LMM
Lightweight Multirole Missile
Introduction

Lightweight Multirole Missile (LMM) is a lightweight, precision strike missile, which has been designed to be fired from a variety of tactical platforms including helicopters, fixed or rotary winged Unmanned Aerial Vehicles (UAVs), wheeled or tracked vehicles or fast inshore naval craft.

The target set includes surface threats such as static installations, Armoured Personnel Carriers (APC), asymmetric threats, fast inshore attack craft and UAVs.

The precision guidance and low collateral damage mean that LMM is optimised for operation in an urban environment.

The missile, sealed in its canister, consists of a two stage motor, warhead and dual mode fuze, together with guidance electronics and a highly accurate control actuator system. The missile has different guidance modes including laser beam riding and/or laser designation to ensure precision attack of targets with man-in-the-loop or automatic guidance. The fragmenting shaped charge warhead coupled with the laser proximity fuze provides excellent lethality against a wide range of targets. This is achieved with low collateral damage which is essential in built-up and urban environments.

LMM guidance is provided via the optical tracker system fitted to the launch platform. This guidance unit is contained within an optically stabilised mount which normally comprises Charged Coupled Device (CCD) and thermal cameras coupled with an Automatic Target Tracker (ATT) and the missile laser guidance unit.

On target indication, the weapon operator acquires the target in the display monitor. The ATT is directed onto the target by the operator and he engages the ATT, which locks a box around the threat. When the target is within range the operator selects 'System On' and presses the firing trigger. The missile is launched and guided automatically to the target. Throughout the engagement the operator has the executive ability to override the ATT by placing the system in manual guidance mode.

LMM possesses excellent lethality against conventional and asymmetric threats including APCs, wheeled and tracked vehicles, because of the shaped charge coupled with the pre-fragmented blast warhead, matched with the highly sensitive proximity fuze.
The Laser Proximity Sensor has a detection radius of 1 m and 3 m selectable by the operator before launch to provide detonation against all target types. The sensor also has an impact crush switch to initiate the warhead detonation on impact. The high precision Central and Actuation System (CAS) and control surfaces provides the LMM munition with the ability to perform high latency maneuvers to engage moving targets.

The Guidance Processing Unit (GPU) consists of processing hardware and embedded autopilot software, to provide precision guidance commands to the CAS.

The Inertial Measurement Unit (IMU) is a 6-DOF IMU and provides a precise reference for the munition through flight.

The Safe Arm Unit (SAU) ensures that the LMM munition has completed the defined sequence of events within specified time windows to arm the warhead and initiate a detonation when commanded by proximity/impact sensors, or a self destruct command as appropriate.

The fragmenting shaped charge warhead provides excellent proven lethality against a wide range of conventional and asymmetric threats. In the naval domain the system can specifically destroy threats from small ships to fast inshore attack craft. In the land domain the system possesses excellent proven lethality against APCs, artillery and wheeled and tracked vehicles with low collateral damage which is essential in built-up and urban environments.

The missile has a first and second stage rocket motor. The first stage motor ejects the missile from the launch tube providing a zero recoil system with a low blast over-pressure profile. After ejection from the launch canister the missile coasts to a safe distance from the launch platform (approximately 10 m down range). The second stage motor then ignites which accelerates the missile to its maximum velocity. Second stage motor burn time is approximately 1 second.

The Tail Unit fins deploy after launch from the canister and include the Laser Receivers which look back towards the launch platform to detect the guidance beam. The receiver modules are tuned optically and electrically to detect the lower power laser information field and provide the positional reference of the missile in flight to the GPU.

