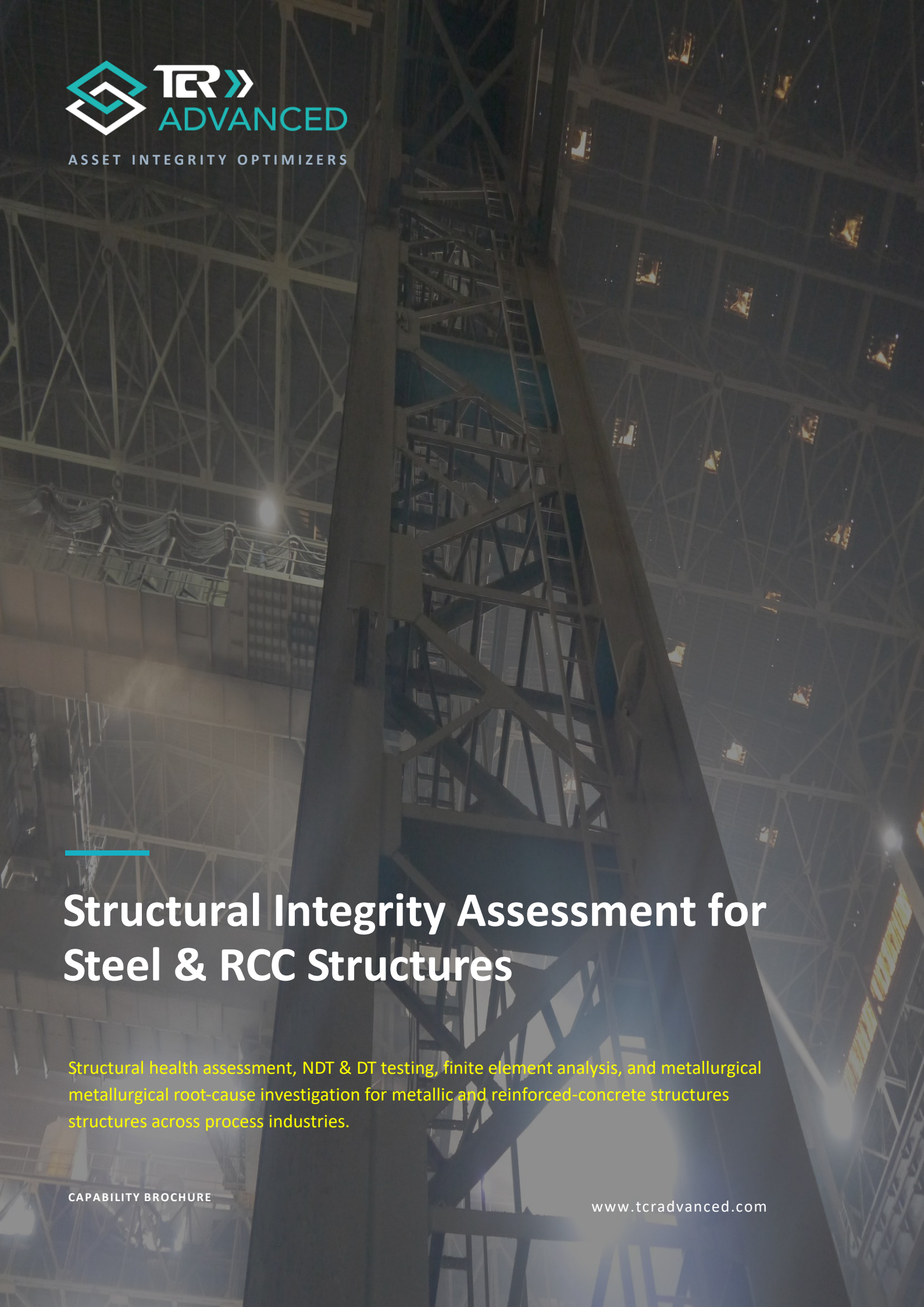
TCR ADVANCED

ASSET INTEGRITY OPTIMIZERS



Structural Integrity Assessment for Steel & RCC Structures

Structural health assessment, NDT & DT testing, finite element analysis, and metallurgical metallurgical root-cause investigation for metallic and reinforced-concrete structures structures across process industries.

CAPABILITY BROCHURE

www.tcradvanced.com

500+ YEARS

Combined metallurgical & structural expertise, reading the signature steel and and concrete leave behind.

From weld to column to reinforced slab, every structural member carries evidence of how it has of how it has aged. Our engineers are trained to read it before it becomes an incident. incident.

> "Every structural failure carries a metallurgical signature. Our work is to read that signature before an incident writes it, not after."

