ZACOM

Lethality, Survivability, Mobility and Sustainment for America's Army

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BSI FS15149

SWING CHAMBER CANNON: TECHNOLOGY DEVELOPMENT FOR THE FUTURE COMBAT SYSTEM

PRESENTATION TO THE 37TH GUNS & AMMO SYMPOSIUM

NDIA
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FUTURE COMBAT SYSTEM

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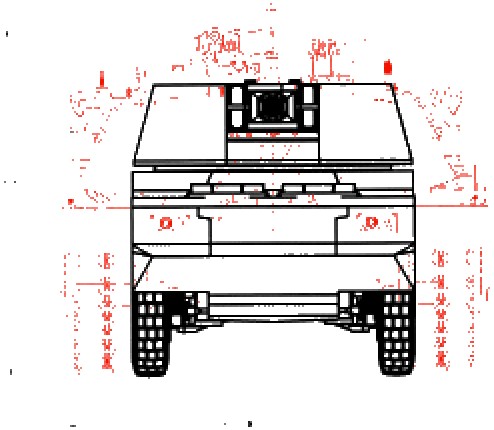
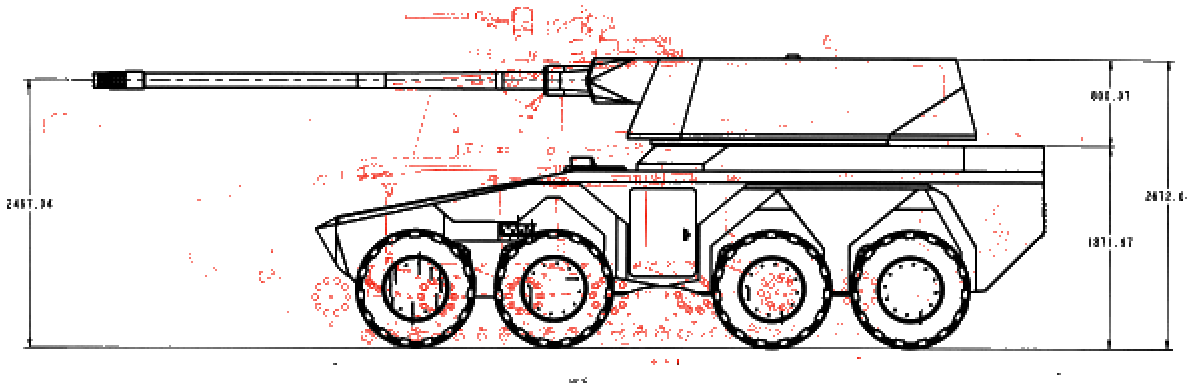
- **WHAT IS THE FUTURE COMBAT SYSTEM (FCS)?**
  - **"The Future Combat Systems will be a multi-functional, multi-mission re-configurable system of systems to maximize joint inter-operability, strategic transportability and commonality of mission roles including direct and indirect fire, air defense, reconnaissance, troop transport, counter mobility, non-lethal and C2 on the move. (Ref: FCS Public Briefings presented on Industry Day Ypsilanti MI on January 11, 2000.)**





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"LIGHT" GUNS

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- **PREVIOUS "LIGHT" LARGE CALIBER CANNON DEVELOPMENTS**
  - **152 MM Gun on M551 SHERIDAN**
  - **155 MM M776 on XM777 LW155**
  - **120 mm XM291 on M1 THUMPER**
  - **105 MM M35 on M8 AGS**
  - **105 MM M35 on LAV 105**
  - **105 MM M68A1E4 on STRYKER (BCT)**
  - **90 MM Cockerill on the LAV**
  - **ARES 75 MM & 90 MM CTA**

SWING CHAMBER CANNON IS PART OF THE MULTI-ROLE ARMAMENT & AMMUNITION SYSTEM (MRAAS)

