

JIMA 2026 - Japan Inspection Instruments Manufacturers' Show

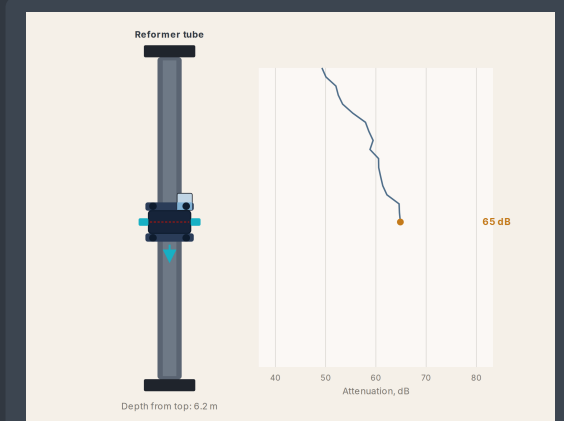
16 to 18 September 2026 - 10:00 to 17:00 - Tokyo Big Sight, East Halls 1 to 3, Tokyo

ASSET INTEGRITY - REFORMER TUBES

WHEN DOES THIS TUBE COME OUT?

The only inspection that returns a definite retirement date, per tube, to API 579-1 Level 3.

Condition assessment, Fitness-for-Service and Remaining Life Assessment to API 579-1 / ASME FFS-1, Level 3. One robotic crawler, four measurements, a retirement date for every tube.



ARTiS® crawler on a radiant catalyst tube, with the live attenuation trace.

2 DAYS

to inspect 100 tubes
against 4 to 5 days manual, including access

ZERO

scaffolding required
the crawler climbs the tube it inspects

100 MM

continuous data resolution
over the full 15 m radiant height

THE FAILURE YOU CANNOT SEE IS THE ONE THAT ENDS THE TUBE

Primary reformer tubes crack hydrocarbons over a nickel catalyst at around 900 °C and 25 to 30 barg. Every tube runs at the edge of its creep limit with minimal margin for error, and an overshoot of 10 to 20 °C in tube metal temperature roughly halves tube life.

It starts at mid-wall

Creep voids initiate about one third into the wall, where hoop and thermal stress peak, then advance inward and outward. By the time cracking is visible at the outer surface, roughly 75% of tube life is already spent.

Oxidation masks the strain

Diametral growth of 1 to 6% signals creep, but external scale spalling reduces OD at the same time. Without thickness, the measured diameter understates true strain.

The temperature you measure is wrong

Pyrometers work on emissivity. A new rough tube reads near 0.9; an oxidised tube falls towards 0.6. The reformer is then controlled on a temperature that is not real.

WHICH IS WHY ARTiS® DOES NOT TRUST THE THERMOCOUPLE

Reformer tubes are designed for 100,000 hours, about 11.5 years. Plants that operate inside the envelope and inspect on a cycle have run the same tubes past 200,000 hours, about 23 years. The gap between those two numbers is operational control, and it is worth more than any alloy upgrade.

ARTiS® back-calculates the effective tube metal temperature that produced the damage actually present, then projects forward from that to a retirement date.

Who this is for

Owners of hydrogen, ammonia and methanol reformers: refineries, petrochemical complexes, fertiliser plants and hydrogen production facilities. Tube materials include HP modified micro-alloyed grades, G4852 Micro, KHR35CT, HP39W, IN519, HK40 and proprietary alloys such as Manaurite XM.

SEE ARTiS® LIVE AT JIMA 2026

Visit the Chugai Technos stand at Tokyo Big Sight for crawler hardware and sample API 579-1 Level 3 assessment reports. To book a slot before the show, write to n.kawabe@chugai-tec.co.jp.



SCAN FOR THE SECOND
FIELD VIDEO

Transparency. Competence. Reliability.

FOUR MEASUREMENTS, ONE PLATFORM, ONE PASS

01 Ultrasonic attenuation Creep voids and mid-wall fissures, transmit-receive mode. 35 to 72 dB - 0.1 dB	02 Outer diameter Creep strain along the whole tube, not one spot check. every 100 mm - 0.5% of OD	03 Tube bowing Gyro-measured and quantified, not estimated by eye. 5 to 200 mm - digital	04 Effective tube metal temperature T-Eff back-calculated, then remaining life per tube. API 579-1 Level 3
--	--	--	--

ARTiS® AGAINST MANUAL SCANNING

Parameter	Manual	ARTiS®	Business outcome / ROI
Inspection time, 100 tubes	4 to 5 days incl. access	2 days	Roughly half the inspection window back
Scaffolding	Required	None, the crawler climbs	Erection cost and critical-path delay removed
Reporting resolution	6 ft (1.8 m) segments	Continuous, every 100 mm	18x granularity
OD measurement	1 or 2 spot checks per tube	Every 100 mm, full length	Finds localised bulging that spalling masks
Bowing	Visual estimate	5 to 200 mm, gyro digital	An objective number against OISD and API
Analytical output	Pass / fail judgement	API 579-1 Level 3 retirement date	Answers when, not whether

FROM RAW SCAN TO A DATE IN THE TURNAROUND PLAN



DAMAGE CLASSIFICATION, ARTiS® AGAINST API 579

Class 1 0% As-cast, sound material Continue in service	Class 2 40% Creep voids at the inner wall Re-assess next inspection	Class 3 55% Aligned voids and cracking, inner to mid-wall Increase monitoring	Class 4 75% Creep cracking, mid-wall to outer wall Plan replacement	Class 5 100% Macro-cracking through 75% or more of wall Replace immediately
---	--	--	--	--

WHERE ARTiS® IS DEPLOYED

Refining Hydrogen plants on refinery reformers	Petrochemical Steam and auto-thermal reformers	Ammonia and fertiliser Primary reformers, catalyst tubes	Methanol and hydrogen Merchant and captive hydrogen units	Industrial gases On-site hydrogen generation
--	--	--	---	--

TECHNICAL SPECIFICATION

Tube OD range 105 to 190 mm	Scan speed 2 to 5 min / 10 m	Scan resolution 100 mm	Fixing time 3 min per tube	Climbing height 15,000 mm max	Diameter sensing IR, 0.5% of OD
--------------------------------	---------------------------------	---------------------------	-------------------------------	----------------------------------	------------------------------------

53 years since 1973	100+ reformer assignments 80+ with ARTiS®	50,000+ tubes scanned cumulative	100,000+ replica microstructures reference base
----------------------------	--	---	--

Technical basis: Haribhakti and Upadhyaya, "Optimising Tube Life", World Fertilizer, January/February 2019; API 579-1/ASME FFS-1 Part 10; API 530; OISD. ARTiS by TCR Advanced is a registered trade mark of TCR Advanced Engineering Pvt. Ltd., Trade Mark No. 4562090, Class 9, registered 09 July 2020.

FIELD OPERATIONS, JAPAN Chugai Technos Corporation 9-12 Yokogawashinmachi, Nishi-ku, Hiroshima City, Hiroshima 733-0013, Japan Naoshi Kawabe n.kawabe@chugai-tec.co.jp Tel +81-82-295-2222	GLOBAL ENGINEERING AND ANALYSIS TCR Advanced Engineering Pvt. Ltd. TCR Engineering Services Pvt. Ltd. Mahape, Navi Mumbai 400710, India sales@tcrceng.com - +91 98335 30200 www.tcrceng.com	ACCREDITATIONS NABL (TC-6739) ISO/IEC 17025:2017 NADCAP AC7101 ILAC MRA recognised in 90+ economies
---	---	--

Transparency. Competence. Reliability.