




DENEL DYNAMICS

A large, blue, curved graphic element that spans the width of the page, resembling a stylized arc or a missile's trajectory, positioned above the tagline.

PROUD INNOVATORS OF COMPETITIVE MISSILES,
UAVS, INTEGRATED SYSTEMS AND SPACE SOLUTIONS

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DENEL GROUP VALUES
THESE VALUES ARE GIVEN AS A GUIDELINE FOR THE GROUP. BUSINESS ENTITIES ALTHOUGH SIMILAR, MAY SUBSCRIBE TO THEIR OWN SET OF VALUES.

 **Performance**
WE EMBRACE OPERATIONAL EXCELLENCE.

 **Integrity**
WE ARE HONEST, TRUTHFUL AND ETHICAL.

 **Innovation**
WE CREATE SUSTAINABLE INNOVATIVE SOLUTIONS.

 **Caring**
WE CARE FOR OUR PEOPLE, CUSTOMERS, COMMUNITIES, NATIONS AND THE ENVIRONMENT.

 **Accountability**
WE TAKE RESPONSIBILITY FOR ALL OUR ACTIONS.

DENEL DYNAMICS

Denel Dynamics has proved itself as an innovative leader in advanced systems technology. Its core business covers tactical missiles, precision guided weapons, Unmanned Aerial Vehicles (UAVS), integrated systems and Space solutions.

Known for its forward-thinking approach to providing solutions for clients – its track record reflects that most clients start and continue their business journey with Denel Dynamics as it continues to break new grounds to develop, upgrade and integrate world-class products.

Recent successful test flights yet again confirm excellent performance, denoting the desired outcomes and huge return on investment. Denel Dynamics' products find themselves amongst a catalogue of choice by the international defence market.

MISSILES

Proudly innovative, Denel Dynamics is a competitive missiles and UAV solutions company which forms part of the Denel Group, South Africa's largest manufacturer of defence equipment. The company's flagship R1bn A-Darter joint development air-to-air missile project with Brazil, and its successful relationship with the Finnish Navy using the Umkhonto surface to air missile, are ways in which Denel Dynamics is making the South African missiles industry fly internationally.

UAVS

Denel Dynamics is also South Africa's biggest supplier of Unmanned Aerial Vehicle (UAV) systems, respected for developing and producing some of the most rugged and reliable tactical UAV surveillance systems in the world. While power nations dominate the global market, there is scope for South Africa to use local skills to create market-leading UAVs for developing nations.

DENEL DYNAMICS - DENEL INTEGRATED SYSTEMS SOLUTIONS (DISS)

Denel Integrated Systems Solutions (DISS) has an established reputation as a main contractor and system integrator of complex systems with a broad spectrum of skills. This skill set enables DISS to address higher order systems at capability level, addressing not only system performance, but also in-service sustainability. Impartiality is crucial in systems thinking and for that reason DISS is totally product independent, ensuring that the best solutions are proposed to satisfy the client's needs.

SPACETEQ

Spaceteq, a new business unit in Denel Dynamics, a division of Denel SOC Ltd became operational on the first of July 2013. It will use the IP from DST, the ex-Sunspace people, and the heritage from work previously done by Houwteq, as a solid foundation on which to build an organisation that will develop satellite systems for the South African Government and also for International Clients.



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COMPANY OVERVIEW

Introduction

Past milestones, present trends and future battle space are the forces that shape the dynamic evolution of products and solutions from Denel Dynamics.

Today's competitive products are developed from a foundation of more than 45 years worth of design, development and production experience in the South African guided missiles and UAV business. Yet it is our solid reputation as a highly creative company, delivering quality product solutions, that serve as the anchor for continued success into the future

The Vision

Proud Innovators of Competitive South-African Missile, UAVS, Integrated Systems and Space Solutions

- Maintaining long-term mutually satisfying relationships with all our key customers
- Special deep and long-term strategic relationship with RSA DOD, Armscor and SANDF, now supplemented by the new SANSA and DST strategic relationship
- Exceptional ability to respond to unique customer requirements
- Innovative and creative designs that deliver robust and reliable product solutions

Denel Dynamics is situated in Irene, near Pretoria, South Africa, with the Spaceteq branch office in Stellenbosch and employs approximately 800 people (70% of our employees are technically highly qualified). Our commitment to sharing our success with small and medium enterprises has gained momentum to the extent that we have created a multiplier effect. Every one job within Denel Dynamics creates an additional four more jobs outside in the RSA economy.

A rich history

The launch of rocket research

Denel Dynamics has its roots in missile research, design and development, starting in 1964 with the establishment of the Institute for Rocket Research, which later became the National Institute for Defence Research at the Council for Scientific and Industrial Research (CSIR).



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MISSILES

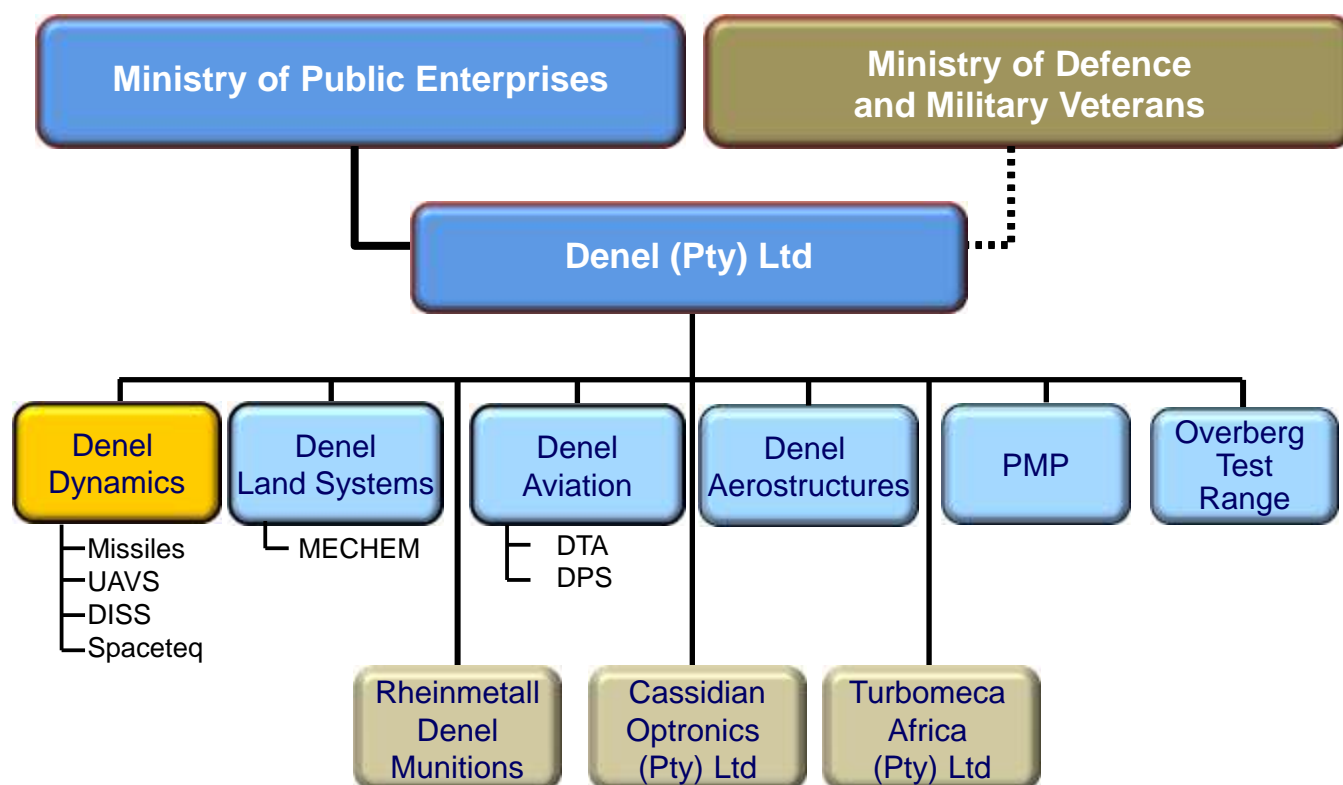
UAVS

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DENEL COMPANY STRUCTURE



CORPORATE GOVERNANCE

Overview

Corporate governance is the responsibility of the board as a whole and is guided by the company's memorandum and articles of association, the board charter, the Companies Act, no 61 of 1973 (amended), the Public Finance Management Act, no.1 of 1999 (PFMA), as well as various corporate governance guidelines provided by the King III Code and the global reporting initiative (GRI). Various other legislation and governance standards also guide the company's legal and disclosure obligations.