**Key Features**

- **Max Range:** >6 km (Surface Launch)
- **Min Range:** <400 m
- **Guidance:** Laser Beam Riding
- **Max Mach:** ~1.5
- **Diameter:** 76 mm
- **Length:** 1.3 m
- **Max Weight:** 13 kg
- **Warhead:** Dual Effect, Blast Fragmentation and Shaped Charge
- **Fuze:** Impact and Proximity Modes, selectable pre-launch
- **Propulsion:** 2 Stage Solid fuel, Low Smoke Propellant
- **High level of Insensitive Munition compliance**
- **Immune to all known Countermeasures**

**LMM Sub-Systems**

The main LMM sub-systems are:

- Laser Proximity Sensor
- Control and Actuation System (CAS)
- Guidance Processing Unit (GPU)
- Inertial Measurement Unit (IMU)
- Safety and Arming Unit (SAU)
- Warhead
- 2 Stage Rocket Motor
- The Tail Fins and Laser receiver modules

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**LMM Land Target Set**

**Land Threats - Conventional Armour & Asymmetric Vehicles**

**LMM Naval Target Set**

**Fast Inshore Attack Craft, Patrol Boats, Mission Kill Larger Ships**

**LMM Air Target Set**

**Border Protection Air Threats – Helicopters, Light Aircraft and UAVs**

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**Comprehensive Defence Solution**

**Naval CONOPS**
- Layer Defence Solution for Naval Environment
- Inner Layer - Ship Defence Weapon
- Intermediate Layer - Patrol/Interceptor Craft Weapon
- Anti-Fast In-shore Attack Craft (FIAC)
- High Firepower to Defeat Swarm Attacks
- Precision Strike Capability for Amphibious Assault
- Transformational Capability for Interceptor/Patrol Boats
- Extended Missile Coverage Complements Traditional short range coverage of small Calibre Guns
- Point Defence against Air Threats - Helicopter, Light Aircraft and UAV Targets

**Land CONOPS**
- Precision Attack Conventional Armoured and Asymmetric Threats
- Armoured Personnel Carriers, Vans, Cars and Troops in the open
- Scout and Border Control Missions
- To defeat terrorists who are deploying increasing firepower
- Rapid Response Platforms
- Lightweight Systems maintains platform mobility
- Vital Asset and Coastal Protection - Gulf Region
- Border Protection - Critical Infrastructure
- Point Defence against Air Threats - Helicopter and UAVs
Naval Applications

The maritime environment creates a major challenge to conventional missiles in engaging Fast In-shore Attack Craft (FIAC) threats, due to their high mobility, small signature, and the severe background clutter.

The compact and lightweight characteristics of LMM coupled with the recoilless launch of the 2 stage motor system makes LMM ideal for the weaponisation of small tactical platforms operating in naval environments.

The fragmenting shaped charge warhead provides excellent proven lethality against a wide range of conventional and asymmetric threats. In the naval domain the system can specifically destroy threats ranging from FIACs to small ships as well as UAVs and maritime helicopters.

Stabilised Sighting System

The Stabilised Electro-Optics provides high-resolution IR and TV sensors and a Laser Rangefinder. The unique LMM laser guidance beam is generated from a sophisticated Laser Transmitter Unit (LTU) which projects low power coded signals direct to the LMM in flight.

Man Machine Interface (MMI)

The Missile Launching System is controlled by a single operator crew station. The Crew Station provides a high-resolution display of the sensor image and provides immediate access controls on 2 handgrips. Configuration and set-up data are entered using an integrated keypad. The MMI provides essential safety switches and interlocks to ensure safe operation of the system.

Thales has identified 3 potential configurations for the maritime environment:

- LMM weapon system customised for integration on a fast patrol boat
- An all-in-one weapon system for larger naval platforms
- A hybrid missile/gun system composed of LMM integrated with naval guns
LMM on Helicopters

High Fire Power Maritime Surveillance and Strike Helicopters

Integrated onto a helicopter platform, the system can specifically destroy threats from small ships and fast inshore attack craft or threats from light aircraft, UAVs or micro-lites.

Thales is developing LMM, for the UK MoD Future Anti-Surface Guided Weapon Light (FASGW(L)) requirement. This programme will deliver a stand off weapon effect for the Wildcat helicopter. A five pod missile launcher will be integrated for the FASGW(L) requirement however different launcher configurations for the LMM Weapon System are available dependent on the application.

