Remote Inspection for TIC Industry Application

Inspections performed by third-party conformity assessment bodies such as inspection bodies and certification bodies play a critical role in supporting a secure and reliable supply chain and the development of new and innovative products. The free movement of products requires inspections to be performed efficiently and without disruption throughout the supply chain. Inspections confirm conformance with customer, industry, and government requirements and provides third-party attestation of that conformity.

The performance of inspections in-person aims to ensure that the business and site of inspection can be confirmed, physical evaluation and testing of items can be performed, and interviews and other administrative steps taken.

Increasing digitalization has led to the development of specialized tools and technologies which may enhance remote inspection capabilities, providing more opportunities to incorporate remote inspection into day-to-day activities.

This white paper illustrates under which conditions a remote inspection can complement or effectively replace an in-person inspection, thereby offering an alternative when risks to health and safety or other conditions render in-person inspections inadvisable or impossible.

What is "Remote Inspection"

Remote inspection is a term used to refer to the performance of inspection using technology such as a video feed while an intermediary person moves at the inspector's direction around with the camera. The inspector is located off-site at a remote location while the intermediary, typically a person working at the business or site, is on-site. The intermediary person can be anyone with the appropriate training and approval to act in this role including the customer or inspector's staff.

Remote inspection can also refer to inspections performed where the inspector is on-site but does not look at the object or area being inspected directly, but rather through use of an intermediary such as person, robot, or drone.

Other terms used when referring to remote inspection include:

- Digital inspection,
- Remote video inspection,
- Remote supervision,
- Guided inspection,
- Augmented inspection; and
- Remote visual inspection.

Remote inspection can be used in concert with in-person inspections – augmented inspection – and is commonly used at times when risks to health and safety or other conditions render in-person inspections inadvisable.

A remote inspection, while performed in a different manner, should continue to have the same level of robust review as an in-person inspection. In comparison to time on-site during in person inspections, remote inspections can at times take

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longer due to the need for the inspector to instruct the intermediary to perform certain steps, aim the camera to show different views of an item, and ensure due diligence. This will vary from inspection to inspection within industries and dependent on the type of inspection being performed and is meant as a general note and should not be considered the norm.

When performing a remote inspection, the following may be used:

- Use of live-stream audio-video conferencing,
- Document sharing,
- On-screen chat,
- Body and robot cameras,
- Screen captures and annotations (e.g. telestration), and;
- Recording of video and audio of the remote inspection (only after explicit approval of the inspected facility and all recorded persons).

Downloadable applications ("Apps") are also available for the performance of remote inspections. These apps are available through third-parties or some third-party conformity assessment bodies have developed their own proprietary software for the performance of remote inspections. In both cases, these apps which can be downloaded onto smart devices can be used to provide a secure channel through which data can be shared. Overall function and ability of such apps to ensure security of data should be evaluated prior to use.

When considering the use of applications and other technologies, data protection should be considered including what data of the remote inspection is stored and for how long such as audio and/or video recordings, digital copies of personal files. Explicit approval of the involved persons might be required.

Accreditation bodies and government oversight bodies may also employ online systems to support the safe and secure transfer of data as part of the remote inspection process.

When performing a remote inspection, the same steps as would be performed in-person should be taken.

The remote inspection may include more than one intermediary, inspector, or customer participant. Online tools such as video conferencing allows for multiple participants to participate and support the performance of the remote inspection.

A hybrid or partial-remote inspection would include some portion of the inspection being performed in-person and a portion of the inspection performed remotely. Such descriptions would include scenarios where the object requiring inspection cannot be accessed in-person and so the inspection is completed using an intermediary such a robot or drone. The inspection is on-site and performs portions of the inspection in-person, but inspection of the object is performed remotely.

Technical requirements for performance of remote inspection

Remote inspections are not a best fit for everyone, nor always an option even if the right conditions such as connectivity are met. They require that the organization to undergo inspection have:

1. WiFi and/or reliable cellular connections
2. Personnel to act as the intermediary
3. A smart device with built in camera
4. Audio-video software or app for the smart device are also needed.
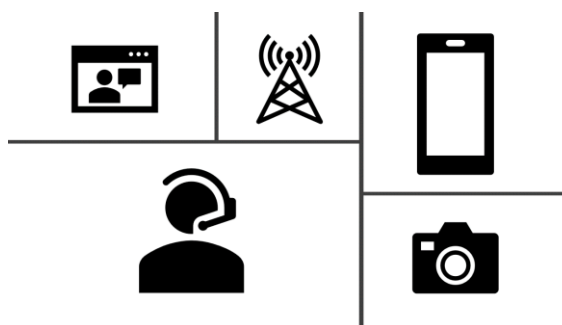
In addition to meeting technical needs, inspector(s) and the intermediary(ies) will require a level of comfort in using the technology effectively. Training and support to ensure their understanding of how to use the software may be needed.