Denel subscribes to the principles of good corporate governance, including those advocated in King III, which essentially requires effective leadership that is able to integrate decision-making, strategy and sustainability. This also entails an inclusive and collaborative approach to stakeholder management. King III advocates an 'apply or explain' rather than 'comply' approach, with integrated sustainability being included as a core focus area of good corporate governance. The company has a mature corporate governance process that meets most of the King III requirements and fulfils the provisions of the new Companies Act, 2008. A review of the group's governance practices was carried out. This resulted in the updating of the following documentation, in accordance with the requirements of King III and the new Companies Act, 2008.

- Board charter
- The terms of reference for board committees
- Board and committee agendas and documentation

Corporate governance is standardised across the Denel Group to ensure consistent implementation and monitoring of the high governance standards set by Denel in all its operations.

The performance of the board and board committees, with respect to governance, was reviewed, and areas for improvement identified. These included stakeholder engagements, communications and formalised sustainability reporting processes. To address these, Denel has embarked on a number of initiatives.

UMKHONTO-IR

Surface-to-air Missile



The Umkhonto-IR missile is a vertically-launched, high-velocity, infrared homing missile specifically designed for providing all-round defence against simultaneous air attacks from multiple combat aircraft (fixed-wing or helicopter) and missiles.

The missile and associated subsystems are supplied as a missile group for easy integration into naval combat suites or ground-based air defence systems. The Umkhonto vertical launch SAM system was developed by Denel Dynamics for the SA Navy's Meko A200 class frigates, and is in service in both Block 1 and Block 2 versions. The Block 2 differs from the Block 1 primarily in having a seeker better suited to look-down engagements in a cluttered littoral environment and its 15 km range, 3 km further than the Block 1. Both are in service with the SAN; the Block 2 is also in service with the Finnish Navy aboard its Hamina class corvettes and Hämeenmaa class mine layers. The recent successful firing of Umkhonto missile at 20 km range means that the Umkhonto Missile now has a Block 3, the physical dimension of the missile has not changed.



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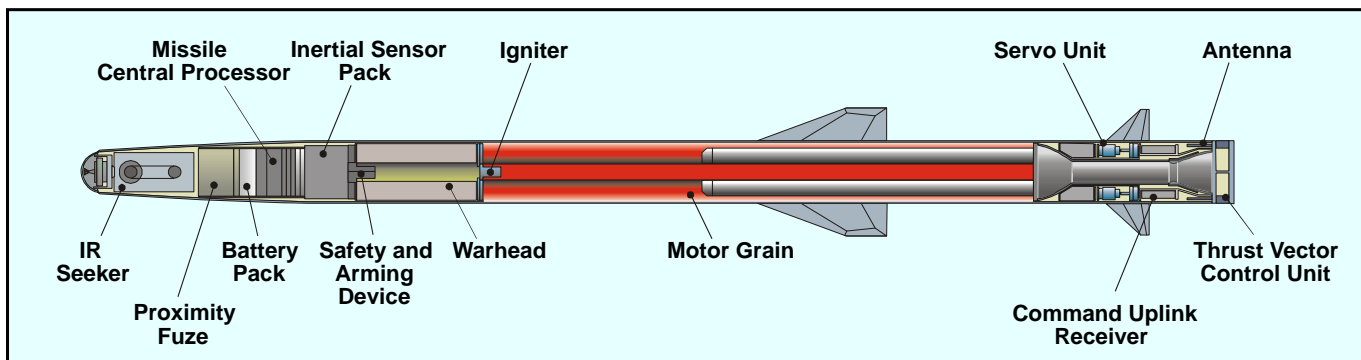
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SYSTEM FEATURES

- Multiple-target engagement (up to four targets)
- Ease of integration
- High-kill probability (23 kg warhead)
- Countermeasure resistance
- Absence of line-of-sight limitations
- Ease of maintenance (high BIT coverage)
- All-round (360°) coverage (with vertical launch)

SYSTEM OPERATION

- Target is acquired and tracked by 3D target acquisition radar
- Missile is launched and flies to a lock-on point, using an on-board inertial navigation subsystem
- IR seeker locks on and missile intercepts target under seeker control
- Continuous updating of target course from surface radar during missile flight, via a telecommand link, to enable engagement of manoeuvring targets

SYSTEM SPECIFICATIONS

Physical Characteristics

- Missile length : 3 320 mm
- Missile diameter : 180 mm
- Wingspan : 500 mm
- Launch mass : 135 kg
- Canister length : 3 800 mm
- Canister maximum: 650 mm diameter

Performance Characteristics

- Range : Max 20 000 m
- Ceiling : 8 000 m
- Maximum Mach No. : 2
- Time of flight to 8 km: 18 s

UMKHONTO-IR

Ground-based Launcher System: Land Application



The Umkhonto Ground-based Launcher (GBL) is a versatile, compact and mobile surface-to-air missile vertical launching system providing all-round defence against simultaneous air attacks from multiple combat aircraft (fixed- or rotary-wing) and missiles. The GBL is based on the proven naval system as used by local and international clients, and carries a combination of eight Umkhonto-IR MkII and Umkhonto-R missile rounds. The GBL is supplied as a stand-alone effector system for easy integration into bigger ground-based and naval air defence systems.



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LAUNCHER SPECIFICATIONS

Physical Characteristics

- Length : 6 058 mm
- Width : 2 438 mm
- Height : 2 000 mm
- Mass : < 4 500 kg (empty)
- Mass : < 7 100 kg (with eight IR missiles)
- ISO 668 Lock and STANAG 2413 hook-lift compliant

Missile Performance Characteristics

- Range : Max 20 000 m
- Ceiling : 8 000 m
- Maximum Mach No. : 2
- Time of flight to 8 km : 18 s



SYSTEM FEATURES

- Multiple simultaneous target engagement.
- Ease of integration with next level Command and Control Systems.
- Absence of line-of-sight limitations.
- ISO 668 Lock and STANAG 2413 hook-lift compliant.
- Transportable by land, sea and air (C130 and helicopter lifting).
- All-round (360°) coverage (with vertical launch).
- Rapid encampment/decampment possible due to highly mobile and autonomous features.
- Design allows for rapid reloading.
- Deployment on vehicle or stand-alone.
- Surface attack mode

SYSTEM OPERATION

- The GBL can be deployed either on a vehicle or stand-alone, and is connected to the Command and Control centre via radio, hard-wired or fibre-optic links.
- The GBL can be deployed on various ISO and STANAG 2413 compliant vehicles.
- The GBL operates autonomously for extended periods without significant replenishment requirements.
- The GBL is specifically designed to launch the well-known Umkhonto range of missiles using the designated homing principle.

INGWE

Precision-guided Missile



Ingwe (African for 'leopard') is a jam-resistant, beam-rider missile with a tandem warhead that will penetrate up to 1 000 mm of Rolled Homogeneous Armour (RHA) after a single layer of reactive armour. It is designed to operate with the minimum of logistics support, making it ideal for severe or isolated battle conditions. It is suitable for deployment by infantry, armoured and helicopter forces.



