

# APEX

ENGINEERING TECHNOLOGY GROUP



**AUSTRALIAN DEFENCE  
CAPABILITY STATEMENT**



# DEFENCE APPLICATIONS

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# BENEFITS FOR DEFENCE

## Enhanced Corrosion Resistance

APEX ETG's laser cladding technology is known for its corrosion resistance, improving the durability and reliability of equipment and components. This makes it especially beneficial for navy vessels, protecting essential parts like propulsion systems, hulls, external surfaces, deck machinery, and ventilation systems against marine corrosion.

## Superior Wear Resistance & Durability

APEX ETG's laser cladding enhances surface quality, durability, and wear resistance for wear parts. For ground vehicles, like the Bushmaster, strengthening wear-prone parts like suspension and final drive components, prolonging vehicle lifespan.

## Efficient Repair and Restoration

APEX ETG's laser cladding offers a customised approach for repairing high-value, hard-to-replace components. This technique, applied to aircraft like the C-130J Hercules and F/A-18 Hornet, could significantly extend engine and turbine blade life. Prospective R&D collaboration between the defence force and APEX ETG may refine these solutions, advancing military aviation maintenance strategies.

## Precise Dimensional Control

APEX ETG's laser cladding is adept at restoring and enhancing critical component dimensions. For naval vessels like Hobart-class destroyers, they could accurately repair or modify parts such as propeller shafts and engine components. Similarly, in aircraft like the P-8A Poseidon, APEX ETG could precisely refurbish intricate landing gear or engine turbines to meet exact performance specifications. This precision is vital for these advanced defence systems' operational integrity and efficiency.

## Enhanced Resilience to Extreme Temperatures

APEX ETG's laser cladding can improve thermal management. Collaborative R&D with the defence sector could enhance heat resistance in key components. For example, Collins-class submarines may better protect propulsion systems and electronics against high temperatures. High-speed aircraft like the EA-18G Growler could improve engine performance in extreme heat, suggesting a forward-thinking approach to enhance the longevity and functionality of military assets in challenging thermal environments.



# DEFENCE APPLICATIONS

## Australian Army



### Australian-made and repaired

- Rheinmetall MAN Military Vehicles Australia Pty Ltd (RMMVA)
  - Boxer 8x8 Combat Reconnaissance Vehicles (CRV)
  - High Mobility Logistics Trucks
- Thales Australia
  - Hawkei
  - Bushmaster Protected Mobility Vehicle
- Hanwha Defense



### Application examples:

- Engine Components
- Drivetrain and Transmission Systems
- Suspension Components
- Exterior Vehicle Armour
- Chassis Components
- Wheel and Axle Assemblies
- Armament Systems
- Protective Components
- Internal Framework and Supports

## Royal Australian Air Force



### Main RAAF Aircraft:

- F-35A Lightning II
- F/A-18F Super Hornet
- EA-18G Growler
- Boeing P-8A Poseidon
- Pilatus PC-21
- Gulfstream G550



### Application examples

- Engine Components
- Landing Gear Components
- Propulsion System Parts
- Structural Components
- Hydraulic Systems
- Exhaust Systems
- Rotorcraft Components



# DEFENCE APPLICATIONS

## Australian Navy



### Fleet Base West

- HMAS Anzac (III)
- HMAS Arunta (II)
- HMAS Ballarat (II)
- MV Besant
- HMAS Collins
- HMAS Dechaineux
- HMAS Farncomb
- ADV Ocean Protector
- HMAS Perth (III)
- HMAS Rankin
- HMAS Stalwart (III)
- MV Stoker
- HMAS Stuart (III)
- HMAS Toowoomba (II)
- HMAS Waller
- HMAS Sheean

### **Upcoming Projects:**

- Tasman-class Corvette
- Alpha 5000 Combatant
- Flight III Destroyer



### **Engine Components Enhancement**

- Turbine Blades
- Cylinder Heads
- Piston Rings
- Valves and Valve Seats
- Bearing Surfaces
- Fuel Injector Nozzles



### **Propulsion Systems Resilience**

- Propeller Shafts
- Drive Gears
- Bearings and Bushings
- Pump Impellers
- Seal Areas
- Shaft Sleeves



### **Hydraulic and Pneumatic System Longevity**

- Cylinders and Piston Rods
- Valves and Valve Seats
- Pump Shafts
- Actuators
- Rotary Joints and Swivels