FUTURE COMBAT SYSTEM & MRAAS

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- **FCS CONCEPT - HOW MRAAS FITS INTO IT.**
  - **MRAAS IS COMPOSED OF A GROUP OF TECHNOLOGIES BEING PURSUED BY TACOM ARDEC IN SUPPORT OF THE FCS, INCLUDING NEW AMMUNITION, AUTOLOADERS, ETC.**
- **MRAAS TEAM**
  - **FOCUS ON ARMAMENT COMPONENTS INTEGRATION**
  - **USE OF INTEGRATED DATA ENVIRONMENT IS ENSURING TIGHT INTERFACE AND TEAM OPERATION**
  - **GDLS CHOSEN AS PRIME CONTRACTOR TO DEVELOP WEAPON CONTROL SYSTEMS AND INTEGRATE THE TURRET MISSION MODULE.**

MRAAS
TECHNOLOGY RISK ASSESSMENT

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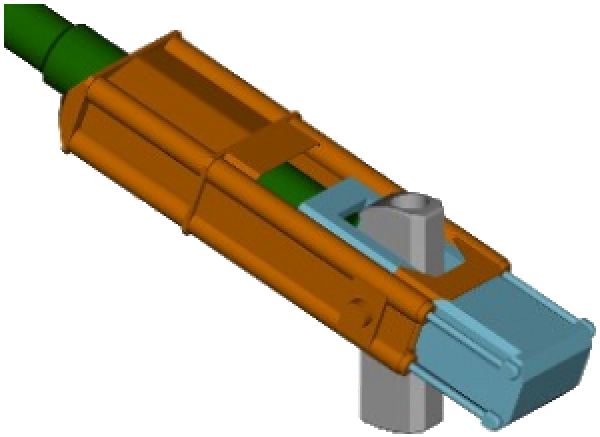

KEY FEATURES - LAUNCHER

- REDUCE ARMAMENT VOLUME/ WEIGHT
- DECREASE AUTOLOADER COMPLEXITY
- INCREASES RATE OF FIRE
- UTILIZES HIGH STRENGTH GUN STEEL
- COMPOSITES & TITANIUM
- CONTROL SYSTEM W/ SENSORS

Risk to Attain

	Current TRL	TRL 5 by 4/15/03	TRL 6 by 4/15/04	TRL 7 by 9/30/05
WEIGHT	4			
ACTUATION TIME	4			
SEALING	3			
HIGH STRENGTH STEEL	4			

RISK LEVELS

- HIGH
- MED/HIGH
- MEDIUM
- LOW/MED
- LOW

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MRAAS
OBJECTIVES & CONCEPT

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- **MRAAS OBJECTIVES**
- **MRAAS CONCEPT**
  - **NOT A GUN BUT A 'LAUNCHER'**
  - **CLEAN SHEET OF PAPER – AMMO AND 'LAUNCHER'**
  - **BASED ON A NUMBER OF NEW/OLD TECHNOLOGIES**
    - **SWING CHAMBER ARES GUN**
    - **XM25 120 MM TUBE**
      - COMPOSITE OVERWRAP
      - DYNAMIC STRAIN COMPENSATED
      - LONGER THAN M256
    - **INTEGRAL MUZZLE BRAKE**

MRAAS
TECHNOLOGY THRUSTS

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- **MRAAS COMPATIBLE WITH SEVERAL GUN & LAUNCHER TECHNOLOGY THRUSTS BEING EXPLORED FOR MRAAS:**
  - **COMPATIBLE WITH ETC**
    - **ORIGINALLY DEVELOPED BY UDLP – TESTED ON XM291**
  - **COMPATIBLE WITH FIRE-OUT-OF-BATTERY (FOOB)**
    - **TESTED ON M35 TEST BED**
  - **COMPATIBLE WITH RAVEN**
    - **PM-TMAS SUPPORTED**
    - **TESTED IN 30 MM TEST BED**
  - **DYNAMICALLY TUNED SHROUD**
    - **PM-TMAS SUPPORTED**