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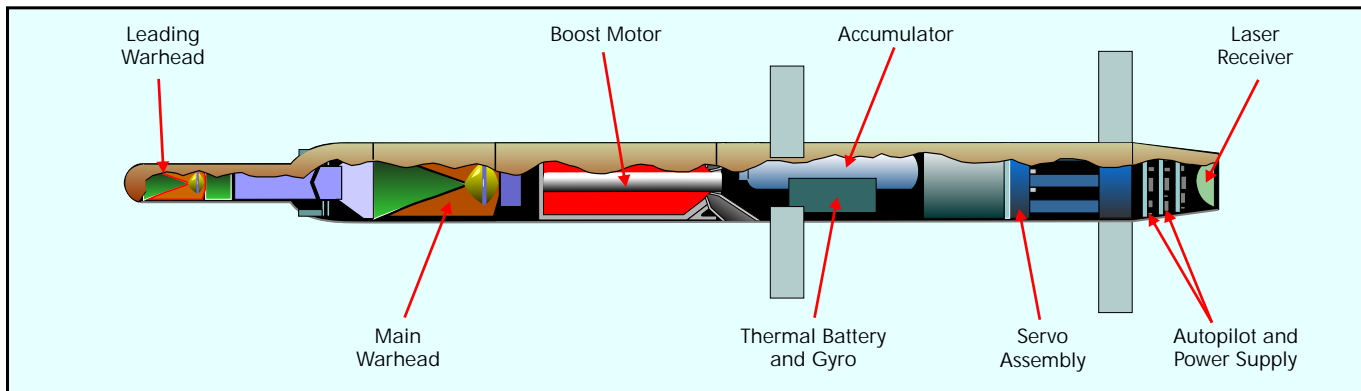
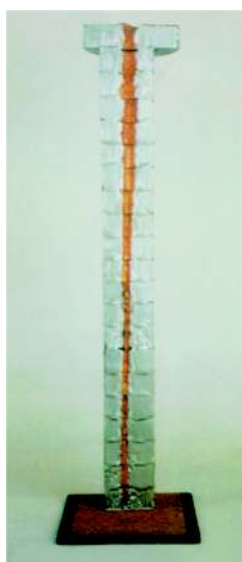


Photo: Courtesy Jane's



Actual Penetration in RHA

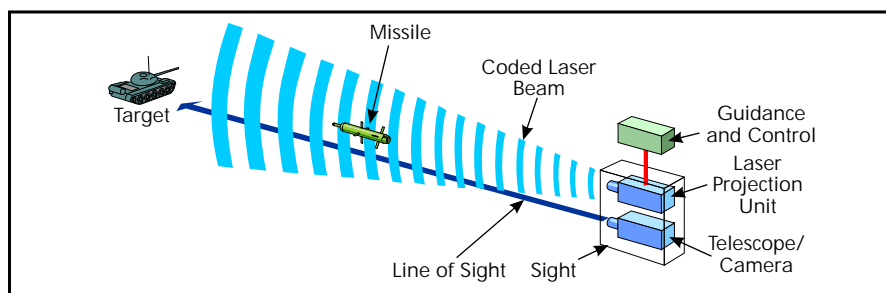
SYSTEM FEATURES

- Multi-purpose missile for use by infantry, armoured or helicopter forces against modern threats
- Crossfire capability from adjacent platforms
- High-speed launch from helicopter platforms
- Fire-on-the-move from land platforms
- High countermeasure resistance
- High-accuracy laser beam-riding guidance
- Short- and long-range application (250 m to 5 000 m)
- Easy to use, with automatic target tracking
- Low maintenance cost

PRINCIPLE OF OPERATION

Ingwe uses laser beam-riding guidance. The missile automatically determines its own position in the laser beam and manoeuvres onto the line of sight. The missile follows the line-of-sight until the target is hit. The warhead ensures effective target neutralization.

The sighting system can vary from a non-stabilized optical sight for light vehicles to a more complex and integrated stabilized day/night sight for moving platforms such as helicopters. Automatic target-tracking modules can be added to ensure fully automatic missile guidance after target lock-on by the operator.



SYSTEM DESCRIPTION

The system is designed to ensure that it can be installed easily on most aircraft in either standard two- or four-missile configuration.

Electrical integration with aircraft avionics is achieved with standard serial communication interfaces.

Other platform options include heavy IFV turrets fitted with stabilized sighting systems, to light vehicle- and even tripod-mounted solutions.

TECHNICAL DATA

- Missile mass : 28.5 kg
- Missile diameter: 127 mm
- Missile length : 1 750 mm
- Penetration : up to 1 000 mm in RHA (with ERA)
- Range : 250 m to beyond 5 000 m

IPLS INGWE

Ingwe Portable Launch System (IPLS)



The IPLS (Ingwe Portable Launch System) brings further flexibility to the already proven operational capability of the highly effective Ingwe anti-armour missile. The portable launch system provides a cost-effective anti-tank solution when installed on a Light Utility Vehicle (LUV) without compromising on performance.



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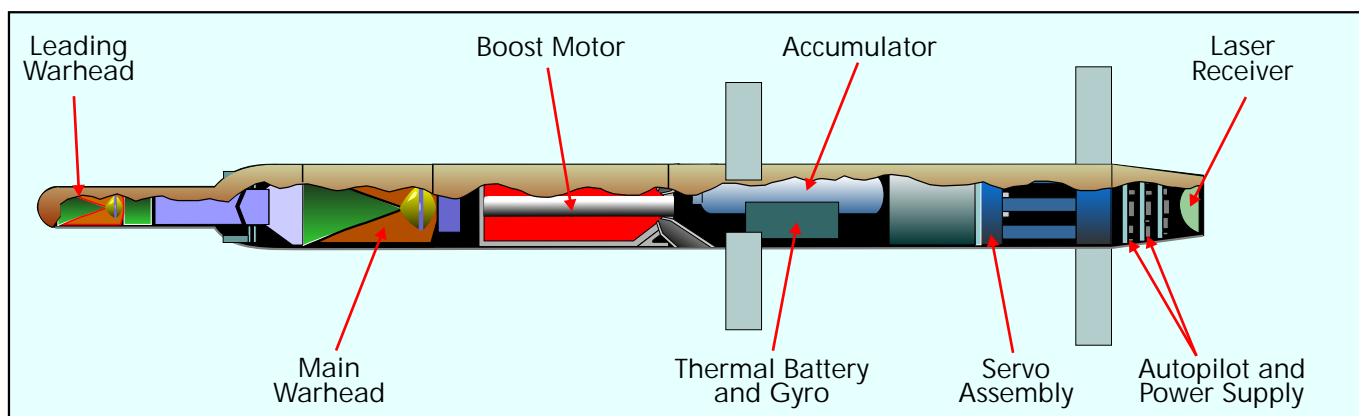
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SYSTEM FEATURES

- Manual operation with Day View Optical (DVO) telescope
- Crew portable in tripod configuration
- Easy to use with low maintenance
- High accuracy with advanced countermeasure resistance
- Upgrade options:
 - Thermal imager for night capability
 - Servo driven remote control
 - Two missile launcher
 - Auto tracker
 - Laser Range Finder (LRF)



PRINCIPLE OF OPERATION

Ingwe uses laser beam-riding guidance. The missile automatically determines its own position in the laser beam and manoeuvres onto the line of sight. The missile follows the line-of-sight until the target is hit. The warhead ensures effective target neutralization.

The sighting system can vary from a non-stabilized optical sight for light vehicles to a more complex day/night sight. Automatic target-tracking modules can be added to ensure fully automatic missile guidance after target lock-on by the operator if a thermal imager is fitted.

SYSTEM DESCRIPTION

The IPLS is a manually operated system adding to the operational effectiveness of the Ingwe Anti-armor Missile.

The IPLS is a cost-effective, portable single missile launch system. It offers flexible integration on light vehicles and is dismantlable onto a tripod.

TECHNICAL DATA

- Mass:
LRUs are manportable
- Dimensions
Swept circle diameter: 1 770 mm
- Elevation angles : -20° - +20°
- Sight performance:
DVO: 12 x magnification
- 24 V Electrical interface
- Adaptable to two missiles



ALRRT-4M INGWE

Armed, Long-range, Reconnaissance Turret (Alert)



The ALRRT (Alert) armed, long-range, reconnaissance turret adds to the operational effectiveness of the highly lethal Ingwe anti-armour missile. Available in a variety of configurations (four missiles, two missiles with a 7.62 mm calibre machine gun, etc.), the turret can be integrated on a wide range of vehicles from Light Utility Vehicles (LUV) to heavy Infantry Fighting Vehicles (IFV).



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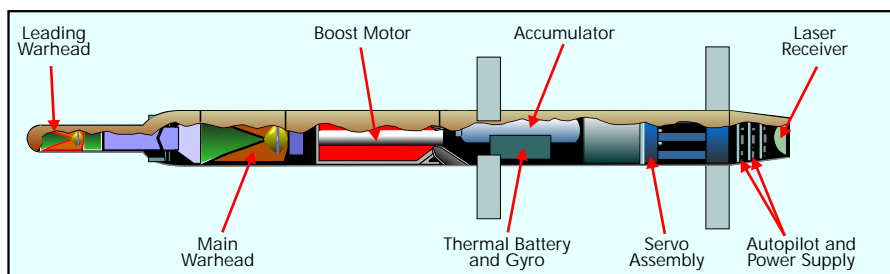
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SYSTEM FEATURES

- Stabilized for reconnaissance and fire-on-the-move capability
- Remote-controlled from inside or outside the vehicle
- Lightweight and unmanned (non-intrusive), allowing integration on a wide range of vehicles
- Full day and night capability coupled to automatic target-tracking
- Advanced state-of-the-art man-machine interface with colour displays
- Easy to use, with low maintenance cost
- High accuracy and advanced countermeasure resistance



PRINCIPLE OF OPERATION

Ingwe uses laser beam-riding guidance. The missile automatically determines its own position in the laser beam and manoeuvres onto the line of sight. The missile follows the line of sight until the target is hit. The warhead ensures effective target neutralization.