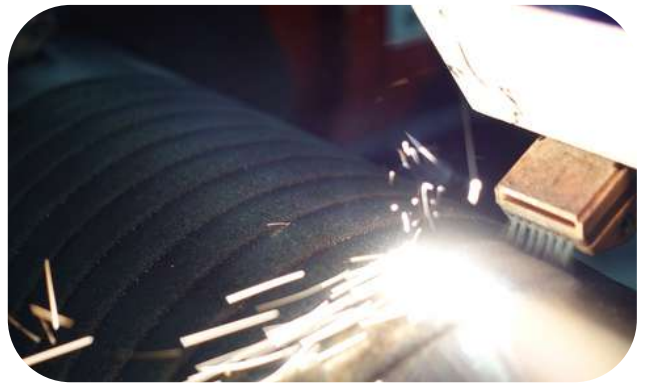
# CAUSES OF WEAR



## Mechanical Wear

Mechanical wear occurs due to physical contact and movement between surfaces, leading to material loss through friction or abrasion.

**APEX ETG's Solution:** Our laser cladding services can apply a harder, more wear-resistant surface layer to parts, reducing the rate of material loss and extending the component's lifespan.



## Corrosion Wear

Corrosion wear results from chemical reactions, often aggravated in marine environments, leading to material degradation.

**APEX ETG's Solution:** Laser cladding can apply corrosion-resistant coatings to vulnerable surfaces, significantly enhancing their resistance to harsh chemical environments.



## Fatigue Wear

Fatigue wear arises from repeated stress and small oscillatory movements, causing cracks and surface damage.

**APEX ETG's Solution:** By applying a robust cladding layer, they can enhance the surface strength and resistance to fatigue, reducing the likelihood of cracks and structural failures.



## Erosive Wear

Erosive wear is caused by the impact of particles or fluids, wearing away materials over time.

**APEX ETG's Solution:** Their laser cladding can create a protective layer on exposed surfaces, making them more resilient to erosive elements and prolonging the operational life of the components.



# ENGINEERED SURFACE SOLUTIONS



## What is laser cladding?

Laser cladding is a high-tech surface enhancement technique. It involves using a laser beam to fuse a coating material onto a base material, resulting in a strong metallurgical bond. This process provides improved wear, corrosion resistance, and minimal dilution of the base material, making it superior to traditional hardfacing methods. Laser cladding is known for its precision, efficiency, and ability to maintain the integrity of the base material while adding enhanced surface properties.

## What are the benefits of laser cladding?

- **Minimal Base Material Distortion:** Laser cladding's reduced heat-affected zone ensures minimal distortion, preserving the integrity of the base material.
- **High Hardness and Wear Resistance:** The retained properties of the coating material result in superior hardness, enhancing wear resistance.
- **Corrosion Resistance:** Coatings developed through laser cladding offer robust protection against corrosion.
- **Dimensional Control and Precision:** Allows for precision control over the cladding process, achieving exact dimensional specifications.
- **High Deposition Rate:** Capable of covering large areas swiftly.
- **Metallurgical Quality:** Ensures excellent cladding metallurgy, crucial for long-term durability.
- **Low Residual Stress:** Reduces the likelihood of warping or structural weakness.
- **Fine Cladding Layers:** Enables the application of thin layers (approx. 0.25 mm), suitable for detailed work.
- **Minimal Pre/Post-Processing:** Streamlines the overall process by reducing the need for extensive preparation or finishing."

# OUR CAPABILITIES



## LARGE AREA LASER CLADDING

APEX ETG offers high-quality laser cladding services for a variety of industrial applications.

### Laser cladding services

- 10 kW direct-diode high power large area cladding
- Hotwire and powder feed delivery options
- Up to 15kg/hr material deposition
- Up to 95% deposition efficiency
- Minimum Heat Affected Zone (HAZ)
- Large area laser heat treatment capabilities



## INTERNAL DIAMETER (ID) CLADDING

ID laser cladding is when the inside of a component, such as a pipe, bores or tubes, is clad. Our versatile ID laser cladding capabilities are ideal for:

- Bores or tubes 75mm in diameter or greater
- Reach up to 2.5 meters in length
- High precision deposition in small areas
- Hotwire and powder feed delivery options
- Wide range of high-performance alloy materials



## LASER HEAT TREATMENT

The advantages of APEX ETG's cost-effective surface hardening diode laser heat-treating service are high processing speed and precise case depths resulting in negligible distortion and enhanced resistance to wear, fatigue and corrosion resistance. Application examples include: carbon alloy steels and cast irons, bearing surfaces, cutting surfaces, pumps, valve seats, drive train components, gears, pulleys, hand tools, needles and pins, forming tools, stamping dies and turbine blades.



## WELDING

At APEX ETG, we use both conventional and laser welding technologies in conjunction with automated robotics allowing us to offer fabrication and hardfacing services, ensuring quality, repeatability and productivity.