Consideration should also be given to product, process, and data protection (e.g. trade secrets protection).

Determining whether to proceed with a remote inspection

- Remote inspection may be implemented based on various circumstances. Inspection scenarios that may fit a remote inspection model include:Areas of high risk to health and safety
- Remote locations
- Inaccessible environments
- Instances of high demand and limited availability for in-person inspection
- As part of an overall global quality inspection program with a customer
- When a first in-person inspection has been conducted and a reinspection is needed

Construction sites, manufacturing facilities, marine vehicles and equipment, and biohazard sites are examples of industries and locations which have incorporated remote inspection.

Remote inspection can also be used at times of public or other emergency such as a pandemic where mobility and transportation are limited. During these times, in-person inspection may be prohibited or inadvisable and as such, remote inspection may be utilized until such time as an in-person inspection can be performed.

When determining whether to proceed with a remote inspection, the third-party conformity assessment body will evaluate all risk factors to confirm that use of remote inspection is appropriate and feasible. This would include confirmation that technical resources available will ensure the proper level of access to needed items and records and that limitations can be mitigated or reduced to an acceptable level.

Other risks that may be considered include:

- The organization undergoing inspection's comfort level, willingness, and ability in using online tools.
- The organization undergoing inspection's willingness to share information and documentation through virtual means. (i.e. some internal policies prevent sharing documents electronically due to data privacy concerns.).
- The increased chance of overlooking instances of noncompliance.
- The complexity of the inspection and organization undergoing inspection's system.
- The complexity of the inspection to be performed.
- Access to tools needed to perform the inspection such as measuring and other test equipment.
- The organization undergoing inspection's willingness to accept the results of the remote inspection.

In all cases, the third-party conformity assessment body maintains the ability to require an in-person inspection or if a remote inspection has begun, to stop the remote inspection and require an in-person inspection. Formal notification and justification are commonly provided in such cases.

Accreditation bodies, scheme owners, and government oversight bodies may also specify additional steps in evaluating whether to perform a remote inspection and under what justified and agreed circumstances a remote inspection would be prohibited or would be required to be converted to an in-person inspection. In these cases, a thorough understanding of the program under which inspection is sought will clarify the expectations of the in-person inspection and when a remote inspection would be permitted.

Benefits of remote inspection

Remote inspection supports industry and customers by facilitating the continuity of quality control and quality assurance activities without compromising safety or compliance requirements.

Inspectors can perform remote inspections from anywhere around the world as long a connection can be established. In the absence of days and time spent traveling between inspections, inspectors become available during additional periods, allowing for additional inspections to be performed. Travel costs are also reduced or eliminated.

For organizations seeking to reduce their carbon footprint, remote inspection cuts or reduces time spent in air, car, and boat, lowering their carbon footprint.

When applicable, scheduling can also often be confirmed quickly, and the remote inspection performed much sooner than in-person inspection. This reduces wait-times for industry.

Remote inspections can prevent lapses in recognition or approvals which are contingent upon successful completion of inspections.

During the remote inspection, organization contacts that normally would travel to the inspection site to observe can now join the video call and participate online, further reducing travel expense and time away from work duties.

Remote inspections also allow inspection bodies to 'supervise' inspectors as part of internal quality assurance and control processes, wherein inspectors are

observed by senior or supervising inspectors. Performance of such supervised inspections remotely, reduce travel time and time away from the office.

And finally, audio and video recording of the remote inspection can be used internally to improve processes and can be quality checked by an oversight body or others, further supporting the robustness of the review.

The future of remote inspection

While in-person inspection will continue to be the ideal, there are many practical uses of remote inspection and it is expected that remote inspection will continue to be used to augment in-person inspection and when in-person inspection is not possible or advisable.

