ESTD 1974

Machine Tool Designs & Controls MADECON

Five Decades of Mission Critical Engineering Excellence

Established 1974 | Powai, Mumbai, India

Engineering Precision. Assured Metrology.

Manufacturing and Metrology Under One Roof

MADECON bridges the gap between complex kinematic modeling, heavy duty shop floor execution, and certified sub micron verification. By integrating multi axis precision machining and climate controlled 3D CMM inspection within a single facility, we eliminate subcontracting variance, enforce material traceability, and guarantee dimensional certainty.

50+ Years Pedigree

Operating continuously since 1974 in Powai, Mumbai.

In House Metrology

Climate controlled cleanroom 3D CMM inspection with sub 5 micron resolution.

Thermal Threshold

ASME standard fabrication of exotic superalloys operating continuously at 1000°C.

Gearing Standards

Precision gear cutting and tooth grinding to Class 8 DIN 3962 and AGMA 2000 limits.

> "In high integrity engineering, zero tolerance for error is not a marketing phrase; it is an absolute physical requirement. When our assemblies are installed inside a nuclear reactor core or a 1000°C nitric acid absorption column, they must perform without interruption. At MADECON, we engineer certainty." *Pankaj Shah, Founder & Chief Executive Officer*

MADECON

Division 01: Precision Engineering & Drive Systems

High Torque Kinematics and Zero Backlash Drive Assemblies

MADECON specializes in the complete kinematic engineering and precision manufacturing of custom gearboxes and high torque mechanical operators. Every tooth profile is optimized to eliminate acoustic signatures and minimize dynamic backlash under heavy shock loads.

Kinematic Gear Profiling

Double helical herringbone gears, Class 8 precision ground spur and helical gear trains, and high ratio worm sets.

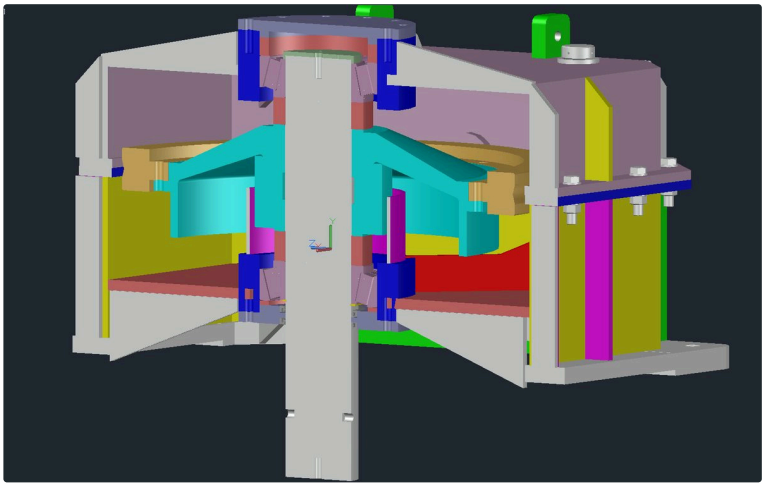
Nuclear Positioning Actuators

Zero backlash motion containment drives engineered for NPCIL reactor control mechanisms and BARC auxiliary propulsion systems.

Tight Tolerance Turning

High concentricity shafts, bearing sleeves, and flanged housings machined to 0.01 mm continuous geometric tolerance.

Key Clients: NPCIL, DRDO, BARC, Siemens Medical, Godrej & Boyce.



Engineering Parameter	Certified Capability	Application Standard
Gearing Quality Class	DIN 3962 Class 8 / AGMA 2000	Nuclear & Defense Build to Print
Continuous Machining Tolerance	±0.010 mm (10 Microns)	High Concentricity Shafts & Journals
CNC Turning Capacity	Up to Ø500 mm Chuck / 5000 mm Length	Multi Axis Heavy Shaft Turning
Gear Geometries	Double Helical, Spur, Helical, Worm	Zero Backlash / Shock Load Damping

MADECON

Division 02: Process Equipment & Exotic Alloy Fabrication

ASME Standard Fabrication for High Temperature and Corrosive Media

Operating a dedicated INOX clean fabrication bay to prevent ferrous cross contamination, MADECON manufactures high integrity pressure vessels and process internals for continuous chemical, petrochemical, and fertilizer plants.

ASME Section IX Certified Inconel 800HT Nitric Acid Catalyst Basket Assembly at INOX Clean Station 2.

Prilling Buckets & Micro Orifice Drilling

Inconel 800HT Catalyst Baskets

Fabricated for continuous operation at 1000°C in aggressive oxidizing nitric acid environments, featuring 100% radiographic X Ray and dye penetrant certified welds.

SS 316L / SS 304L Prilling Buckets

Conical and cylindrical shells featuring thousands of calibrated micro orifices (Ø0.8 mm to Ø2.0 mm) with dynamic balancing for uniform droplet dispersion.

Heat Transfer Equipment

Shell and tube heat exchangers with roller expanded and seal welded tube to tubesheet joints, rated for hydrostatic pressure testing up to 150 Bar.

