

3RD SEMINAR ON "GOLD ASSAYING, HALLMARKING & REFINING TECHNOLOGIES"

DAY 1
IGC
SEMINAR
2026

Day 1: IGC 2026 Highlights

Day 1 Sets the Tone for IGC 2026 with Technology, Assaying, Standards and Refining in Focus



Day 1 of the India Gold Conference 2026 opened on a strong technical note, drawing 150+ delegates and bringing together refiners, assayers, technology providers, jewellers, laboratory experts and standards institutions for an intensive day of knowledge-sharing. The sessions reflected a clear industry shift: competitiveness today depends not only on metal availability, but also on precision, traceability, testing accuracy, energy efficiency, responsible processes and globally credible standards.

The technology session showcased how automation and advanced analytical systems are reshaping precious-metal production and testing. **Mr Walter Grifoni** of TERA Automation demonstrated how integrated weighing, imaging, laser marking and trimming can reduce gold give-away and strengthen bar-level traceability. **Mr Faoro GianMarco** of IKOI presented SANDENSE®, a mechanical precious-metal sand process capable of reducing energy use in cast-bar production by nearly 90%. **Mr Eeresha Ramaiah** highlighted LIBS technology for deeper and more representative purity analysis, while **Mr Jacopo Monteforte Specchi** focused on anti-counterfeiting and secure packaging. **Mr Rakesh Kumar Bhan** demonstrated advances in automated, non-destructive XRF analysis.

Attention then shifted to assaying and sampling, where **Ms Sandra Ratsoma** and **Mr Kanthanathan P** stressed that reliable results begin with representative samples. The LBMA-curated Fire Assay Workshop examined how small assay errors can translate into significant commercial losses, with **Mr Dippal Manchanda** and **Mr Pankaj Deshmukh** emphasising process discipline, competency, calibration, traceability and laboratory quality systems. The standards session reinforced trust across the value chain. **Mr Neil Harby** explained LBMA Good Delivery, while **Mr Chandan Rao** outlined the scale and digital traceability achieved through BIS hallmarking and HUID in India. Day 1 concluded with **Mr Ankur Goyal's** refining session, highlighting how feed quality and deleterious elements affect recovery, efficiency and final bullion quality.

Session on Technology

Day 1 IGC Seminar 2026



Automation Brings Precision, Traceability and Lower Gold Give-Away to Bar Production

Mr Walter Grifoni – TERA Automation

Mr Walter Grifoni presented MARKVERY as an integrated automation solution designed to improve precision, reduce precious-metal losses and strengthen traceability in bullion-bar production. The system combines camera-based inspection, weight verification, laser marking and precision trimming, with a recovery mechanism to capture precious metal removed during weight correction.

A major focus was reducing “give-away” - the additional gold manufacturers leave in bars to ensure the final product does not fall below its declared weight. MARKVERY can reduce average give-away by approximately 7.5 mg on a 1 kg bar, compared with an indicated conventional average of around 15 mg. At current gold values and large production volumes, even milligram-level savings can have a meaningful commercial impact.

Beyond weight optimisation, the system integrates digital identity and bar-level traceability, allowing each product to be inspected, marked and digitally identified within an automated production environment.

Key Takeaways

- Integrated weighing, imaging, laser marking and trimming
- Reduces average give-away by around 7.5 mg per 1 kg bar
- Recovers precious metal removed during trimming
- Improves production precision and automation
- Enables digital identity and bar-level traceability
- Combines cost savings with stronger bullion integrity

SANDENSE Could Cut Energy Use in Cast-Bar Production by Nearly 90%

Mr Faoro GianMarco – IKOI S.p.A.

Mr Faoro GianMarco presented SANDENSE®, an innovative process that replaces conventionally produced cast granules with mechanically produced precious-metal sand. Initially developed for silver bars ranging from 1 oz to 100 oz, the technology uses IKOI's Density Booster® process to transform pure silver crystals into material suitable for cast-bar production.

