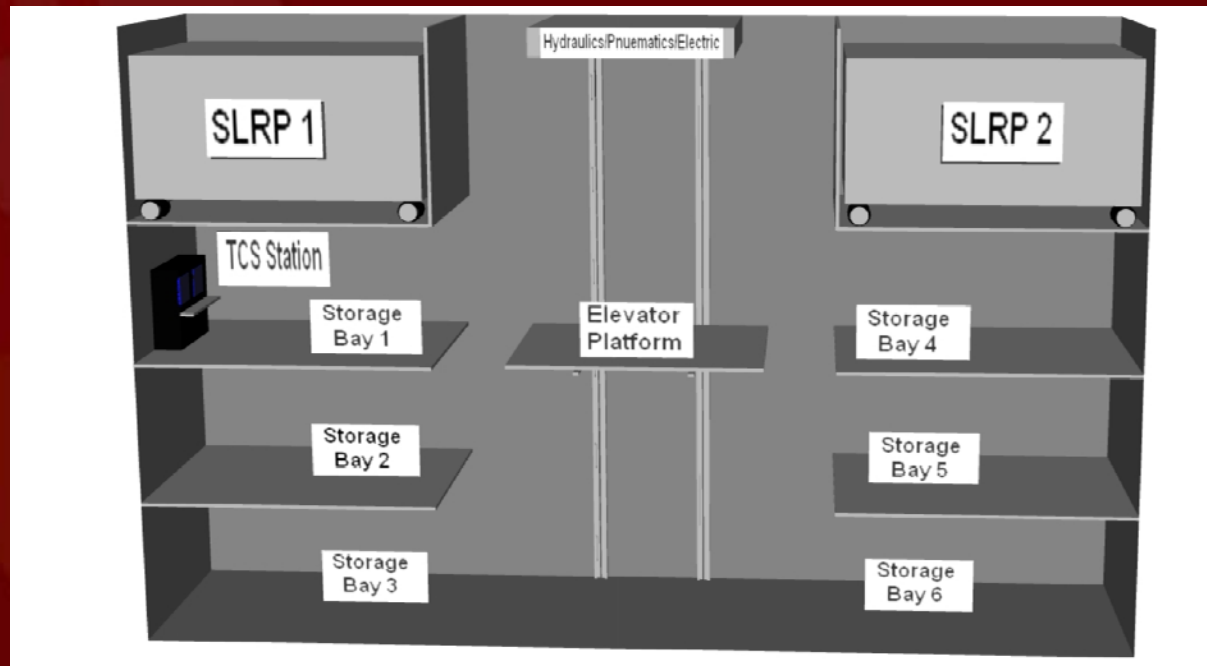
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Hangar Configuration