The sighting system can vary from a non-stabilized optical sight to a more complex and integrated stabilized day/night sight for moving platforms. Automatic target-tracking modules can be added to ensure fully automatic missile guidance after target lock-on by the operator.

TECHNICAL DATA

- Mass:
 - Turret only : 290 kg
 - Turret armed (four missiles) : 400 kg
- Dimensions:
 - Height : 668 mm
 - Turret swept circle diameter : 1 630 mm
 - Launcher swept circle diameter : 2 600 mm
 - Ring gear diameter : 960 mm
- Elevation angles : -10° to $+25^{\circ}$
- Sight Performance:
 - Recognition (target: tank, visibility > 23 km) :
 - 3 x TV fields of view:
 - WFOV (12°) : 950 m
 - IFOV (4°) : 2 700 m
 - NFOV (1.2°) : 6 300 m
 - 2 x TIS fields of view:
 - WFOV (6.25°)
 - NFOV (1.3°) : 7 350 m
- Integrated Auto-tracker
- 24 V Electrical interface
- Adaptable to two missiles and light machine gun configuration (2M-MG) turret



MOKOPA

Long-range Precision-guided Missile



Mokopa is a long-range, precision-guided missile that utilizes the semi-active laser guidance concept. Its high-performance, large-calibre tandem warhead will destroy any foreseen armoured threat.



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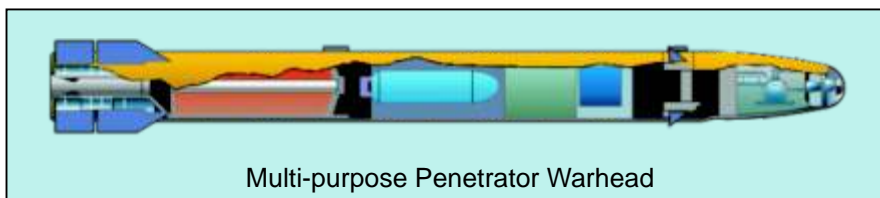
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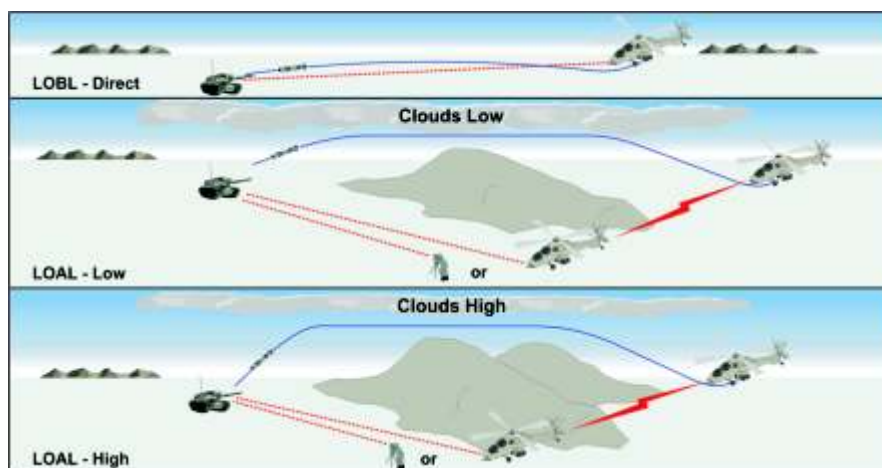
Multi-purpose Penetrator Warhead

SYSTEM FEATURES

- Multi-purpose, precision-guided missile may be used against a variety of targets and launched from various platforms
- Semi-active laser guidance upgradeable to fire-and-forget
- Excellent price/performance ratios
- Multiple warhead capability, including state-of-the-art tandem warhead (1 350 mm penetration)
- Modular airframe facilitates future upgrades as a common missile

DESCRIPTION

Mokopa is a state-of-the-art, long-range, precision-guided, anti-armour missile. It may, however, be used effectively against other high-value ground, air or naval targets from a variety of launch platforms such as land vehicles, shore battery installations, naval vessels and fixed-wing aircraft. The modular design of the missile allows for different warheads (e.g. penetration, fragmentation or anti-armour), optimized for the type of target. Furthermore, the modularity of the missile system facilitates pre-planned upgrades, such as mmW and IIR seekers, ensuring a continued presence in the market.



SYSTEM OPERATION (SAL VERSION)

Prior to launch, target information must be supplied via the on-board sighting system or from an external source. After launch, the missile flies towards the target area, using the selected trajectory and fly-out method. During the terminal phase, the target must be illuminated by the on-board sighting system or a remote designator.

SYSTEM DESCRIPTION

The Mokopa system consists of the following major components:

- 178 mm missile
- Launcher (two or four missiles)
- Support equipment

TECHNICAL DATA

- Missile mass : 49.8 kg
- Missile diameter : 178 mm
- Missile length : 1 995 mm
- Seeker : Semi-active laser homing
- Warhead : Tandem HEAT
- Penetration : > 1 350 mm RHA
- Range : 10 000 m

A-DARTER

Fifth-generation Air-to-air Missile System



A-Darter is a state-of-the-art, competitive, fifth-generation IIR air-to-air missile system. It is designed to meet the challenges of future air combat against next-generation fighters in a hostile ECM environment.

Denel Dynamics can be contracted for prime missile integration responsibility on your platforms, as a cost-effective solution.



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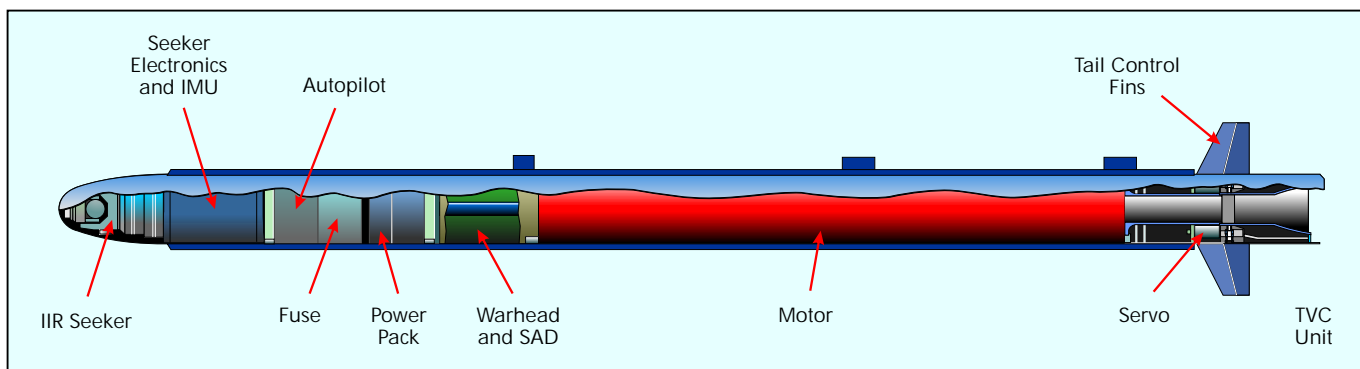
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SYSTEM FEATURES

- A-Darter is a leading wingtip fifth-generation Imaging Infrared (IIR) SRAAM that will enhance your platform's lethality
- Designed by Denel Dynamics (co-funded by Brazil), utilizing its 50 years of air-to-air missile experience
- High agility (thrust vector controlled) to handle the closest of close combats
- A two-colour thermal imaging seeker with high sensitivity and a multi-mode ECCM suite
- Advanced digital processing capability ensures improved performance in terms of image detection, false target rejection, ECCM, guidance and control
- Lock-on after launch and memory tracking capabilities
- A lightweight design compatible with traditional Sidewinder stations



PRINCIPLE OF OPERATION

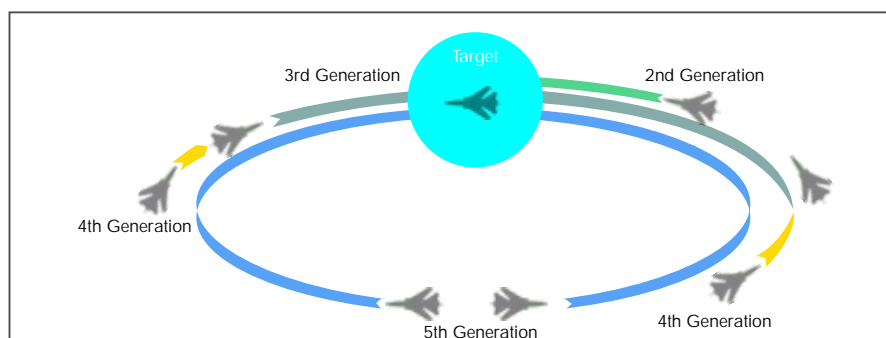
The A-Darter may be designated to a target by using the aircraft's radar, a helmet sight or the missile's very effective autonomous scan feature if radar silence is required. The seeker's large look-angles and the airframe's agility enable high off-boresight helmet-designated firings. Long-range intercepts beyond IR detection range are also possible with the lock-on after launch capability of the A-Darter.