Equipment Class	Material Specification	Operating Threshold	Quality Assurance Protocol
Catalyst Baskets	Inconel 800HT / Alloy 600	1000°C Continuous	100% X Ray Radiography & DP Testing
Prilling Buckets	AISI SS 316L / SS 304L	High RPM Tower Service	Calibrated Micro Orifice & Balancing
Process Exchangers	SS 316Ti / Hastelloy / Super Duplex	150 Bar Hydrostatic	ASME Section VIII Pressure Standards

Key Clients: Deepak Fertilisers (DFPCL), RCF Ltd, Camlin Fine Sciences, Sai Fertilizer.

MADECON

Division 03: Heavy Reconditioning & Import Substitution

Precision Overhauling and Reverse Engineering of Critical Spares

Process plants across India depend on legacy European, American, and Japanese machinery where original spares carry prohibitive lead times or are discontinued. MADECON provides complete reverse engineering, metallurgical upgrading, and precision reconditioning.

5 Stage Precision Remanufacturing Workflow:

01

Defect Audit

Laser alignment, CMM baseline check, and ultrasonic crack detection.

02

Surface Restoration

Submerged arc welding and laser cladding of worn journals.

03

Precision Machining

Heavy horizontal line boring and lathe turning up to 5 meter lengths.

04

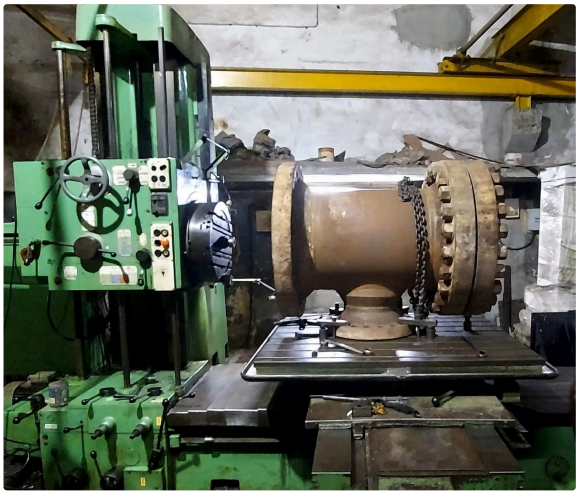
Dynamic Balancing

ISO 1940 Grade G1.0 and G2.5 high speed balancing.

05

Quality Verification

100% dimensional runout audit and quality sign off.



0.015mm

Journal Runout (TIR)

Sub 0.015 mm Total Indicated Runout on re machined bearing lands.

60%

Capital Efficiency

Reduces replacement capital expenditure by 40% to 60% compared to foreign OEM purchases.

8wks

Lead Time Reduction

Decreases procurement lead cycles from 10 months to under 8 weeks.

Key Clients: DFPCL, RCF, Tata Chemicals, Mukand Steel.

MADECON

Division 04: Asset Integrity & Surface Coatings

IIT Bombay Patented Cladding and Zirconium Thermal Barriers

Corrosive acid condensation and thermal erosion are primary causes of unscheduled plant turnarounds. In technical collaboration with patented surface technology from IIT Bombay, MADECON applies specialized surface cladding that shields base metals from severe chemical attack.

Zirconium Thermal Barrier Cladding

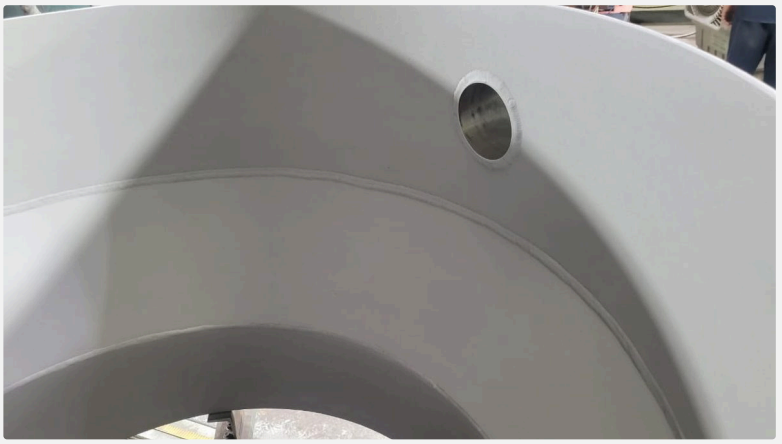
Dense, ultra pure zirconium linings engineered for high temperature chemical reactors and acid vapor zones.

Patented Anti Corrosive Barrier Systems

Chemically inert surface barriers shielding against concentrated nitric, sulphuric, and phosphoric acid exposure.

Inconel & Stellite Weld Overlays

Automated weld cladding of high wear slurry pump casings, agitator blades, and valve seats.



