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ARTICLE



Precision Under Pressure - Why Penetration Testing cannot be an afterthought for Measurement and Instrumentation Businesses

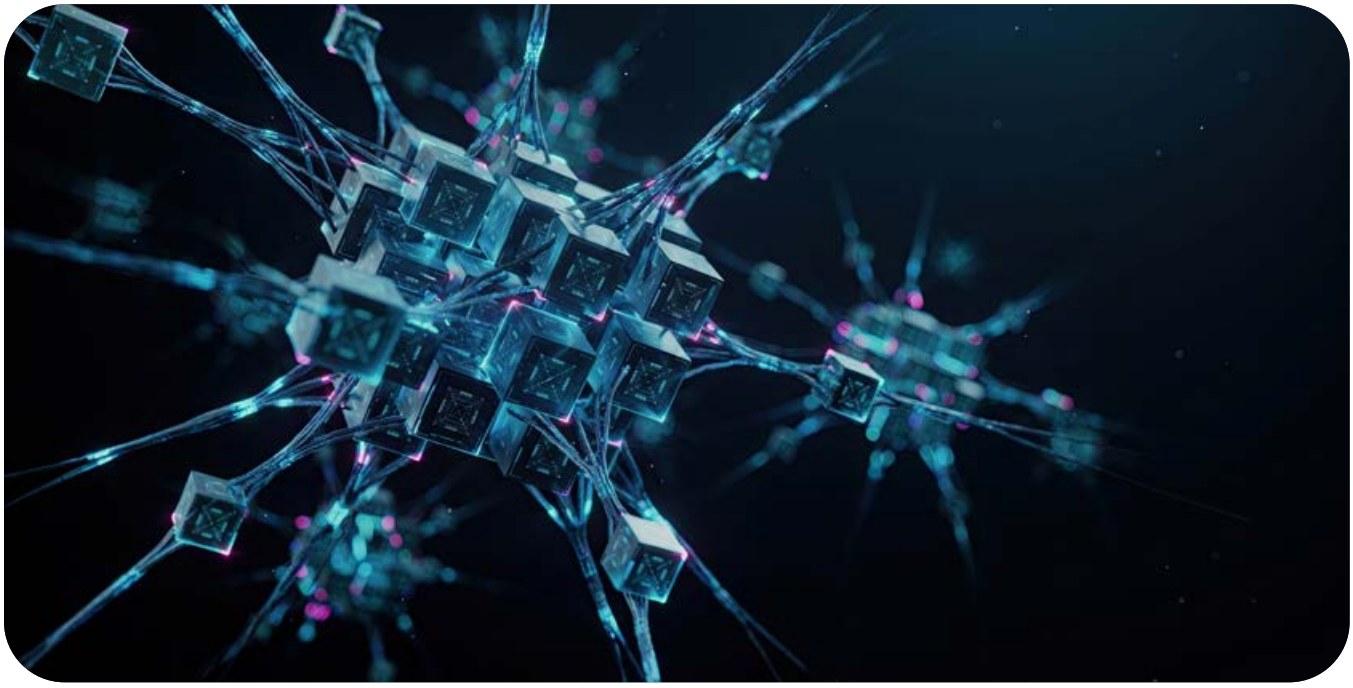
Your instruments are trusted to measure the world accurately. But how accurately are you measuring your own cyber risk? For businesses whose products sit at the heart of laboratory, medical and industrial supply chains, penetration testing is not a compliance checkbox, it is a direct line of defence for operational continuity, customer trust, and the regulatory standing your markets demand. In this article Cyberfort security experts discuss the importance of Penetration Testing for Measurement and Instrumentation businesses and the outcomes they should be looking to achieve by implementing a programmatic approach.

The Penetration Testing landscape for Measurement and Instrumentation Businesses

Precision measurement and instrumentation businesses operate in a world of extreme accountability. Whether your products underpin pharmaceutical quality control, industrial process management, or accredited calibration services, your customers rely on your outputs to make decisions that carry real-world consequences. A reading that is wrong, a certificate that cannot be trusted, or a system that goes offline at the wrong moment does not just cause inconvenience, it can halt a production line, fail a regulatory audit, or compromise patient safety. That is the commercial reality of the markets you serve.

At the same time, your business model is evolving. IoT-enabled devices, digital integration of weighing and measurement data into customer workflows, global e-commerce and download portals, and an expanding network of international distributors and partners have all extended your digital footprint significantly. Each of these represents genuine competitive advantage, and each one introduces cyber risk that your traditional quality management systems were never designed to address.