AIRCRAFT INTEGRATION

The A-Darter missile can be integrated on the latest and older generation aircraft platforms. It has already been integrated on the JAS-39 Gripen. Integration on the Hawk Mk 120 is under way. The wingless missile design promotes a low-risk integration process.

TECHNICAL DATA

- Length : 2 980 mm
- Diameter : 166 mm
- Mass : 93 kg



RAPTOR II

Long-range, High-precision Guided Weapon



Raptor II is a long-range, high-precision guided weapon that can be launched from a variety of aircraft to achieve pinpoint accuracy for the destruction of high-value targets.

The modularity of the system ensures mission flexibility for optimum launch aircraft survival and target destruction.

Various system upgrades such as improved stand-off range and alternative seeker types are in progress.



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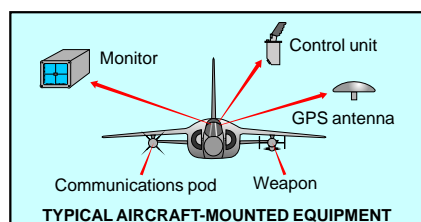
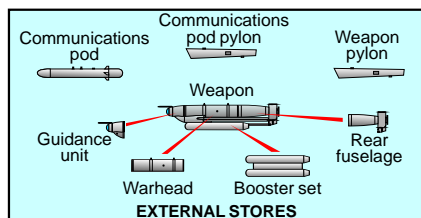
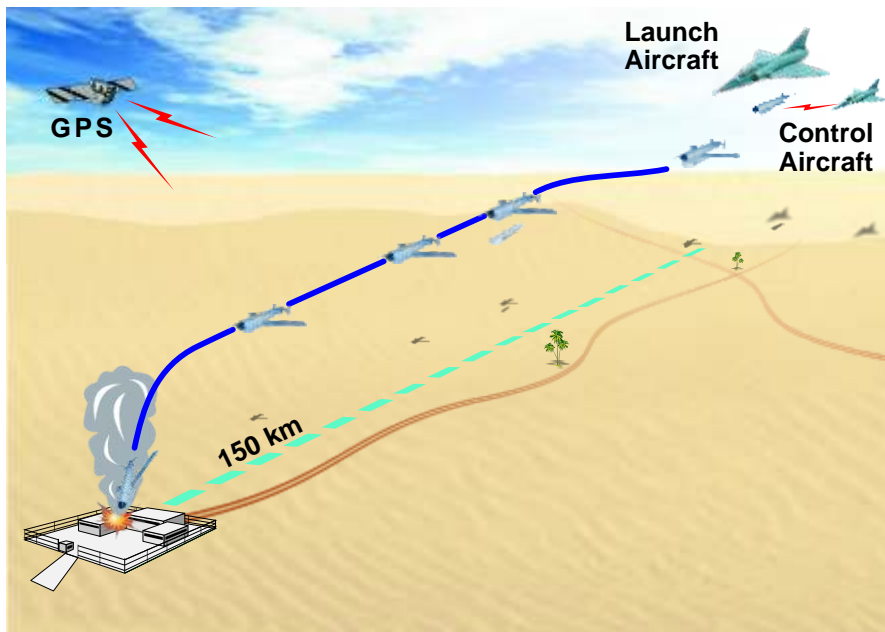
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SYSTEM FEATURES

- Extreme high precision
- Modularity allows for mission flexibility
- Heavy calibre warheads (600 kg)
 - Fragmentation (with airburst capability)
 - Penetration



- Multiple simultaneous target engagement
- Variety of seekers:
 - GNSS/INS
 - LLTV
 - IIR (with ATR)
- All-weather attack capability
- Ease of integration with older (strap-on) and new generation aircraft
- Enhanced robustness against GNSS jamming and spoofing
- In-flight target re-programming capability



SYSTEM DESCRIPTION

The Raptor II system flies autonomously to the target and is then designated on the intended point of impact by the operator. The Communications Pod is mounted on the launch aircraft or on a second aircraft, which allows for the control of the weapon over a separation distance of up to 200 km.

A set of cockpit display symbology indicates weapon and mission status.

The weapon allows for two methods of operation, depending on the Seeker used:

- MITL – The weapon will fly autonomously to the target. The operator designates the precise point of impact by means of an advanced auto-tracker.
- Fire-and-forget – GNSS/INS aided navigation.

AIRCRAFT INTEGRATION

Raptor has been integrated on the Mirage III/V, Mirage F1, Cheetah and SU-24. The system can also be integrated with other suitable aircraft, e.g. MiG-29, SU-27/30, Mirage 2000, and Tornado.

SIMULATION AND TRAINING

Mission planning is performed by means of the Ground-based System (GBS) utilizing geographic maps and/or photo-strips.

Operator training of the aircrew is also performed on the GBS, simulating the entire mission.



A low-cost multi-mission Airborne Trainer allows for cost-effective operator training. This trainer can be integrated on smaller light fighters for cost-effective operations.



AL-TARIQ

Precision-guided Bomb Kit



Al-Tariq is a family of strap-on bomb kit systems, used on Mk81, MK82 and MK83 bombs. Al-Tariq provides the user with all-weather, day or night operational capabilities, utilizing GPS/INS guidance.



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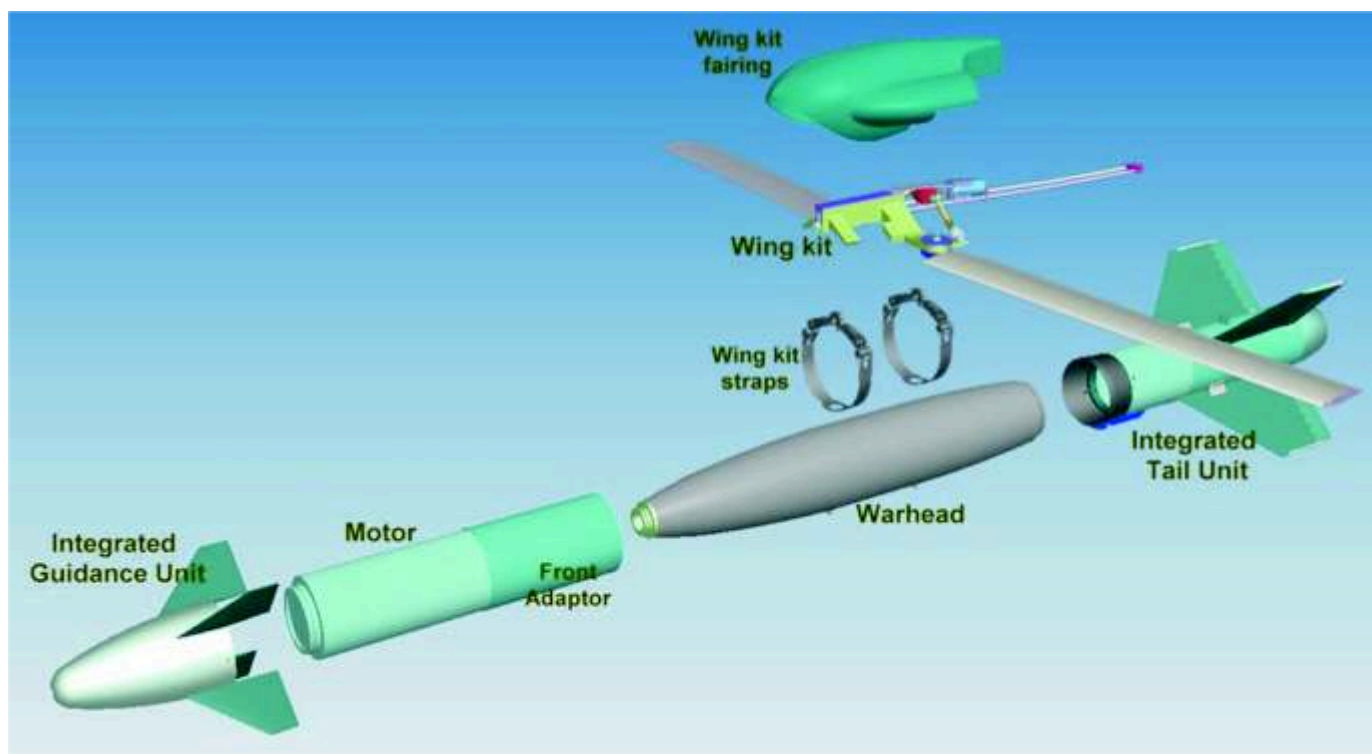
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DESCRIPTION