Paresh U. Haribhakti
Managing Director, TCR Advanced Engineering

About TCR Advanced

Headquartered in Vadodara and working alongside TCR Engineering Services, Mumbai, TCR Advanced Engineering has spent Engineering has spent 26 years building the asset-integrity discipline that industrial plants depend on. For structures under structures under sustained process load, thermal cycling, and corrosive environments, that discipline means catching catching degradation before it becomes downtime, or worse.

Our scope spans both metallic structures, columns, pipe racks, tanks, and gantries, and reinforced concrete (RCC) structures above and below grade, combining field engineering, advanced NDT/DT, finite element analysis, and NABL-accredited laboratories into one traceable assessment.

26+	9500+	1,800+	500+
YEARS IN OPERATION	INVESTIGATIONS	CLIENTS	YEARS COMBINED EXPERTISE

Metallic Structure Assessment

01 **Structural Health Assessment**

Condition assessment of columns, pipe racks, tanks, and load-bearing steelwork against original design codes, mapping corrosion mapping corrosion and section loss to a documented fitness rating.

02 **Design Verification & Engineering Critical Assessment**

Review of design documents and load calculations against as-built and as-degraded condition, closing the gap between drawing and between drawing and reality.

03 **Advanced NDT & DT Assessment**

Visual, dye penetrant, magnetic particle, ultrasonic thickness, weld flaw detection, and in-situ metallography performed by Level 3 performed by Level 3 certified engineers.

04 **3D Laser Scanning & Dimensional Survey**

High-precision laser scanning to capture deformation and settlement, producing an as-built model traceable to millimetre millimetre tolerance.

05 **Metallurgical Root Cause Analysis**

Laboratory investigation of failed or fire-affected steel and welds, establishing root cause after an incident and the corrective path corrective path forward.

Tests for Metallic Structures

Visual Examination by Expert

Baseline Assessment

A qualified engineer's first-pass survey for deformation, corrosion, and corrosion, and distress, framing where further testing is warranted. warranted.

Dye Penetrant Testing (DPT)

ASTM E-165, E-1417

Capillary-action penetrant reveals surface-breaking cracks under UV under UV or white light.

Magnetic Particle Testing (MPT)

ASTM E1444, E-709

Magnetic flux leakage detects surface and shallow subsurface flaws in flaws in ferromagnetic steel.

Ultrasonic Thickness Measurement

ASTM E797/E797M

Gauges remaining section thickness from wave transit time, tracking tracking corrosion loss.

Hardness Measurement (UCI)

ASTM A1038-10a

Ultrasonic contact impedance reads material hardness at the point of point of contact.

Alignment & Verticality Check

Plumb-bob · Theodolite · 3D Scan

Verifies distortion from corrosion or overload against original verticality.

UT Flaw Detection at Weld Joints

ASTM E164 · ASME Sec V

Ultrasonic scanning of weld joints detects subsurface cracks, porosity, porosity, and lack of fusion.