For boards and executive teams in this sector, the priority is clear: protect the operational continuity, data integrity, and regulatory standing that underpin your reputation. Penetration testing sits at the centre of that ambition, not as a one-off technical exercise, but as an ongoing discipline that validates whether your defences actually hold under real-world attack conditions.



Where the real risk lives in your organisation

The critical success factors for cyber resilience in precision manufacturing are not primarily about firewalls or antivirus software. They are about understanding the specific points in your business where a successful attack would do the most damage and then testing systematically whether those points can be breached. For a business in this sector, three areas carry disproportionate risk.

1

Public-facing digital infrastructure - Web shops, customer portals, software download areas, and firmware update mechanisms, are an attack surface that is easy to overlook precisely because it appears routine. Yet if an attacker is able to compromise a download area and replace legitimate software or firmware with a malicious version, every customer who trusts your brand enough to install that update becomes a victim. This is not a theoretical risk. Sandbox analysis of files retrieved from download areas in this sector has already flagged malicious behaviour in the wild. The financial and reputational cost of a supply-chain attack through your own distribution channel could be severe and long-lasting.



2

Connected and IoT-enabled products present a second critical exposure. Instruments integrated into laboratory information management systems, production environments, or remote monitoring platforms carry bi-directional data flows. A vulnerability in the application layer that sits between your devices and your customers' infrastructure could allow an attacker to manipulate measurement data, disrupt automated processes, or move laterally into a customer's network. In regulated environments, pharmaceutical manufacturing, medical diagnostics, or accredited testing laboratories that kind of interference carries consequences that extend well beyond your own organisation.

3

The third area is your compliance and accreditation obligations, which are tightening. The EU's NIS2 Directive, which came into force in October 2024, explicitly places manufacturers of critical-use products, including measurement and instrumentation businesses supplying healthcare, energy, and industrial sectors within its scope as important entities.

NIS2 requires not just documented security policies but evidence of active risk management, including vulnerability testing and incident response capability. ISO 27001 Annex A Control 8.8 mandates management of technical vulnerabilities across your estate. IEC 62443, the international standard for operational technology security, sets out specific requirements for industrial control systems and their supply chains. And for businesses holding DAkkS or equivalent laboratory accreditation, auditors are increasingly asking for evidence that the systems underpinning calibration records and certificates have been tested for integrity. Penetration testing is the mechanism by which you generate that evidence.

Precision manufacturers are no longer just engineering businesses. They are data businesses, software businesses, and in many cases, critical infrastructure suppliers. Your security programme needs to reflect that, and penetration testing is how you find out whether it actually does.

What Penetration Testing should deliver for your business

> When structured correctly around your specific operational environment, a penetration testing programme does not just produce a report.

It produces a set of evidence-based outcomes that directly affect your KPI's, your ability to maintain regulatory standing, protect revenue continuity, and defend the customer relationships that your reputation depends on.

An external infrastructure penetration test validates whether your internet-facing systems - web shop, customer portal, download and update services, can be breached by an attacker starting from the same position as anyone on the internet. If the test finds that your download area can be accessed without proper authorisation and content can be substituted, you are looking at a potential brand issue and the liability exposure that comes with it. Finding and closing these issues before an attacker does is the difference between a controlled remediation and a crisis that lands on the front page of a trade publication and triggers regulatory notification obligations under GDPR and NIS2.

An application penetration test goes deeper, examining the business logic and security controls of the web applications and APIs that connect your products, services, and customers. For businesses offering IoT-integrated solutions, this is particularly significant. Flaws in the API layer that bridges your instruments to customer systems - injection vulnerabilities, broken access controls, insecure direct object references, can allow a sophisticated attacker to manipulate the data your instruments report, impersonate authorised users, or gain a foothold in a customer's environment through a trusted connection.

Discovering a flaw of that nature on your own terms and timeline, rather than through a customer complaint or a regulatory investigation, is a material business outcome in its own right.

Internal infrastructure penetration testing should simulate the scenario where an attacker has already gained an initial foothold inside your network - through a phishing email, a compromised partner account, or a vulnerable edge device. It tests whether your internal segmentation, access controls, and privilege management actually contain a breach, or whether an attacker can move freely towards your calibration systems, manufacturing operations, ERP, or customer data. For a business with DAkkS accreditation and time-critical calibration commitments, the operational cost of an uncontrolled ransomware event that reaches your laboratory systems is not abstract. It is a specific, quantifiable risk to contract performance and accreditation status.