The most significant benefit highlighted was energy efficiency. Conventional grain production consumes approximately 1.6 kWh/kg, compared with only 0.17 kWh/kg for SANDENSE, representing an energy reduction of roughly 89%.

The process also reduces exposure to molten metal and high temperatures, lowers crucible and consumable requirements, simplifies operations and can reduce operating costs. Mr Faoro GianMarco said IKOI is also exploring whether the technology can be extended to gold, using powders, sponge or crystals generated through hydrometallurgical refining.



Key Takeaways

- Replaces conventional granules with mechanical precious-metal sand
- Initially developed for 1 oz-100 oz silver bars
- Energy consumption falls from 1.6 to 0.17 kWh/kg
- Delivers roughly 89% lower energy consumption. Reduces molten-metal and high-temperature risks

Session on Technology

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LIBS Technology Targets False Purity Readings in Polished Gold Jewellery

Mr Eeresha Ramaiah – Nucleus Analytics / SPECTRO

Mr Eeresha Ramaiah highlighted the challenge of obtaining representative purity readings from highly polished gold jewellery. Polishing can create a gold-enriched surface layer, meaning surface-sensitive testing may indicate a higher purity than the actual bulk composition of the article.

The presentation demonstrated this using a nominal 91.6% gold sample, which produced readings ranging from 92.6% to as high as 95% after polishing.

Key Takeaways

- Polishing can create gold-enriched surface layers
- A 91.6% sample was shown reading as high as 95%
- LIBS provides 150+ micron penetration
- Test spot is approximately 60 microns
- Analysis takes around two seconds
- Eliminates electrode-related memory effects
- Provides faster and more representative elemental analysis

LIBS addresses the issue by using a laser to remove and vaporise a microscopic quantity of material and analysing the resulting plasma. SPECTRO PORT was presented as achieving penetration of more than 150 microns, with a test spot of approximately 60 microns and analysis completed in around two seconds.

The technology also eliminates electrodes and associated contamination or memory effects, positioning LIBS as a fast, deeper-reading technique for obtaining more representative precious-metal purity information.

Anti-Counterfeiting Must Protect Gold's Identity, Not Just the Metal

Mr Jacopo Monteforte Specchi – Certiline s.r.l.

Mr Jacopo Monteforte Specchi focused on the growing sophistication of precious-metal counterfeiting and the need to protect not only the gold itself but also the brand, identity and provenance associated with the product.

Counterfeit bullion can increasingly imitate refinery marks, serial numbers, certificates and packaging. This means effective authentication must extend beyond simply confirming whether the surface of a product contains genuine gold.

Certiline's approach combines secure packaging with multiple authentication and anti-tampering features. Its security film uses luminescent inks that create identifiable patterns. Any attempt to interfere with the package permanently changes the security pattern, with the alteration particularly visible under UV light.

Mr Jacopo Monteforte Specchi also demonstrated how security can be integrated into high-volume automated packaging using collaborative robots, rotary indexing, hot and cold pressing and vision inspection.



Key Takeaways

- Counterfeiting increasingly targets brands and product identities
- Authentication must go beyond testing the metal
- Tamper-evident films strengthen packaging security
- Luminescent inks allow UV-based authentication
- Tampering permanently changes the security pattern

Session on Technology

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Next-Generation XRF Brings Speed and Automation to Precious-Metal Testing

Mr Rakesh Kumar Bhan – Fischer Measurement Technologies (India) Pvt. Ltd.

Mr Rakesh Kumar Bhan presented advances in EDXRF-based precious-metal testing, highlighting the new FISCHERSCOPE XDV/ XDAL systems and FISIQ X software. A major advantage of EDXRF is its ability to provide non-destructive analysis of gold, silver, platinum and complex alloys without damaging high-value jewellery or bullion. The technology can determine alloy composition and impurities, measure coating thickness and support other analytical applications, with results available within minutes.