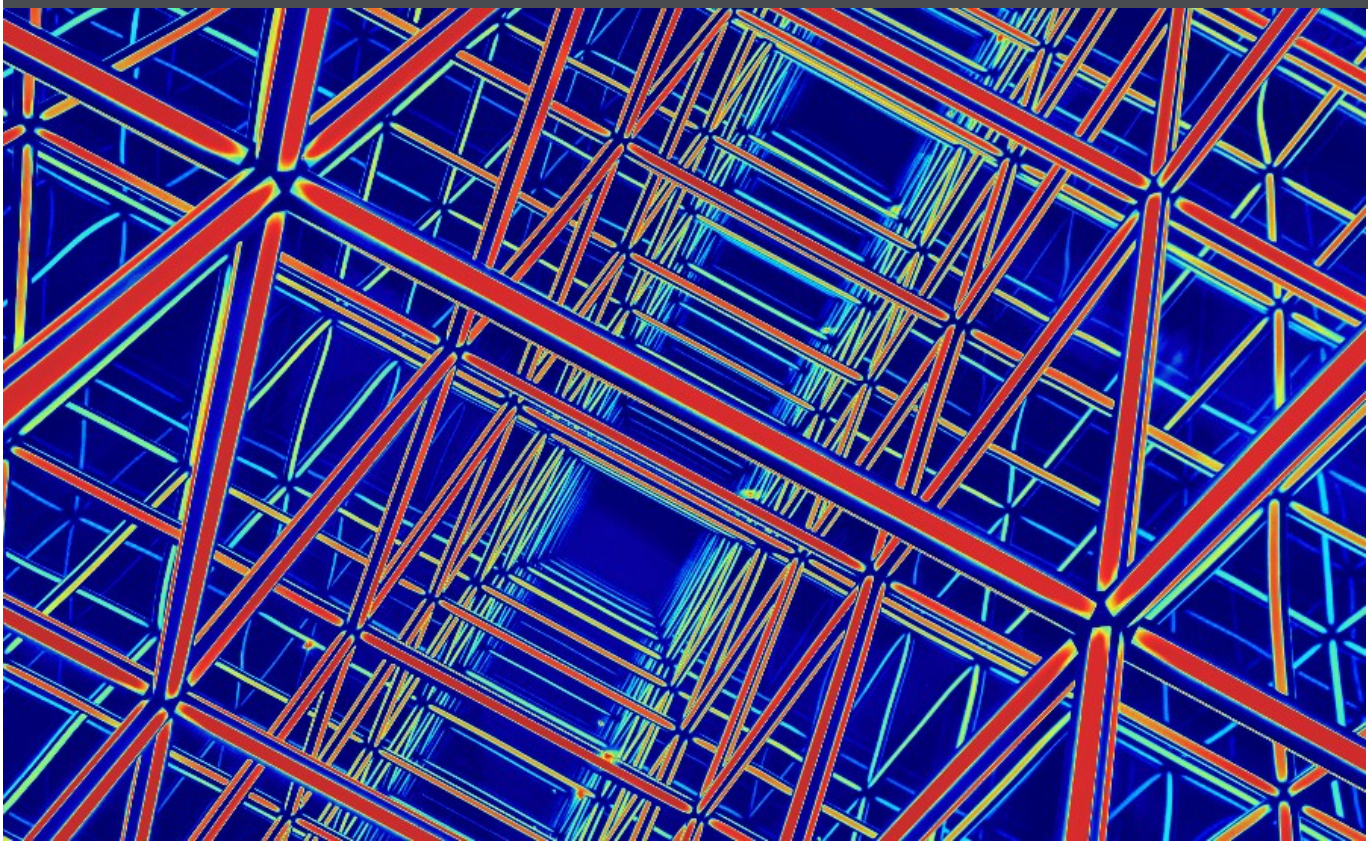
In-Situ Metallography

Replica Microstructure

On-site replication reveals microstructural degradation, creep, and creep, and ageing without cutting a sample.

STRESS ANALYSIS · FEA

Using ANSYS and STAAD Pro on the available structural drawings, finite element analysis locates the maximum stress region and models wind and seismic loads not envisaged at the time of original design.



METALLIC & RCC, ABOVE AND BELOW GRADE

Inside the plants we assess.

Furnace bays, pipe racks, foundations, and process structures: our engineers work at engineers work at height, in heat, and under shutdown pressure, alongside plant plant teams, to deliver findings that hold up in an audit.

Tests for RCC Structures

Rebound Hammer Test

IS 13311-2, BS 1881-202

Surface hardness read as a rebound number, correlated to compressive strength.

Ultrasonic Pulse Velocity (UPV)

IS 13311-1, BS 1881-203

Pulse velocity flags voids, cracking, and concrete homogeneity against homogeneity against standard limits.

Carbonation Depth Analysis

BS 1881-201

Phenolphthalein indicator establishes carbonation depth, a leading leading cause of rebar corrosion.

Half-Cell Potential Test

ASTM C876

Maps corrosion activity of embedded reinforcement across the the concrete surface.

Core Extraction & Compressive Strength

IS 516

Drilled cores establish the true in-place compressive strength of of hardened concrete.

Chemical Analysis of Concrete

pH · Chloride · Sulphate

Laboratory analysis of extracted chips quantifies aggressive-ion ion content.