Hardware and firmware testing addresses the security of the devices themselves - the interfaces, update mechanisms, and embedded software that sit in your customers' facilities. For instruments operating in regulated environments, this matters both for your own product liability and for your customers' compliance posture. Red team and purple team exercises then test your detection and response capability under realistic attack conditions, measuring not just whether you can be breached, but how quickly you can identify and contain an incident, a metric that NIS2 and your customers' own supplier assurance programmes are increasingly asking you to demonstrate.

The Compliance Landscape - What you are required to evidence

The regulatory environment for precision manufacturers in EU and international markets is no longer permissive about security. These are the specific frameworks that a structured penetration testing programme directly supports:

NIS2 Directive (EU, October 2024) Requires important entities - including manufacturers supplying critical sectors - to conduct regular vulnerability assessments and penetration tests as part of active risk management. Non-compliance carries fines of up to €7 million or 1.4% of global annual turnover.

ISO 27001:2022, Annex A Control 8.8 Mandates the management of technical vulnerabilities across all in-scope systems, with evidence of identification, assessment, and remediation. Penetration testing is the primary mechanism for generating that evidence.

IEC 62443 Sets security requirements for industrial automation and control systems and their supply chains. Manufacturers supplying OT environments are increasingly required by their industrial customers to demonstrate compliance.

DAkkS and ISO 17025 Accreditation auditors are increasingly examining the integrity of IT systems that underpin calibration records and certificates. Independent security testing strengthens accreditation renewals.

GDPR Requires appropriate technical measures to protect personal data processed through customer portals, contact forms, and order management systems. Penetration testing provides evidence of due diligence in the event of a breach investigation.

The question most senior leaders ask at this point is a fair one - so what does this mean for us, right now?

Every framework listed above shares a common requirement: evidence. Not a policy document, not a stated intention, not a completed self-assessment questionnaire - demonstrable, tested, independently verified evidence that your controls work under real-world conditions.

For a precision manufacturer operating across EU and international markets, that evidence is no longer a nice-to-have that sits in a compliance backlog. It is the artefact your largest industrial customers will request before renewing a supply agreement, the documentation your insurer will examine before confirming cover, the proof your accreditation auditor will expect to see alongside your calibration records, and the assurance your board needs before it can sign off NIS2 obligations with confidence.

A structured penetration testing programme does not add to your compliance burden, it resolves it. It converts a series of open obligations into closed, evidenced, defensible positions. The organisations that act on this now will be in front of their renewal cycles, their audits, and their customer questionnaires. Those that wait will find themselves answering difficult questions under pressure, at exactly the moment they can least afford to.

Why sector experience matters more than credentials alone

Technical capability in penetration testing is a baseline. What makes a material difference at the executive level is whether your security partner understands the business context in which they are operating - the customer relationships, compliance obligations, operational sensitivities, and reputational stakes that make your sector distinct from a generic enterprise IT environment.

Cyberfort brings direct, active experience of the precision measurement and instrumentation sector. We deliver the full spectrum of penetration testing services - external infrastructure, application, internal infrastructure, hardware, and red and purple team exercises, for businesses whose product portfolio, customer base, and technical challenges closely mirror your own. That includes organisations operating at global scale in the same sector, serving the same laboratory, medical, and industrial end markets, and managing the same combination of IoT-connected product lines, accredited calibration services, and complex international distribution networks.

That sector experience translates into concrete differences in how we engage. We understand that a scheduled test window in a calibration laboratory needs to be structured around instrument availability and accreditation audit cycles, not just IT change management windows. We understand that the API layer connecting your instruments to customer systems is a higher-value target than a standard web application, and we test accordingly.

We understand that a finding in your firmware update mechanism carries different business implications to a finding in your marketing website, and we prioritise and communicate accordingly to your technical and executive stakeholders.

Organisations in this market sector that have engaged Cyberfort for structured penetration testing programmes have identified and closed critical vulnerabilities in their public-facing download infrastructure before those vulnerabilities were exploited. They have used our findings to satisfy NIS2 supplier assurance questionnaires from their largest industrial customers, turning security investment into commercial enablement. Additionally, they have entered accreditation renewals with independent evidence that the systems underpinning their calibration certificates have been tested and validated. And they have built the confidence to extend their IoT-enabled service portfolios, knowing that the application and infrastructure layers beneath those services have been independently verified.

For Measurement and Instrumentation businesses where brand promise, heritage, customer commitments, and ambitions in digital-enabled measurement services, penetration testing is not a cost. It is the investment that protects every other investment you are making, in new products, new markets, and the trusted relationships that have taken generations to build.





For more information about Cyberfort Penetration Services contact us at info@cyberfortgroup.com or or call +44 (0)1304 814800.

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