Key Takeaways

- Non-destructive testing of gold, silver and platinum
- Results available within minutes
- 6× faster positioning
- 14× faster autofocus
- 10× higher camera resolution
- Guided workflows reduce operator dependence
- Centralised data improves traceability and auditability
- Supports impurity, alloy and coating analysis

The new generation of equipment delivers significant improvements in speed and imaging, including six-times faster positioning, 14-times faster autofocus and ten-times higher camera resolution.

FISIQ X software adds guided workflows, user-specific roles, calibration management and centralised measurement records. These features help reduce operator influence while improving repeatability, quality control and traceability.

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SESSION HIGHLIGHTS – CONCLUSION

The technology session highlighted a clear transformation underway in precious-metal manufacturing: the future of bullion and jewellery processing is becoming more intelligent, measurable and traceable. From controlling microscopic weight variations to achieving deeper purity analysis, reducing energy consumption and securing product identity, the technologies presented demonstrated how innovation can address both operational efficiency and industry integrity.

A common thread across the presentations was the move from manual intervention and conventional processes towards connected, data-driven production. Precision is no longer limited to the final weighing or assay; it is increasingly being built into every stage of the product journey - from production and testing to marking, packaging and authentication. The session also demonstrated that small improvements can have significant consequences at industrial scale. Milligram-level metal savings, dramatic reductions in energy consumption, faster analytical cycles and stronger product-level security can collectively improve profitability while supporting more responsible production.

Ultimately, the message from the session was clear: technology is not simply making precious-metal manufacturing faster; it is making it smarter, more transparent and more accountable. As automation, advanced analysis, digital identity and sustainable processing continue to converge, the industry is moving towards a future where precision, efficiency, authenticity and trust are engineered into the product itself.

Session on Assaying

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Accuracy in Low-Gold Assaying Starts with the Right Sample

**Ms Sandra Ratsoma – Senior Manager:
Technical Assurance and Laboratory, Rand Refinery**

Ms Sandra Ratsoma highlighted the challenges of accurately assaying low-grade gold materials, where heterogeneity and the “nugget effect” can create significant variations between samples.

She stressed that assay accuracy begins with representative sampling, as even the best laboratory method cannot correct a sample that does not properly represent the original material.

Key Takeaways

- Representative sampling is critical to assay accuracy.
- Heterogeneity and the nugget effect are major risks.
- Samples are milled to 75 microns.
- 40 g assay charges improve low-grade testing.
- Replicate testing and certified reference materials strengthen reliability.
- Fire assay remains effective when supported by rigorous controls.

Rand Refinery controls these risks through crushing, homogenisation, milling to 75 microns, larger assay charges and replicate testing. For low-grade material, a 40-gram assay charge is used, supported by duplicate sample streams and multiple fusions.

Fire assay remains suitable for complex low-grade gold and silver materials when backed by certified reference materials, spike-recovery tests, calibrated equipment and laboratory cross-checks.

A Perfect Assay Cannot Correct a Poor Sample

Mr Kanthanathan P – Head of Central Quality, Titan Company Ltd.

Mr Kanthanathan P emphasised that sampling is the foundation of reliable precious-metal assaying. An error introduced during sampling can continue through sample preparation and assaying and ultimately affect the final commercial decision.

Precious-metal materials are often not homogeneous, particularly recycled and alloyed gold. Titan therefore follows a risk-based sampling approach: known homogeneous gold is treated as low risk, recycled and alloyed materials as medium risk, and unknown or potentially contaminated material as high risk requiring multiple samples and verification.

Titan uses dip sampling, drill/cut sampling and random sampling at different stages of its value chain. A case study involving approximately 101 kg of complex dore showed only 0.001% assay variation between Titan and an independent international laboratory, demonstrating the value of robust sampling and assay controls.