Al-Tariq is a family of strap-on bomb kit systems, used on MK81, MK82 and MK83 bombs. Al-Tariq provides the user with all-weather, day or night operational capabilities, utilizing GPS/INS guidance. Improved targeting accuracy can be achieved by using an Imaging Infrared (IIR) with complete Automatic Target Recognition (ATR) capability, or a Semi-active Laser (SAL) seeker. The system can also be fitted with an RF proximity fuze for area targeting, using a pre-fragmented warhead.

The Al-Tariq guided bomb kit forms part of a joint venture company (Tawazun Dynamics) between Denel and Tawazun in the United Arab Emirates aimed towards the international market.



SYSTEM FEATURES

- Autonomous target acquisition with long stand-off range
- Wing kit or motors may be added to increase stand-off range and low-level (straight and level) launch capability
- Programmable attack angle up to 90° (straight from above)
- Different adaptations possible, including seekers, fuzes and warheads, utilizing a common airframe



CHARACTERISTICS

- Range up to 120 km (depending on configuration)
- Accuracy as low as 3 m CEP (laser or IIR)
- Warhead: MK81, MK82 and MK83 and variants
- Large launch envelope
- Wireless integration capability with the launch aircraft
- Fully autonomous operation once released
- Modular system
- Low maintenance and life-cycle cost
- Minimal logistics equipment
- Ease of use
- Extended Range (ER) module can increase range to 200 km

TYPICAL MISSIONS AND TARGETS

- Offensive counter-air, e.g. hardened aircraft shelters, runway cratering, runway denial, aircraft on tarmac
- Battlefield interdiction, e.g. air defence units, surface-to-air missile launchers, supply columns (trucks)
- Deep battlefield interdiction, e.g. buildings, bridges and refineries, industrial areas
- Close air support, e.g. troops, artillery

SEEKER 200 UAS

Tactical ISR System



The Seeker 200 tactical Unmanned Aerial System evolved from the battle-proven Seeker II system. This feature-packed derivative offers an engine with long service intervals (> 250 h), long endurance, low noise levels (<70 dB open throttle at 1 000 ft AGL), short take-off distance (~ 300 m ASL) and a rapid rate of climb (~ 750 ft/min).

Other key features include: Automatic Take-off and Landing (ATOL); state-of-the-art avionics (Autopilot and Integrated Navigation Unit including a power PC); electro-optical multi-sensor payload combining EO/IR (day and night) and equipped with a Laser Designator (LD) and Laser Rangefinder (LRF); as well as numerous enhancements to the Ground Stations, Mission Control Unit and Tactical Ground Station (up to 16 waypoints, corridor flying capability, alternative loiter patterns, Digital Elevation Model (DEM)/Map datum, and video encryption).



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THE SYSTEM

The Seeker 200 System operates at ranges of up to 250 km from base and provides:

- Real-time day and night reconnaissance
- Target location
- Artillery fire support
- Electronic intelligence (ELINT)
- Its reliable communication link, modular design, high mobility and self-contained support provide an advanced system that has passed the real test of operational use.

The system comprises:

- Four to six unmanned aerial vehicles
- Tactical Ground Station (TGS)
- Payloads
- Field support equipment
- Optional MCU and TCU Units



SYSTEM FEATURES

Slant range surveillance:

- 250 km line-of-sight communication
- Redundant data links (two control links, one status and video link and one emergency link)
- Range and azimuth tracking for operation under GPS denial conditions
- Endurance: up to 10 h; 6 h over target at 250 km
- Service ceiling: up to 18 000 ft
- Multi-mission payload, excluding fuel: up to 40 kg
- Range extension capability via passing control of the UAV to a secondary TGS
- Deployment and flight preparation < 2.5 h



UAV

The Unmanned Aerial Vehicle (UAV) variants have an all-composite, low-drag airframe for optimum performance. The UAV's highly efficient engine and large fuel capacity provide up to 10 h endurance, a service ceiling of up to 18 000 ft and a payload capacity of up to 40 kg.

An on-board directional antenna gives high resistance to jamming and enables real-time communication up to 250 km from base.

TGS

The Tactical Ground Station (TGS) is compact UAV control station and is the main interface between the mission control crew and the UAV. With its high mobility and low footprint, the TGS provides for:

- Mission planning
- UAV control and monitoring
- Communications control
- Payload control
- Mission simulation

Workstations have identical hardware, with dedicated software enabling specific functions.

As a force multiplier a secondary TGS can be deployed to extend the range of Seeker 200 with ground stations placed up to 400 km apart.

The secondary TGS also allows control of the Seeker 200 UAV and its payloads, providing total mission independence.



MCU (Optional)

Like the TGS the Mission Control Unit (MCU) is the main interface between the mission control crew and the UAV. It provides for similar functions to those of the TGS.

For long-term deployments the MCU and TCU ground segments are available as options to provide greater comfort to the crew.

Workstations have identical hardware, with dedicated software enabling specific functions.

TCU (Optional)

The Tracking and Communications Unit (TCU) contains the tracking and communications equipment that maintains contact with the UAV. It is an unmanned, separate unit that can be located up to 80 m from the MCU, enabling it to be positioned for optimum line-of-sight communication.

The stand-alone TCU has the additional benefit of providing safety to the crew in the event of an air-to-ground weapon strike onto the TCU.

PAYLOADS

Several different payloads can be carried using 'plug and play' methodology.

Goshawk II HDT multi-sensor payload combining EO/IR (day and night) with integrated LD and LRF to 20 km, containing a single CCD with x20 zoom, a 3rd generation 3 - 5 μm IR camera with continuous zoom lens, automatic video tracker, azimuth and elevation gimbal, < 20 mrad stabilization. Histogram, edge, correlation and scene-based auto-trackers are available.

An ELINT Payload is available for radar emitter detection (0.5 to 18 GHz, 120-degree sector direction location, on-board emitter library). The man-machine interface is integrated into the ground control station.

To provide for multi-mission and multi-roles, optional COTS sensors and payloads like SAR, COMINT, SIGINT etc. can be integrated.

SEEKER 400 UAS

Multi-mission, Multi-role ISR System



For enhanced situational awareness

The Seeker 400 is an evolution of the battle-proven Seeker II UAS. This self-contained system with operational spares offers: a large payload carrying capability; high-definition video imagery; real-time data acquisition and transmission to remote receivers; autonomous take-off and landing capability; external wing hard points for carriage of external fuel tanks or weapons; multiple sensor payloads; manual and autonomous capability (flight control and payload control); brake-assisted ground operation; separate or combined shelter configurations for the Mission Control Unit (MCU) and Tracking and Communications Unit (TCU); and integration with customer-preferred payloads (such as Communications Intelligence (COMINT), Electronic Intelligence (ELINT) and Synthetic Aperture Radar (SAR)).



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THE SYSTEM

The Seeker 400 System operates at direct line-of-sight (LOS) ranges of up to 250 km from the base station and provides:

- Real-time day and night reconnaissance
- Target location and designation
- Artillery fire support
- ELINT and Electronic Support Measures (ESM)
- Border and Maritime patrol

The system comprises:

- Four to six UAVs
- MCU and TCU units
- Payloads
- Field support equipment
- Optional secondary MCU and TCU

WEAPONS

Laser-guided missiles and LD can be carried for armed reconnaissance.