MRAAS
MODELING & SIMULATION

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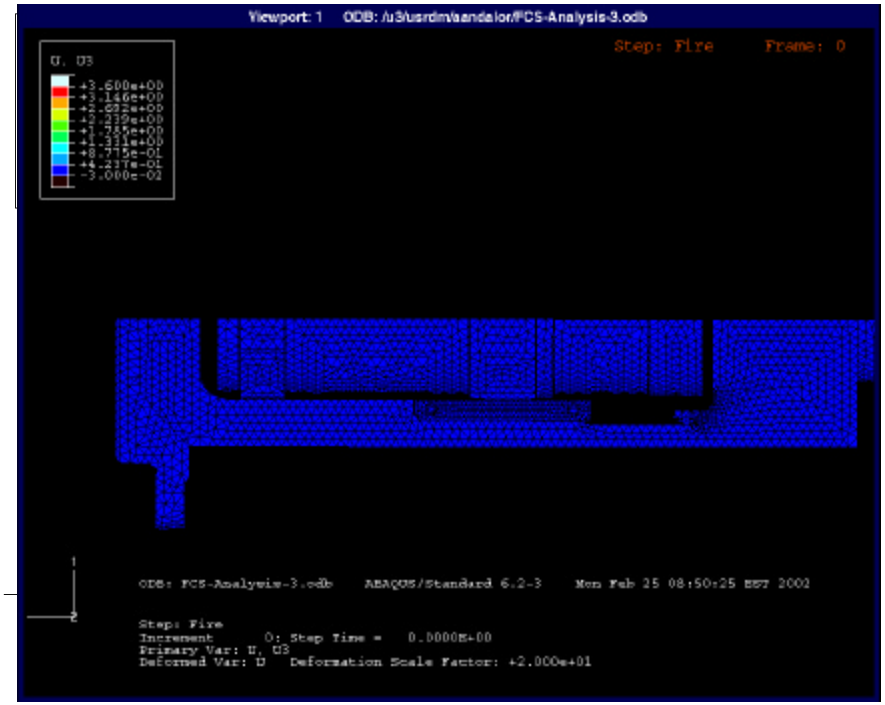
- AS PART OF MRAAS DEVELOPMENT, EXTENSIVE USE IS BEING MADE OF MODELING & SIMULATION AND NEW TOOLS ARE BEING DEVELOPED TO SUPPORT THIS
  - MUZZLE BRAKE COMPUTATIONAL FLUID DYNAMICS TOOLS (SUPPORTED BY PM TMAS & ARMY TECHNOLOGY)
  - LINEAR/NON-LINEAR FEA
  - DYNAMIC FEA
  - COMPOSITE FEA
- CASTING MODELS
- PRO-ENGINEER ®
- SIMBAD ® –TUBE DYNAMICS
- MATLAB® & DADS®



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MRAAS - DESIGN DETAILS

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- DATA
  - 105 MM SMOOTHBORE TUBE
  - SWING CHAMBER BREECH
  - 270 VDC ALL ELECTRIC DRIVES
  - INTEGRAL CONTROL SYSTEM (SAVA)
  - CASE TELESCOPED AMMO (CTA)
  - DATA (FOR TRL 7 MODEL)

• TIPPING PARTS WEIGHT	3000 lbs	1360 kg
• RECOILING PARTS WEIGHT	2400 lbs	1089 kg
• LENGTH (LAUNCHER)	256.8 in	6524 mm
• WIDTH (LAUNCHER)	19.5 in	496 mm
• HEIGHT (LAUNCHER)	12.4 in	316 mm