Key Takeaways

- Accurate assaying begins with representative sampling.
- Sampling should reflect the risk and homogeneity of the material.
- Recycled and impure gold require more intensive sampling.
- Sampling errors can directly affect valuation and commercial decisions.
- Titan uses different sampling methods across the gold value chain.

Workshop on Fire Assay Curated by London Bullion Market Association (LBMA)



Tiny Assay Errors Can Translate into Major Financial Losses

Mr Dippal Manchanda – Technical Director & Chief Assayer, Anchorcert Analytical

Mr Dippal Manchanda examined how seemingly minor errors in fire assay can translate into substantial financial consequences in precious-metal settlement. He illustrated that, assuming gold at USD 100 per gram, a 1 ppt assay error on a 1 kg gold bar equates to approximately USD 100 — or USD 100,000 across 1,000 bars. The presentation traced errors through the complete fire-assay workflow—sampling, weighing, cupellation, parting, final weighing and calculation. Sampling was identified as the largest overall contributor to error, while cupellation was highlighted as the stage where several critical variables interact simultaneously.

Key Takeaways

- A 1 ppt error can have a major settlement impact.
- Sampling is the largest overall source of assay error.
- Larger samples help reduce the impact of weighing errors.
- Silver-to-gold ratios must remain consistent between samples and proofs.
- Reagent purity, lead quantity and cupel quality can influence results.

Mr Dippal Manchanda stressed uniformity between samples and proofs, including sample weight, silver and copper additions, lead quantity, cupel quality, furnace temperature and acid strength. He also demonstrated how reagent purity can influence results: gold contamination in silver used for assaying could introduce a positive bias of up to 0.64 ppt in the example presented. The key message was that fire assay remains the benchmark, but accuracy depends on controlling small operational variations throughout the process.

Reliable Fire Assay Depends on the System Behind the Result

Mr Pankaj Deshmukh

Head-Assay Laboratory, MMTC PAMP India Pvt Ltd

Mr Pankaj Deshmukh approached fire assay from the perspective of a NABL technical assessor, asking why laboratories using the same recognised method can still produce different levels of performance. His central argument was that fire assay is a technical method, but reliability is a management system. A reliable result depends on the method, competent people, representative samples, equipment, traceability, quality control and strong laboratory practices.

Drawing on assessment experience, he highlighted recurring weaknesses in laboratories, including insufficient method verification, inadequate measurement-uncertainty evaluation, equipment-control gaps, unproven personnel competency, poor sampling and weak traceability. Even adoption of the IS 1418 method does not remove the need for laboratories to verify their own ability to perform it reliably.

Mr Pankaj Deshmukh concluded that the biggest fire-assay challenges are often not the furnace or chemistry, but competency, representative sampling, traceability, mindset and quality culture.



Key Takeaways

- Fire assay reliability extends beyond the analytical method.
- Standard methods such as IS 1418 must still be verified in-house.
- Measurement uncertainty should accompany assay results.
- Balances and furnaces require calibration and routine checks.
- Personnel competency must be demonstrated, not assumed.

Session on Standards



London Good Delivery: The Standard Behind the Global Gold Market

Mr Neil Harby – Chief Technical Officer, LBMA

Mr Neil Harby explained how the LBMA London Good Delivery (GDL) system provides the technical and quality foundation for gold and silver traded in the global OTC market. Good Delivery ensures that bars entering the Loco London market conform to consistent specifications, providing reliability and confidence in transactions worldwide.

Entry to the Good Delivery List requires considerably more than producing a technically acceptable bar. An applicant must have been in business for at least five years, have at least three years of relevant refining history, maintain tangible net worth of at least £15 million, and demonstrate annual refining production of at least 10 tonnes of gold or 50 tonnes of silver. Applicants must also satisfy due-diligence requirements and implement LBMA's Responsible Sourcing Programme. Technical assessment includes rigorous assay testing, bar inspection and independent referee testing. Gold applicants receive 24 assay samples, while silver applicants receive 10. Successful applicants subsequently cast bars for physical inspection and further testing by LBMA-appointed referees.