Simultaneous deployment and recovery of 2 TRITON helicopters

Central elevator system for optimal use of vertical space



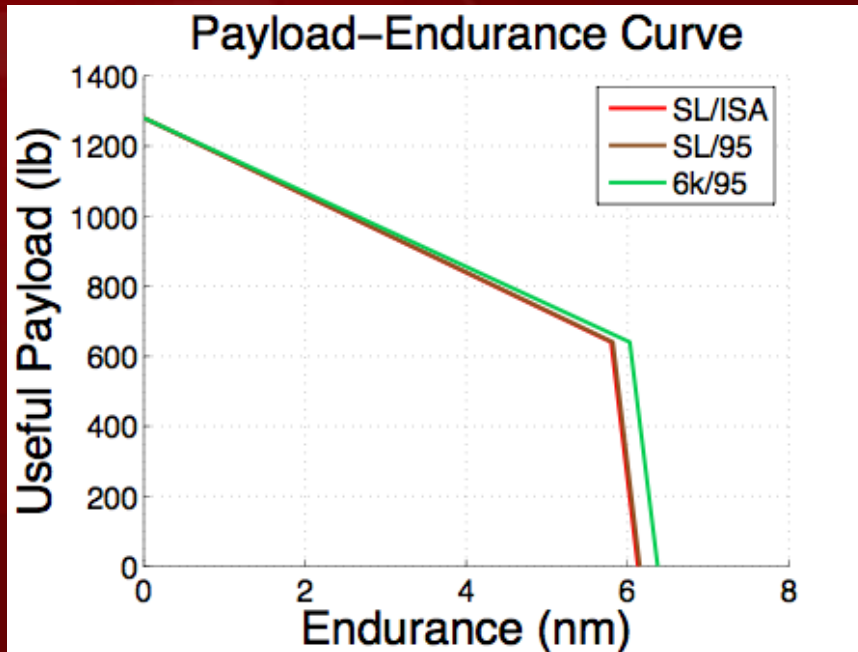
Stow up to 9 TRITON helicopters



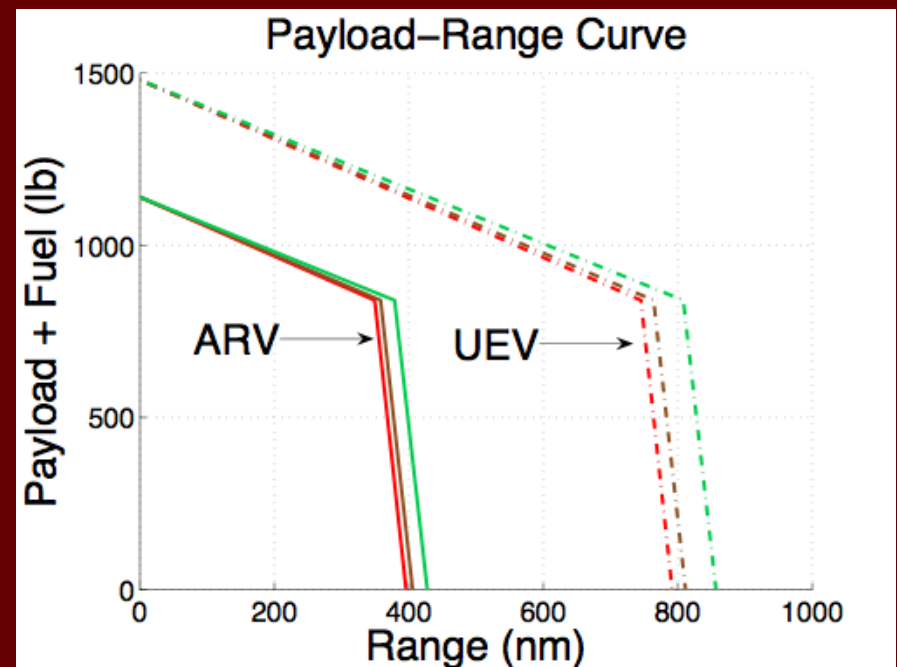
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Performance Summary



Best range velocity = 140 kt
Hover ceiling (6k/95) > 6000ft



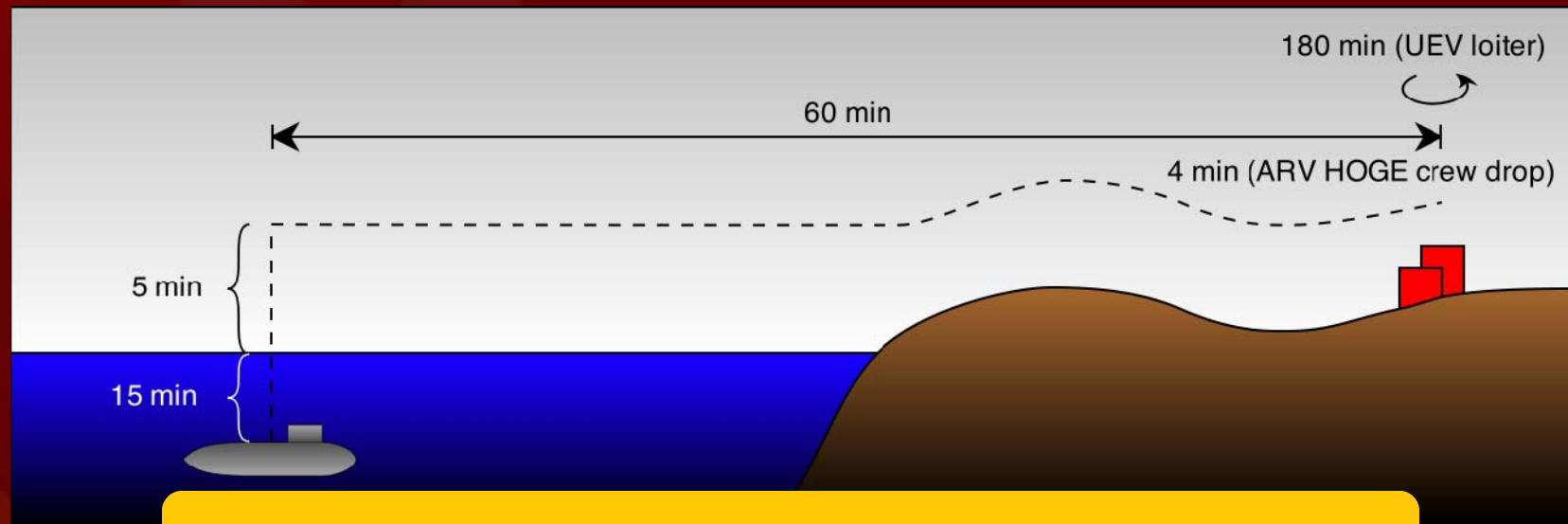
Productivity Metric

Available in SSCN

2 TRITON UEV

2 SLRP

7 TRITON ARV



Total SOF deployed in 6 hours = 28

Conclusions

Watertight, armored composite fuselage

Mission adaptable ARV/UEV design

Crashworthy airframe and fuel system

TRITON

The new advanced deployable compact rotorcraft

Innovative transmission with composite housing

Revolutionary automatic blade folding

All electric design

Swashplateless multifunctional control system

Affordable state-of-art technologies



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