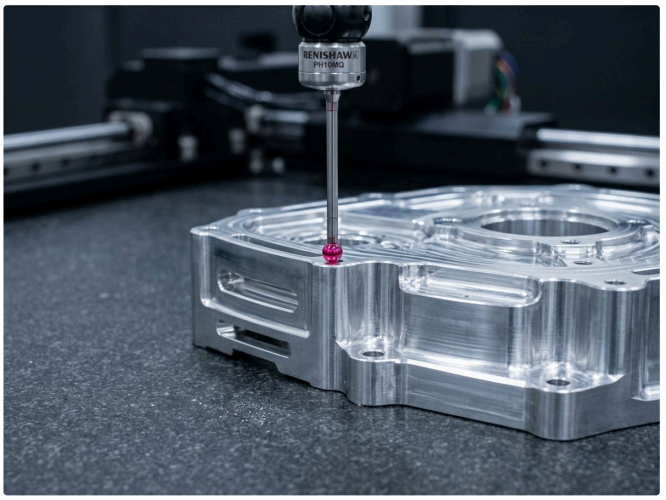
Operational Metric	Untreated Stainless Steel	MADECON Patented Zirconium Cladding
Acid Corrosion Attack	Rapid pitting and grain boundary erosion	Chemically inert across broad pH ranges
Thermal Shock Stability	Prone to micro fissuring above 400°C	Stable across rapid gradients up to 600°C
Asset Lifespan Multiplier	1.0x (Standard Baseline Life)	3.0x to 5.0x Lifespan Extension

MADECON

Division 05: In-House CAD & Metrology Laboratory

Integrated Cleanroom 3D CMM Inspection and Quality Assurance

MADECON maintains a dedicated, climate controlled cleanroom metrology laboratory held at 20°C (±1°C) to eliminate thermal drift during dimensional inspection. Metrology is directly integrated into machining setups rather than treated as a post process afterthought.



Accurate Bridge Type 3D CMM

1500 x 1000 x 800 mm measuring envelope with motorized Renishaw PH10MQ indexing probe, providing sub 5 micron volumetric resolution.

Trimos 2D Digital Height Gauges

Step height and bore pitch verification up to 600 mm with sub micron repeatability.

Mitutoyo Surface Roughness Testers

Precise surface texture quantification (Ra, Rz, Rq) down to mirror polishing.

Quality Scope

100% First Article Inspection (FAI), digital GD&T true position mapping, Non Destructive Testing (NDT), and Mill Test Report (MTR) traceability.

Strategic Quality Framework: Metrology procedures operate to rigorous aerospace and defense protocols, with active strategic roadmaps underway toward formal ISO accreditations.

MADECON

Machinery Infrastructure & Technical Leadership

Modern CNC Machinery Fleet Backed by 175+ Years Combined Experience

Machine Tool Identity	Architecture & Axes	Working Envelope	Primary Manufacturing Role
Haas VF 8 VMC	Vertical Machining Centre (4th Axis)	X: 1600 mm, Y: 1000 mm, Z: 800 mm	Heavy nuclear housings, large plates, multi axis milling
CNC Turning	Rigid Slant Bed Turning Centre	Ø210 mm Chuck / 1500 mm Length	Nuclear reactor drive internal pins, precision sleeves
Heavy HBM & Lathes	Horizontal Boring & Turning	5000 mm Bed / Heavy Multi Point	Line boring, chemical pump casings, large flanged spools
Accurate 3D CMM	Bridge Metrology System	1500 x 1000 x 800 mm Volume	Sub 5 micron verification, GD&T certification, FAI inspection

Leadership Team:

Pankaj Shah (Founder & CEO)

50+ Years Experience | Pioneer in machine tool design, nuclear import substitution (NPCIL), medical drives (Siemens), and fertilizer equipment (RCF/DFPCL).

Habib Ahemad Khan, M.Tech (GM Operations)

10+ Years Experience | Specialist in high speed gear trains, defense build to print programs, and BARC nuclear submarine gearboxes.

Santosh Bandala (Head, Digital Engineering Operations)

29+ Years Experience | Contributor to BRAHMOS Missile Program, ISRO cryogenic components, multi axis CAM, and AS9100 style metrology QA.

N. M. Khan (Lead, Precision Engineering & Shop Floor)

30+ Years Experience | Expert in Plano Millers, large format HBM/VTL operations, and NPCIL End Shield Drive Units.

Milind Khire (Business Development Associate - Process Equipment & Fabrication)

35+ Years Experience | Specialist in ASME Section VIII pressure vessels, 105 Bar DRDO testing, and Inconel 800HT welding at 1000°C.

MADECON

Industrial Client Partnerships & Commercial Engagement

Five Decades of Delivery Across Mission Critical Sectors

Nuclear & Defense

NPCIL, BARC, DRDO, BrahMos Aerospace

Chemical & Fertilizer

Deepak Fertilisers (DFPCL), RCF Ltd, Tata Chemicals, Camlin Fine Sciences

Industrial & Healthcare

Siemens Medical, Godrej & Boyce, Mukand Steel, Sai Fertilizer

Data Governance & Intellectual Property Security: All customer drawings, 3D CAD geometries, and technical process parameters are governed under binding bilateral Non Disclosure Agreements (Indian Contract Act 1872). Digital engineering files and inspection logs are protected in Microsoft 365 cloud vaults with AES 256 encryption. CNC machine program transmission operates across an isolated internal network.

Headquarters & Manufacturing Facility:
Machine Tool Designs & Controls (MADECON)

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