Importantly, accreditation is not the end of the process. LBMA maintains standards through ongoing monitoring, including annual reporting requirements and Proactive Monitoring every three years, which reviews refiners' assaying and casting capabilities.

Key Takeaways

- London Good Delivery provides a globally trusted benchmark for physical gold and silver.
- GDL accreditation assesses financial strength, operational history, responsible sourcing and technical capability.
- Gold GDL refiners must maintain at least 10 tonnes annual refining production and £15 million tangible net worth.
- Good Delivery gold bars are approximately 400 troy ounces, with an assay range of 995.0–999.9.

BIS Hallmarking: Building Consumer Trust Through Purity and Traceability

Mr Chandan Rao – Deputy Director, Hallmarking Department, BIS

Mr Chandan Rao presented the evolution and scale of India's BIS Hallmarking Scheme, which was created principally to protect consumers from purchasing gold jewellery of lower-than-declared purity and to strengthen India's position as a leading global gold market. Gold jewellery hallmarking began in April 2000, while mandatory hallmarking was introduced in June 2021.

The scale achieved since then is significant. As of 31 March 2026, the system included 2,22,632 BIS-registered jewellers, 1,581 recognised Assaying & Hallmarking Centres, 67 licensed refineries and 113 recognised OSCs. During FY2025-26, 12.63 crore gold articles and 59.31 lakh silver articles were hallmarked.

Mandatory hallmarking has expanded from 256 districts covering 14, 18 and 22 karat gold in its first phase in June 2021 to 392 districts covering seven grades—9K, 14K, 18K, 20K, 22K, 23K and 24KS.



Key Takeaways

- Seven gold fineness grades are covered, ranging from 375 ppt (9K) to 995 ppt (24KS).
- More than 2.22 lakh jewellers are registered within the BIS hallmarking ecosystem.

Session on Standards

Global and Indian Standards Converge on a Common Goal: Trust



Moderating the Session on Standards, **Mr Ankur Goyal**, President-Works, MMTC PAMP India Pvt Ltd, brought together the global and Indian perspectives presented by **Mr Neil Harby**, Chief Technical Officer, LBMA, and **Mr Chandan Rao**, Deputy Director, Hallmarking Department, BIS. The interaction focused on how standards can create confidence across different stages of the gold value chain—from internationally traded bullion bars to jewellery purchased by Indian consumers.

Drawing on the two presentations, Mr Ankur Goyal steered the conversation towards the importance of consistency, credible assaying and continuous compliance. The discussion highlighted that achieving the prescribed purity is only one element of a trusted gold ecosystem; the processes behind the metal—including testing, documentation, traceability and oversight—are equally important.

Mr Neil Harby highlighted the international perspective, where London Good Delivery provides a recognised benchmark for wholesale bullion. The conversation reinforced that Good Delivery status is not simply an accreditation achieved once; refiners must continue demonstrating their assaying and casting capabilities and meet ongoing responsible-sourcing and monitoring requirements. Mr Chandan Rao brought the discussion closer to the Indian consumer, explaining how BIS hallmarking has evolved from purity certification into a much broader assurance framework. The introduction of HUID has added article-level traceability, allowing consumers to independently verify key information relating to hallmarked jewellery.

Under Mr Ankur Goyal's moderation, the session connected these two systems around one common principle: trust in gold must be measurable and verifiable. Whether it is a wholesale bullion bar moving through the international market or jewellery reaching an Indian household, credible standards ultimately depend on reliable assaying, transparent processes, traceability and continuous oversight.

Session on Refining

Impurities Can Make or Break Refining Efficiency and Final Gold Quality

Mr Ankur Goyal

President-Works, MMTC PAMP India Pvt Ltd

Mr Ankur Goyal examined how deleterious and base-metal impurities affect gold refining efficiency, recovery and final product quality. He noted that refinery feed increasingly contains metals such as copper, lead, zinc, nickel, bismuth, arsenic, antimony, selenium and cadmium, all of which can complicate refining and increase reagent consumption, gold losses and operational risk.