In some instances, remote inspection may be preferred over in-person inspection. Such instances are still being identified and should be evaluated on a case-by-case basis.

Providing alternatives to in-person inspection enables businesses to keep operating in compliance with industry and government requirements and that supply chains are not disrupted.

The industry is just beginning to explore different approaches and mechanisms to further enhance the process and new technology such as specialized devices and applications could be on the horizon.

A lack of data connection in areas such as deep underground or in remote locations will continue to limit the availability of remote inspection, but innovations in technology such as 5G may alleviate these issues.

Through remote inspection in cross-border processes, the language barriers can be overcome in the future through new real-time translation.

The use of drones, hand-held tablets, and wearables can also assist in replacing or enhancing the use of intermediaries and can also be used by industry to enhance quality assurance and control programs.

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TIC Council is a global association representing over 90 international independent third-party testing, inspection, certification and verification organizations. The industry represents an estimated one million employees across the world with annual sales of approximately USD 200 billion

Appendix 1 - Bulk Cargo Quantity and Quality inspections

Whilst the generic move towards remote inspection does offer various interesting possibilities in the field of bulk cargo quantity and quality inspections, from efficiency to improved HSE, there are a number of very significant challenges to be considered and overcome before any transition can be made. The hurdles fall into three main groups

1. The revision of norms and standards to include any new technologies
2. The recognition in regulations, contractual law and national legislation of the alternative technologies as being equivalent to or better than the established techniques
3. The certification of equipment to operate in hazardous areas.

The activities involved in the inspection of bulk oil, gas and petrochemicals, largely codified in industry standards such as those published in the API MPMS , Energy Institute HM series and ISO norms , call for very specific activities such as obtaining physical samples and making and recording accurate physical measurements. Any remote inspections of bulk hydrocarbon commodities would remain governed by the published standards and norms, all of which rely on physical, largely manual, intervention and have no remote option within them. In addition, the various contractual obligations governing both the custody transfer and the appointment of the inspectors by the transacting parties cite the same ISO / API / EI standards as the minimum requirements for intervention. Even local legislation cites these long-established physical norms with regard to such important areas as consumer protection and environmental controls (e.g. US EPA regulations on gasoline).

One very specific and important area to consider is the requirement that any equipment operating in a hazardous area be fully certified for safe operation in the potentially flammable and /or explosive zone. Much remote inspection equipment available today simply does not comply with the HSE requirements long established in most countries for Class I II and III zones or on-board tanker vessels. Any electronic equipment must be certified as intrinsically safe and their use authorized in writing by the controlling authorities such as the Coastguard, Customs Agencies, HSE bodies, shipping organizations such as OCIMF and to still be compliant with the norms of API, ASTM, EI, etc.

For example, bulk liquid inspections require that cargo be physically gauged and temperatures taken with equipment that cannot be remotely controlled. Indeed in some cases remote monitoring is either forbidden explicitly or must reach a specific level of comparison to the established manual methodology before it may be substituted. The accuracy of representative samples and measurements is vital. This may only be conducted by properly trained, experienced and authorized individuals at the site. Various documents, often only available as physical copies on board a vessel, such as calibration tables and charts need to be consulted and used for data extraction whilst the work is carried out.

The case is similar for bulk dry commodities where draft surveys are required. These types of procedures could not be undertaken without consulting the vessel's hydrostatic tables and confirming various parameters such as weights stowed in none cargo compartments—such as ballast and bunker tanks. Also importantly, the cargo needs to be sampled in compliance with established norms

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and the quality determined/verified which can only be done locally. Whilst auto samplers can and are employed these too must be checked prior to use and then proven they have worked correctly.

There are currently no regulations based on country specific Customs Agencies and provisions or guidelines in our industry standards such as the API, ASTM, EI etc. that govern or even facilitate how any type of remote inspection could be undertaken. The updating and revision of each published standard or norm by the issuing body proceeds according to established guidelines themselves set by each standards body. The process takes several years to accomplish and cannot be done quickly as it requires a consensus be reached by working groups or committees from the industry.

Remote inspections are viable where images and video alone are sufficient to meet the requirements of the customer requirements.

It is inevitable that modern technologies will come into use, but as with much in the bulk commodity world, there are layers of implementation that have to be dealt with, from contractual recognition to industry standards being revised, and the technologies must be made both safe to operate in hazardous environments and certified as such.