Mix Proportion Investigation

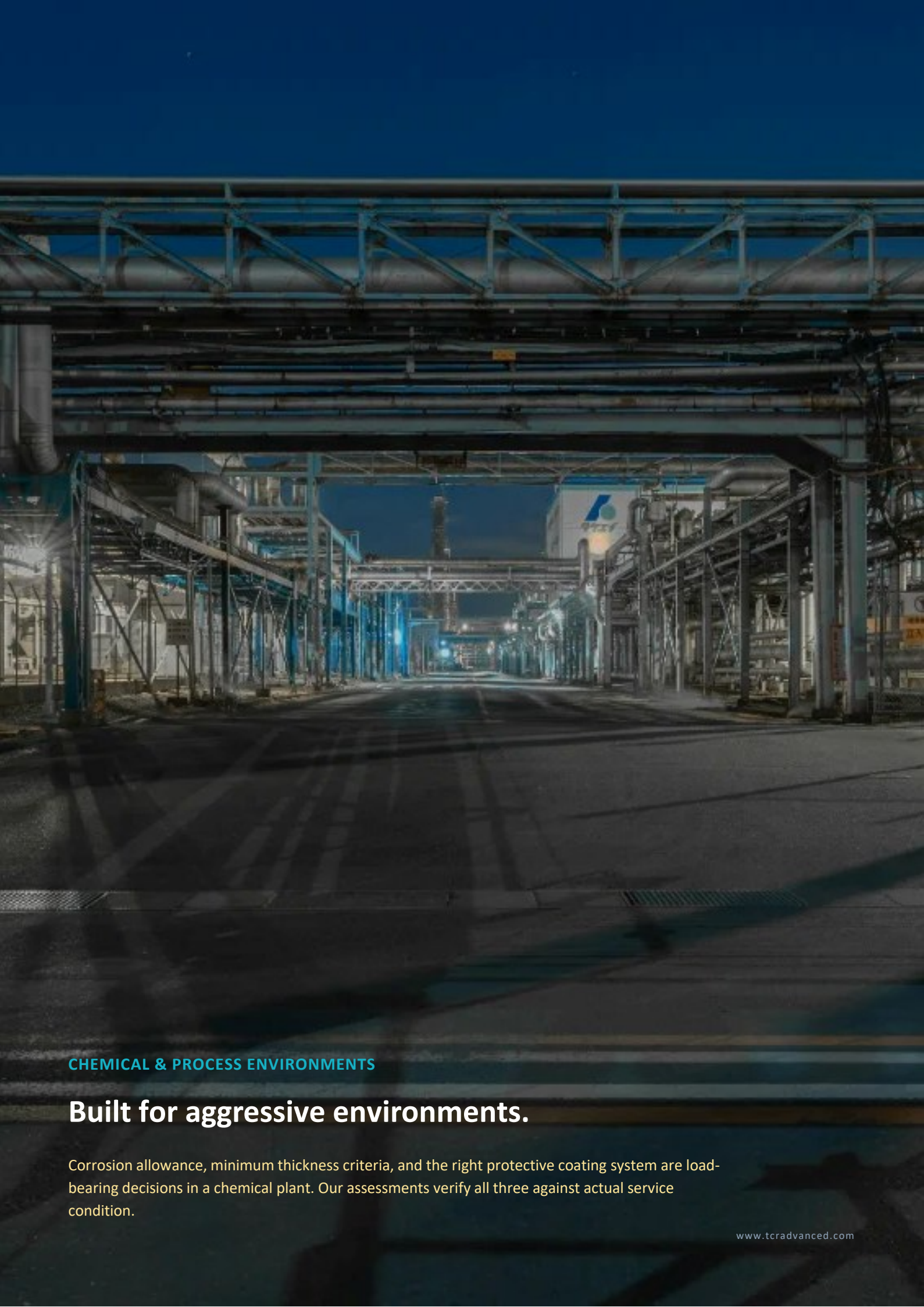
Cement-Aggregate Ratio

Confirms as-built mix composition against design intent.

Verticality Check

Optical Plummet · 3D Scan

Confirms plumb of columns and shear walls above and below grade. below grade.



CHEMICAL & PROCESS ENVIRONMENTS

Built for aggressive environments.

Corrosion allowance, minimum thickness criteria, and the right protective coating system are load-bearing decisions in a chemical plant. Our assessments verify all three against actual service condition.

Our Assessment Methodology

A

Scrutiny of Data & Design

Structural plans, design calculations, and material certificates certificates are reviewed at the engineering office, including including code compliance and load provisions.

B

Visual Inspection & Site Verification

Physical verification at the factory premises checks loading, loading, alterations, defects, and maintenance protocol against against approved drawings.

C

Analysis of Data & Records

NDT, DT, and laboratory results are consolidated with FEA FEA where warranted to establish a fitness-for-service position. position.

D

Report Preparation

Findings are issued as a certified, code-referenced report with a report with a prioritised remediation plan.

NABL Accredited TC-6739, ISO/IEC 17025:2017	**NADCAP Accredited** Materials Testing, AC7101	**Recognised Research Institution** MS University, Vadodara

Industries We Serve

Oil & Gas | Refinery & Petrochemicals | Power | Fertilizers & Chemicals | Manufacturing & Fabrication | EPC | Pharmaceutical | Insurance

Trusted By

Why TCR Advanced

- ✓ NABL and NADCAP accredited laboratories, so results carry independent, auditable weight.
- ✓ One integrated team spans field engineering, NDT/DT, FEA, and metallurgy across steel and RCC.
- ✓ 500+ years of combined metallurgical and structural expertise across the bench.
- ✓ 1,800+ clients served across India and international sites, from single-asset audits to plant-wide programmes.

TCR ADVANCED

Assess the integrity of your structures before they fail.

Request a Structural Assessment →

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