The presentation compared chemical and electrolytic refining routes. In chemical refining, gold is dissolved and selectively recovered, while electrolytic refining separates impurities according to their electrochemical behaviour. Mr Ankur Goyal also highlighted Acid-Less Separation (ALS) as a cleaner pre-treatment route, using vacuum to remove volatile metals such as silver, lead and cadmium while reducing acid use and toxic effluent.

The effect of impurities extends beyond refining. Residual silver can lower assay purity, copper can increase hardness and reduce formability, lead can cause brittleness and cracking, while zinc and iron can create porosity, inclusions and surface defects. PGMs may also create non-homogeneity and assay variations.

Mr Ankur Goyal concluded that the refining route directly determines how effectively impurities are controlled and, ultimately, the consistency of high-purity gold produced.



Key Takeaways

- Feed quality has a major impact on refining performance.
- Deleterious elements increase reagent use, sludge generation and gold losses.
- Chemical refining depends heavily on controlled reactions and washing efficiency.
- Electrolytic refining keeps many impurities out of the deposited gold.
- ALS can reduce acid use and remove volatile metals before final refining.
- Residual impurities affect purity, hardness, ductility, colour and surface finish.
- The right refining route is critical for producing premium bullion and precision-minted products.

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**150+
DELEGATES**

**12+
SPEAKERS**

**10+
COUNTRIES**

DAY 1 IGC Seminar 2026 - Key Voices & Important Quotes



Mr Kanthanathan P

Head of Central Quality, Titan Company Ltd

"A perfect assay performed on a poor sample can still produce the wrong commercial answer. Sampling therefore has to be treated as an integral part of the assay itself. The method should reflect the nature, homogeneity and risk of the material, particularly when dealing with recycled, alloyed or potentially contaminated gold."

Mr Dippal Manchanda

Technical Director & Chief Assayer, Anchorcert Analytical

"In precious-metal assaying, an error that appears extremely small in the laboratory can become a very large financial difference in settlement. Accuracy therefore depends on controlling every stage of fire assay—from sampling and weighing to cupellation, parting and final calculation. Uniformity between samples and proofs is fundamental to reliable settlement."



Mr Pankaj Deshmukh, Head-Assay Laboratory, MMTC PAMP India Pvt Ltd

"Fire assay may be a recognised technical method, but the reliability of the final result depends on the entire laboratory system behind it. Competent people, representative sampling, verified methods, calibrated equipment, measurement uncertainty, traceability and continuous quality control must all work together. Consistent assay performance is as much about laboratory culture as it is about chemistry."

Mr Neil Harby, Chief Technical Officer, LBMA

"London Good Delivery is much more than a specification for the weight and purity of a bullion bar. A globally trusted refinery must demonstrate technical capability, financial strength, responsible sourcing and consistent operational performance. Accreditation is therefore not a one-time achievement; maintaining confidence requires continuous monitoring, testing and adherence to standards throughout the refinery's participation in the global market."



Mr Chandan Rao, Deputy Director, Hallmarking Department, BIS

"Hallmarking has evolved from a purity-certification mechanism into a large-scale system of consumer assurance and digital traceability. Through mandatory hallmarking and HUID, every compliant jewellery article can carry an identifiable record connecting purity, the jeweller and the assaying centre, giving consumers a practical mechanism to independently verify what they are purchasing."

Mr Ankur Goyal, President-Works, MMTC PAMP India Pvt Ltd

"The quality of refinery feed has a direct bearing on recovery, operating efficiency and the quality of finished gold. Deleterious elements can increase reagent consumption, generate additional sludge, contribute to gold losses and create problems in the final product. Selecting the appropriate refining and pre-treatment route is therefore critical to consistently producing high-purity bullion."