MRAAS - LAUNCHER

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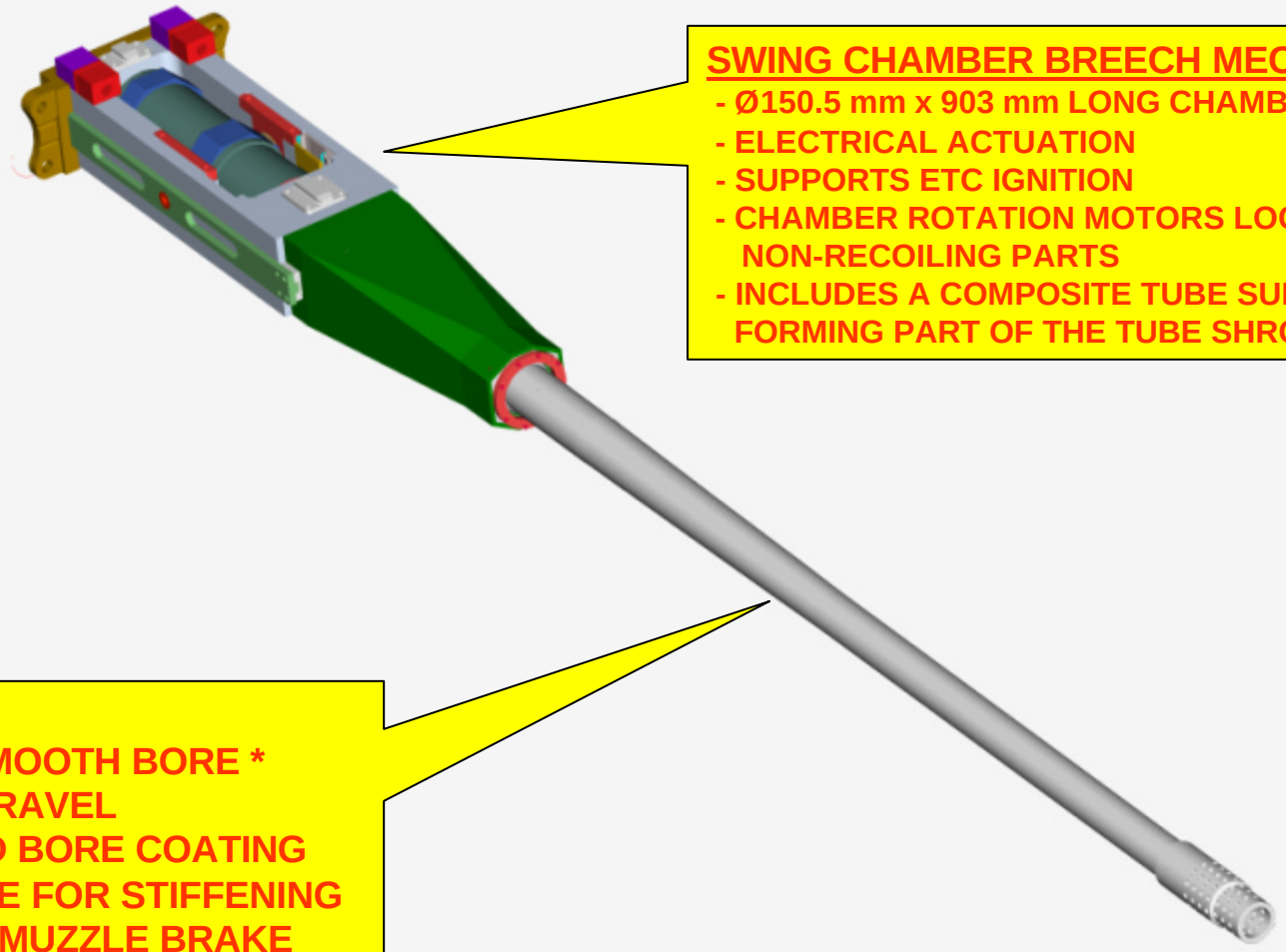

SWING CHAMBER BREECH MECHANISM
- Ø150.5 mm x 903 mm LONG CHAMBER
- ELECTRICAL ACTUATION
- SUPPORTS ETC IGNITION
- CHAMBER ROTATION MOTORS LOCATED ON NON-RECOILING PARTS
- INCLUDES A COMPOSITE TUBE SUPPORT FORMING PART OF THE TUBE SHROUD.