### Welding and fabrication services

- High-speed fabrication
- 3Phase 400amp MIG welder
- Cutting and forming custom jigs for applications
- Equipment reclamation and repairs



# OUR CAPABILITIES

## MACHINING

We offer a comprehensive range of services and equipment to manufacture new components, from unique 'one-offs' to large batch runs in a broad range of sizes, weights and geometries.

### Pre and post-machining services:

- Milling machine with 1.5m bed
- Lathes; 1-4m between centres, up to 2200mm swing
- Cylindrical grinder 3.5m between centres, 650mm swing
- Linisher 5.5m between centres, 1600mm swing diamond belts
- VTL 1200mm swing with a height of 1200mm



## TURNKEY SYSTEMS

Our turnkey systems are custom-built to meet your needs. Through our business partnerships with equipment manufacturers and our expertise, we are able to design, manufacture, build and integrate systems for laser cladding and thermal spray applications. Once the system is fully commissioned, we provide calibration, training and aftermarket maintenance support to your organisation



## LABORATORY SERVICES

APEX ETC's in-house laboratory covers a range of services to engineer, test and analyse hardfacing and laser cladding applications ensuring the optimal surface solution. **These capabilities include:**

- Sample preparation and testing
- Material analysis equipment and software
- Twin rotatory sample grinding & polishing
- Micro and macro hardness testing
- Positive Material Identification (PMI)
- Ultrasonic Testing (UI)
- Dye penetrant inspection



## RESEARCH AND DEVELOPMENT

APEX ETC is actively searching for the next innovative component, product, system, technology or process that can increase the opportunities for surface coating solutions. APEX ETC is at the forefront of cutting-edge hardfacing technologies and provides ongoing R&D collaboration opportunities for businesses looking to improve their efficiencies, long-term profitability and environmental goals.



# SUSTAINABILITY



## Material Conservation

Laser cladding involves applying a thin layer of material onto a base component, which helps restore or enhance its functionality. This targeted approach minimises the use of raw materials compared to full component replacement, reducing waste and conserving resources.



## Extended Lifespan

By repairing components using laser cladding, their operational lifespan can be significantly extended. This reduces the need for frequent replacements, which not only saves resources but also reduces the environmental impact associated with the production and disposal of new components.



## Energy Efficiency

Laser cladding is a highly efficient process that uses focused laser energy to melt and fuse the cladding material onto the base component. Laser cladding typically requires less energy input than traditional repair methods, such as welding or thermal spraying, resulting in lower energy consumption and reduced carbon emissions.



## Reduced Waste Generation

Repairing components through laser cladding generates less waste compared to replacement options. Instead of discarding entire components, laser cladding selectively repairs and reinforces damaged areas, minimising the amount of material that would otherwise be sent to landfills or recycling facilities.



## Improved Performance and Functionality

Laser cladding can enhance the performance and functionality of components by using specialised cladding materials, such as corrosion-resistant alloys or wear-resistant coatings. This improves the durability of repaired components, reducing the likelihood of future failures and the associated environmental impact.



## Cost-effectiveness

Laser cladding can often be a cost-effective repair option compared to component replacement, particularly for high-value or complex parts. By avoiding the need for complete replacements, businesses can save on procurement costs, transportation, and disposal expenses while reducing the overall environmental footprint.





## APEX ETC's Sustainability Strategy

Sustainability is at the **heart of our business** and our purpose in creating lasting value for our clients and society. To this end, it is about integrating **environmental, social and governance (ESG)** considerations into our decision-making every day. As a solutions and services provider, our focus is on contributing to better outcomes for our clients, people, partners, suppliers, and the environment. APEX ETC is uniquely placed as a trusted partner to help facilitate sustainable, responsible and efficient operating procedures. By working together, we collectively contribute to a **low-carbon future**.

In the battle against global warming, APEX ETC supports companies in heavy industries to reach their **carbon neutrality** targets by offering sustainable alternatives to wear part replacement and R&D collaboration opportunities to pursue **green energy innovations**. Refurbishing, reinforcing and repairing wear parts damaged by friction, impact, and erosion with refined hard-facing processes **minimise waste**, reduces downtime and costs, and is a sustainable business approach.

APEX ETC's collaborative R&D efforts with OEMs and service providers are aiding the defence, mineral processing and a range of industries move towards **sustainable practices** with laser-clad hardfacing on excavators, screens, crushing, wear parts and many more applications. We're excited to be working on new lines of business services that we hope will further support our clients, contribute to the **community**, and enable a just and fair transition to a **cleaner global economy**.



# ONE-STOP SURFACE SOLUTIONS COMPANY



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