SYSTEM FEATURES

- Direct 250 km LOS control range with >10h over target
- Range extension up to 700 km with passing control of UAV via the secondary MCU and TCU
- Up to 16 h endurance
- Up to 18 000 ft service ceiling
- 100 kg payload capability (excluding fuel but including optional emergency parachute)
- Dual links allow dual mission payloads
- Brake-assisted ground operation/taxing
- Piloted and autonomous flight capability
- Observer and autonomous payload control capability

- VHF and UHF FM Tactical Communications Radios Mode S Transponder and VHF AM radio for ATC interfacing. An IFF Transponder can be provided as alternative.
- MCU and TCU can also be supplied as a combined single shelter or housed in a building.
- System is air transportable in a single IL-76 or two C-130 aircraft.
- ATOL capability or external piloted take-off and landing.

UAV

The unmanned aerial vehicle (UAV) has a modular all-composite, low-drag design for optimum performance. The highly efficient engine and large fuel capacity provide up to 16 h endurance, service ceiling of up to 18 000 ft and payload capacity of up to 100 kg.

MCU

The Mission Control Unit (MCU) is the main interface between the mission control crew and the UAV. Its functions include:

- Mission planning and simulation
- UAV control and monitoring
- Communications control
- Dual Payload control
- Workstations have identical hardware, with dedicated software enabling specific functions.



TCU

The Tracking and Communications Unit (TCU) contains the dual redundant tracking and communications equipment that maintains contact with the UAV. It facilitates dual payload operation and transmission of high definition imagery. It is an unmanned, separate unit that can be located up to 200 m from the MCU, enabling it to be positioned for optimum LOS communication.

The stand-alone TCU has the additional benefit of providing safety to the crew in the event of an air-to-ground weapon strike onto the TCU.



PAYLOADS

S400 is capable of carrying dual imaging EO/IR payloads with gimbal diameters of up to 530 mm. The images are transmitted to the MCU via the dual high definition video downlinks. The following sensor combinations are typically included:

- Colour daylight camera with zoom lens; IR thermal imager with step fields of view
- Day colour or monochrome spotter camera; Night spotter camera
- Laser illuminator and LRF
- An ELINT Payload is available for detection and location of radar emitters.
- To provide for multi-mission and multi-roles, optional COTS sensors and payloads like SAR, COMINT, SIGINT etc. can be integrated.

HUNGWE UAS

For enhanced situational awareness



This small UAV has an all-composite, low-drag blended wing design that ensures optimum performance. It is fitted with a day or night payload. The communications link on-board the UAV enables real-time communication up to 100 km from base.

The UAV is catapult-launched and skid-landed.

SYSTEM FEATURES

The UAV has an all-composite, low-drag design that ensures optimum performance. It is catapult-launched and skid-landed. Hungwe offers the following features:

- Wing span of 4 m
- MTOW of 35 kg
- Direct Line-of-sight range of 100 km
- Up to 6 h endurance
- Up to 12 000 ft service ceiling
- Up to 5 kg day and night mission payload (fuel excluded)
- Piloted and autonomous flight capability

The system comprises:

- Two Unmanned Aerial Vehicles (UAVs)
- One Ground Control Station (GCS)
- Two payloads
- A launcher
- Field support equipment



GROUND CONTROL STATION

The GCS is portable, quick to set up and easy to use. It consists of the following components:

- Flight Management System, used for:
 - Mission planning
 - UAV control
 - Payload control
 - Status monitoring
 - Video display
- Antenna tripod, used for:
 - Transmission and reception of the radio frequency signal
 - Tracking the UAV

The GCS can easily be installed into a vehicle according to operational requirements and to provide for high mobility of the system.



APPLICATION

A few applications of the Hungwe are:

- Border patrol
- Anti-piracy operations
- Game park surveillance
- Battlefield support
- Law enforcement
- Search and rescue
- Pipeline surveillance

LOGISTICS

The UAS:

- Can be operational within one hour of arriving at the deployment site
- Can be disassembled and transported within less than an hour
- Is capable of being operated by a crew of two Hungwe is transportable in one single commercial 4 x 4 vehicle
- Overall dimensions of 3.0 m wingspan, 2.0 m (L) and 0.45 m (H) ensures portability and a small footprint

SKUA

High-speed Target Drone



The Skua is a high-speed target drone designed to simulate high-speed attack aircraft during weapon development as well as land, sea and air combat training.



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THE SYSTEM

The system comprises:

- Four to eight target drones
- Launcher
- Mobile ground control station
- Ground support equipment

Drone

The Skua is a high-speed target drone designed to simulate high-speed attack aircraft during weapon development as well as land, sea and air combat training. The Skua has an all-composite, low-drag airframe with a wingspan of 3.57 m and length of 6 m. Wing hard-points are provided to carry up to 130 kg of tow-targets and signature augmentation equipment. An internal bay can house a payload of up to 30 kg.

Launcher

The zero-length launcher is easily deployed. It includes self-loading and engine-starting facilities.



Ground Control Station

The mobile ground control station houses the control interfaces, telecommand and telemetry equipment required to control the drone. Tracking is done via position feedback from the drone's navigation system.



SYSTEM FEATURES

- Reliable communications link
- Easy deployment and recovery
- Large payload capacity
- Programmable missions
- Radar and infrared tow targets

PERFORMANCE

- Maximum speed: Mach 0.86 at 10 000 m
- Controllable range: 200 km (line-of-sight)
- Altitude: 150 m to 11 000 m
- Endurance: 60 min at 6 000 m and Mach 0.7
- Manoeuvrability: 5 g at 1 500 m

OPERATION

Deployment

The system is easily transportable by land, sea and air, and can be deployed in less than a day. No sophisticated range equipment is required for system operation.

Flight Control

Following launch, all flight path and drone manoeuvres are controlled by a telecommand and telemetry link between the drone and ground station. The drone can also fly autonomously to a programmed mission plan.

Recovery

A two-stage parachute system is used to recover the drone. The drone lands in an inverted horizontal position on pneumatic landing bags. It can also be recovered over water.



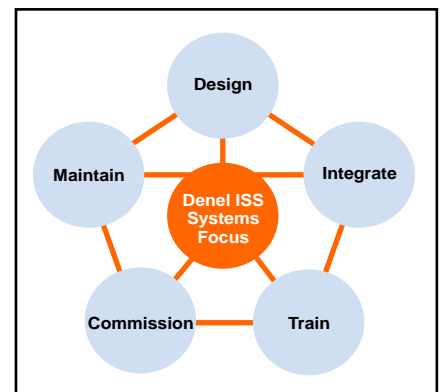
SABLE

Ground-based Air Defence System (GBADS)



The Sable Ground-based Air Defence System (GBADS) provides an advanced, integrated air defence capability based on proven products. Significant upgrade potential is provided through a design that will accommodate interfaces with future developments, both local and international.

Denel ISS, as prime contractor and system integrator, provides the following advantages: a focus on capability delivery in accordance with the client's requirements; single point of entry for the contracting of complex systems; single point of accountability; seamless integration of local and international participation; as well as architecture design, systems integration system engineering, baseline management and life-cycle support.