GUN TUBE
- 105 mm SMOOTH BORE *
- 5400mm TRAVEL
- ADVANCED BORE COATING
- COMPOSITE FOR STIFFENING
- INTEGRAL MUZZLE BRAKE

MRAAS - Critical Milestones

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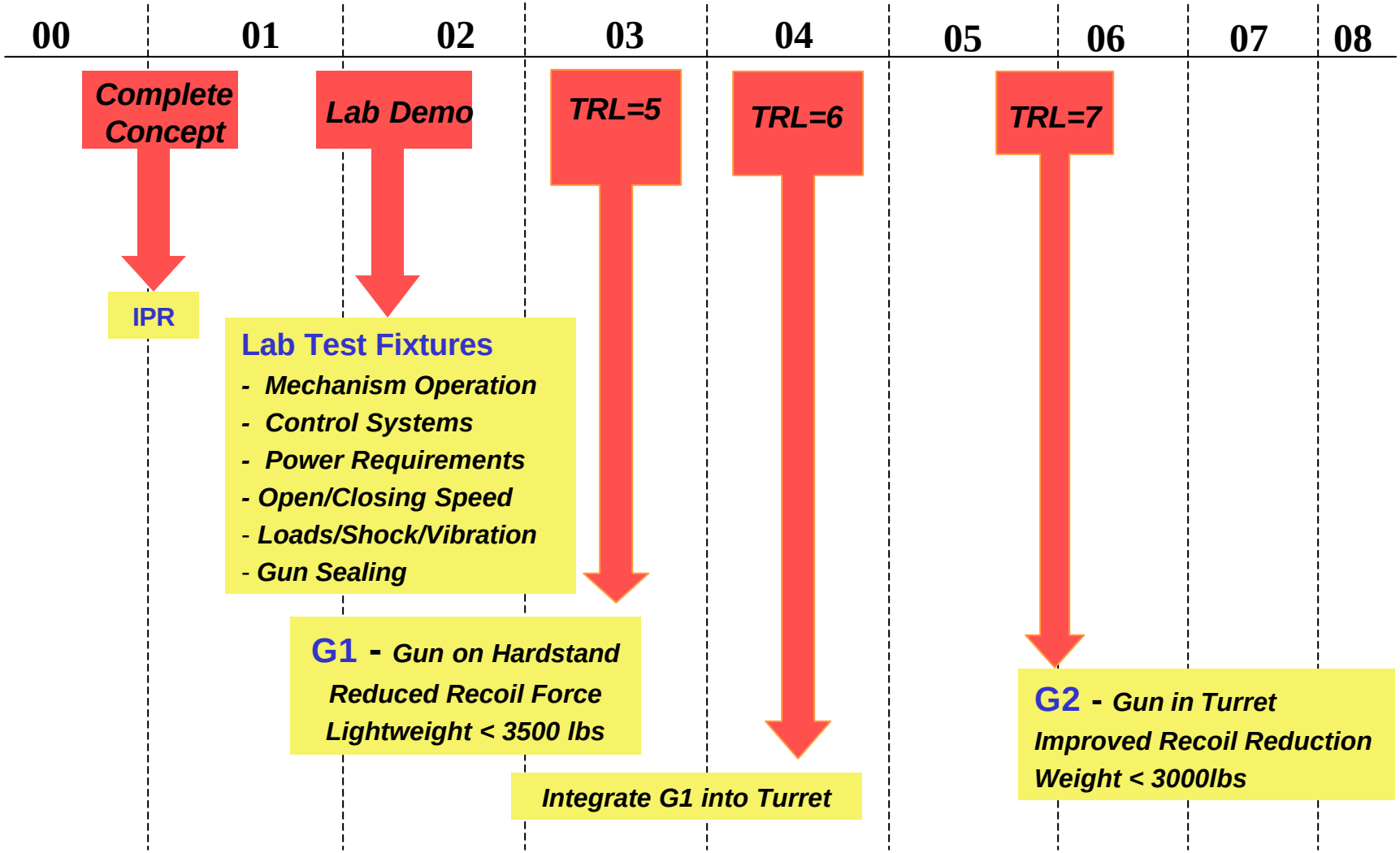
(Fiscal Year)