Features and Benefits

- 8 km strike capability
- Up to 20 LMMs payload on tactical helicopters
- Defeat of swarm/saturation attack
- Defeat of land targets: Asymmetric threats and APCs in Littoral environment
- Air to Air Engagement/Counter UAV - operational flexibility
LMM on Land

Lightweight Multiple Launcher - Next Generation (LML-NG)

The Lightweight Multiple Launcher - Next Generation (LML-NG) provides a cost effective multi-engagement capability against a wide range of threats, utilising the Lightweight Multi-Role Missile (LMM).

The LML-NG system can be used on a tripod or vehicle mount and supports swift deployment of the Lightweight Multirole Missile (LMM). The system provides two ready to fire missiles, allowing it to handle saturation air attacks or provide a complimentary surface to surface capability.

The man-portable system is designed to suit a wide range of missions from lightweight rapid reaction roles to air droppable operations.

The LML-NG employs two missiles and a self-contained sensor assembly enabling targets to be engaged in quick succession. It can be used free standing on any firm surface or from a trench.

- The LML-NG is a manually operated Firing Unit for LMM missiles that offers day and night operation capability.
- The Sensor Unit contains an IR and TV Camera, the guidance laser with associated laser beam steering components, motion sensor, and control electronics.
- The Sensor Unit projects a space stabilised LIF that guides the Missile to the target.
- The High performance IR and TV Cameras provide superb surveillance, detection, and target tracking capabilities in daylight and at night. The IR and TV Cameras ensure maximum availability and surveillance and target recognition.
- The position of the Laser Information Field (LIF) in space is indicated to the operator by super-imposing an electronic aiming mark on the image from the Thermal Imager. The position of the aiming mark can be adjusted by the Operator to ensure that it is maintained on the target and therefore automatically guides the missile to the target.

RAPIDRanger

The RAPIDRanger is a newly designed Weapon System equipped with the latest generation of focal plane array IR and TV target tracking sensors mounted on an inertially stabilised tracking head. By utilising a high degree of system automation and a sophisticated automatic target tracking system, RAPIDRanger can detect and track a wide range of low signature targets.

RAPIDRanger can accommodate a number of configuration options and is ready for integration with a C4I network, or a choice of autonomous surveillance sensors.

The servo driven turret has a payload of four ready-to-use LMMs. In addition the Weapon System is designed to enable the launch of other missile types, which the RAPIDRanger fire control system automatically detects, thus fully exploiting the multirole capability.

The compact RAPIDRanger Launcher can be integrated onto a range of lightweight vehicles to enable rapid force projection by C-130 transport aircraft.

RAPIDRanger provides an extremely versatile system with the following capabilities:

- Target engagements with LMM
- Destruction of targets before they release their weapons
- Lightweight, mobile and flexible integration and deployments
- High accuracy guidance and targeting for precision strike
- The ability to cut-down the weapon and maintain total control of the engagement
Thales provides an unrivalled heritage in missile design, development, manufacture and weapon system integration. The facilities and resources available to Thales for the design and manufacture of missiles and related defence systems are among the finest in the industry. Production facilities are equipped to world-class manufacturing standards, employing precision machines, capable of working to micron tolerances, and including facilities for electromechanical and optical assembly of missile system components.

In addition, Thales has significant research capabilities and extensive expertise in systems simulation, complex system testing, missile trials and vehicle systems integration.

Thales is in the unique position of being able to offer its customers a portfolio of products ranging from man-portable missiles to fully integrated weapon systems.

1962
Seacat

1967
Tigercat

1975
Blowpipe

1984
Javelin

1989
STARBurst

1997
STARStreak

1996-2002
Hellfire

2001
VT1

2002
NLAW

2008
ADAPT (STARStreak Upgrade and Support)

2011
LMM

2014
RAPIDRanger

2014
FASGW

2015
LML-NG