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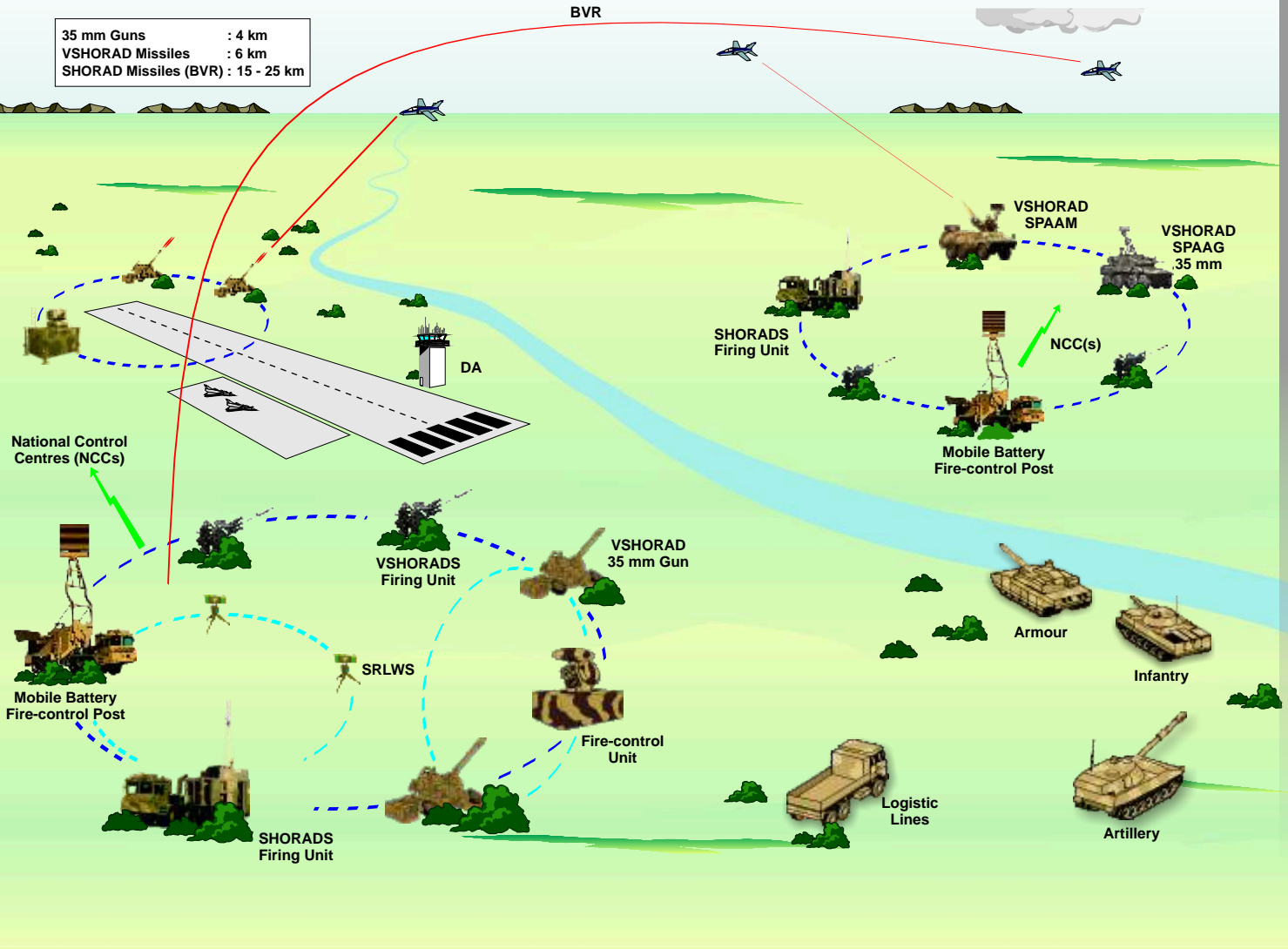
UAVS

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SYSTEM OPERATION



SYSTEM FEATURES

- Modern, fully integrated, layered GBADS for joint operations
- User-defined mix of missiles and guns in VSHORAD, SHORAD and extended SHORAD
- Operational features
 - Integrated BMC⁴I
 - Multi-layer air defence
 - Positive to procedural control (spectrum)
- Centralized and decentralized control
- Air-droppable subset
- High mobility
- Mechanized growth path
- Built-in management of redundancy/degradation
- Cost-effective
- Very high measure of safety (including prevention of fratricide)
- Comprehensive logistics support and training systems
- Modular system allows:
 - Phased or scaled acquisition
 - Incremental growth
 - Combination of latest technology with legacy systems

SPACETEQ



Spaceteq, a new business unit in Denel Dynamics, a division of Denel SOC Ltd became operational on the first of July 2013. It will use the IP from DST, the ex-Sunspace people, and the heritage from work previously done by Houwteq, as a solid foundation on which to build an organisation that will develop satellite systems for the South African Government and also for International Clients.

Value Beyond Africa

The technological impact of the South African satellite's engineering has been felt further afield. Two new young small satellite engineers were able to make successful contributions to the 2011 Australian and Austrian chapters of the International Space University Summer School programs based on the learnings gleaned from SumbandilaSat. The value extends far beyond the initial project itself.



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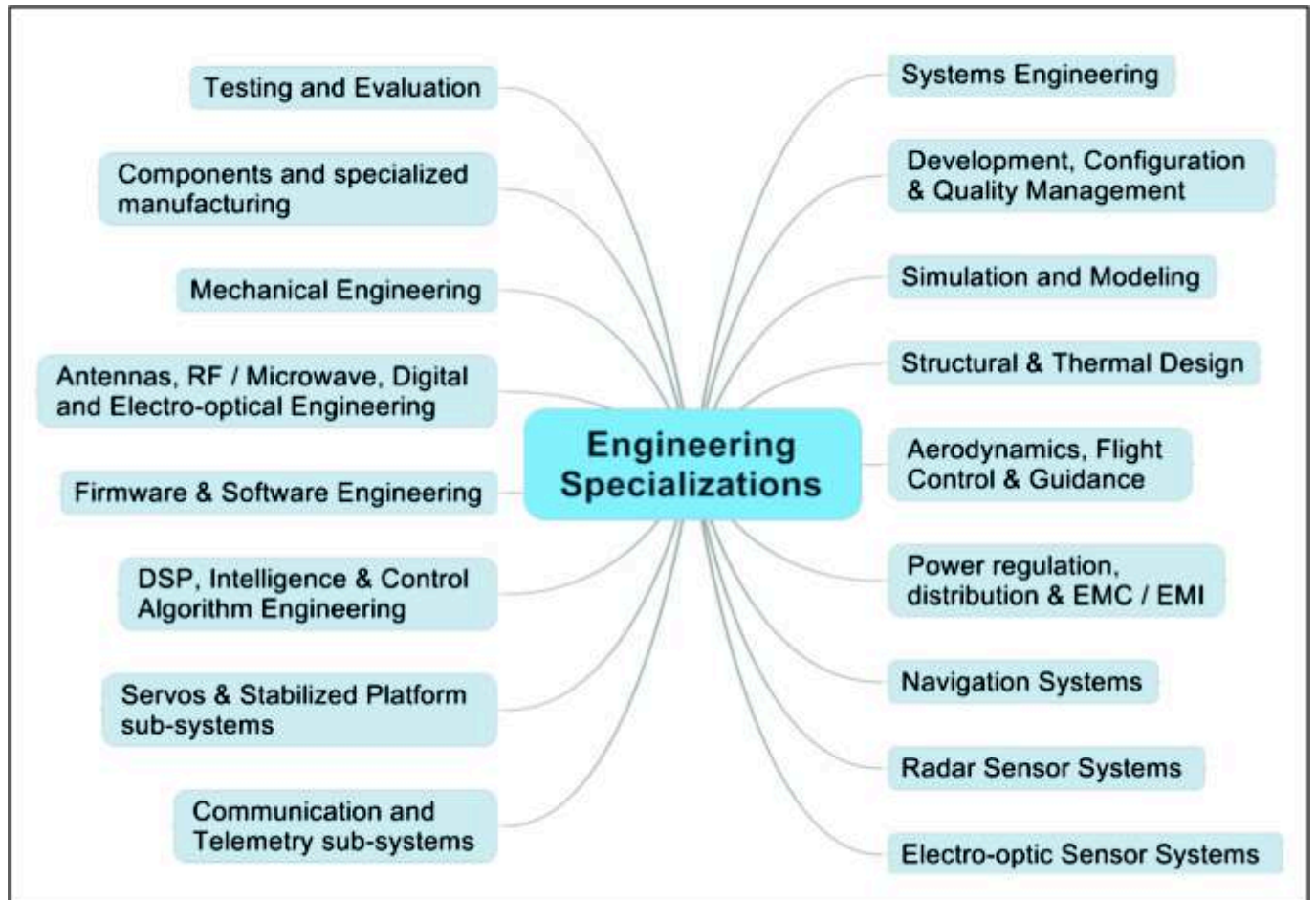
SPACE



DENEL DYNAMICS ENGINEERING

The true character of the business is advanced technology prowess and the evolution of innovative ideas into quality, reliable, robust products for end users. As a key supplier of defence requirements, one of Denel Dynamics' reputed core competencies both internationally and at home, is the fast turnaround of design and development.

Denel Dynamics has a depth of engineering specialisations as indicated below:



As a
forward
thinking business with a vibrant and highly talented
aerospace engineering team, we are
proudly South African
innovators of
competitive Missile, UAVS,
Integrated Systems and Space Solutions



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www.deneldynamics.co.za

DENEL DYNAMICS, a Division of Denel SOC Ltd.

Nellmapius Drive, Irene. PO Box 7412, 0046, Centurion, South Africa

T: +27 (0) 12 671 1911; F: +27 (0) 12 671 1779; E: market@deneldynamics.co.za