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MRAAS
RISK MITIGATION ACTIVITIES

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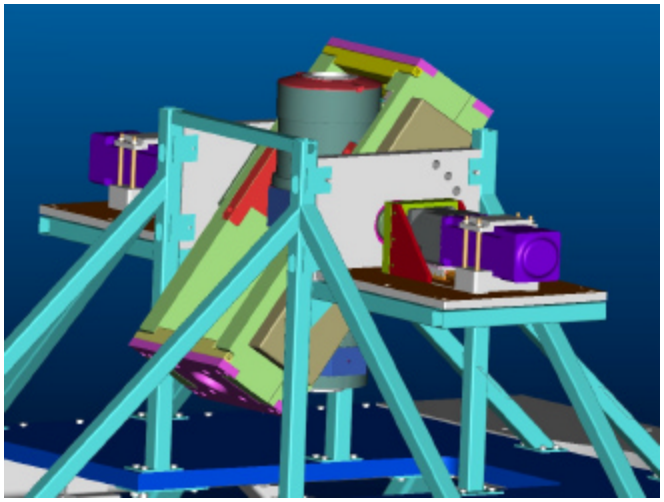
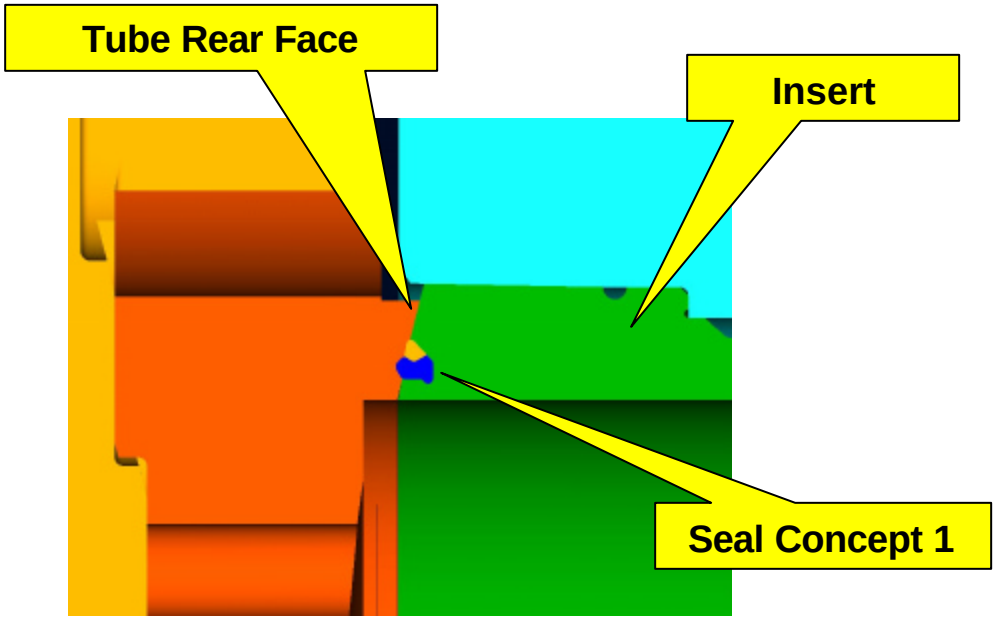
- SWING CHAMBER TEST FIXTURES
  - USED TO DEVELOP SOFTWARE
  - VALIDATE TIMELINE ACTIVITIES
  - VERIFY ASSEMBLY FIT(S)



- SEAL TEST FIXTURE
  - USED TO VERIFY GUN SEAL PERFORMANCE.
  - USES BENET 'H-FIXTURE'



MRAAS CONCLUSION

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MRAAS IS INTEGRAL TO A FUTURE COMBAT SYSTEM (FCS) THAT PROVIDES A LETHAL OVERMATCH