

Industry upbeat on Indian metal detector market

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WITH emerging opportunities in pharmaceutical and other industries as well, the industry observers are upbeat on the prospects of the metal detector market in India. Emerging trends are directly impacting the dynamics of the metal detector industry, driving the market towards technological advancement for superior performance, they opine.

Equipment manufacturers are constantly improving metal object detection systems to provide better performance and ease of use. As more advanced and sophisticated equipment is gradually adopted, particularly in the quality maintenance sector of the industry, it is expected that the metal detector markets will expand in the near future.

The Indian pharmaceutical industry is well equipped for metal detection purposes and, from January 1, 2023, the Indian Pharmacopoeia has also made it mandatory for detection of metallic elements. Following the implementation of the current IP [1st Jan 2023], India will be at par with the developed markets [US, EU, Japan etc.] standards.

According to Dr. Sanjay Agrawal, pharmaceutical consultant, the future of the industry is bright. A change in the market segmentation and the competitive environment is being noticed. While developed regions such as North America and Europe are expected to drive growth, importing industrial metal detectors will also drive sales for manufacturers in India, China and Taiwan.

The adoption of industrial metal detectors in India has increased noticeably and will flourish in the pharmaceutical industry in the coming years as its applicability grows. According to a market research study, the industrial metal detector market is expected to grow steadily between 2021 and 2026.

Expansion in infrastructure, and increasing stringency in government compliances in various sectors to maintain high level of security and safety are the major growth drivers for this market, according to Lucintel.

Emerging trends, which have a direct impact on the dynamics of the metal detector industry, include increasing trend towards advancement in metal detector technology for superior performance and growing use of metal detectors in new applications such as sports and medical applications. Lucintel forecasts that static metal de-

tor is expected to remain the largest segment due to increasing usage of metal detectors in the pharmaceutical industries and hospitals.

"The control and monitoring of metals in APIs ensures that the latter are tested for heavy metals such as lead [Pb]. However, in certain medicines, regulators have from time-to-time recommended control and monitoring of highly toxic metals such as Arsenic [As], Mercury [Hg] etc. in the starting materials and in the finished products as well," said Dr. Ashok Panwar, VP - corporate quality assurance, Akums Drugs and Pharmaceuticals Ltd.

India's existing advantage in large-scale pharmaceutical production, can significantly leverage its soft power by investing in the outward growth of other countries healthcare sectors by increasing pharmaceutical exports; becoming a preferred medical tourist destination for those seeking affordable treatment in quality secondary/tertiary health services; and pursuing medical diplomacy, he added.

"There are opportunities to pursue medical diplomacy by providing medical training and technical expertise to many other developing countries with far worse healthcare systems than India. Companies have been forced to upgrade their systems and learn how to accommodate employees working from home since Covid-19. This shift, expected to take five to 10 years, has happened in months," said Dr. Sanjay Agrawal.

Metal detection has always been important notwithstanding the Covid-19. Since several metals are toxic in nature, quantification of metals has been an important part of pharmacopoeial monographs for over several decades.

Innovations and technological developments

According to Panwar, there are two aspects to the innovations in this sector. These are

1. Detection and quantification of metals in starting materials [such as APIs and excipients] by ICP- MS/ICP-OES. In some cases, Atomic Absorption Spectroscopy [AAS] is also being used.
2. Metal contamination/impurities in drugs are controlled through well-design

processes, MOC of process equipment and highly sensitive metal detection devices that control metallic contamination.

"With the pharmaceutical industry's competition heating up, leading global players and small and medium-sized players are increasingly incorporating cutting-edge metal detection technologies into their processing and packing lines. Companies worldwide are embracing quality control automatic management systems to detect contamination with advanced metal detectors," Dr Aggarwal said.

Emerging trends directly im-



part the dynamics of the metal detector industry, driving the market toward technological advancement for superior performance. Manufacturers focus on introducing and launching new products that meet specific industrial needs. Opportunities for the installation of industrial metal detectors are being driven by investments in further processing and packaging lines.

Micro-scan technologies, which provide excellent sensitivity and accuracy during metal detection, are also gaining traction in the global industrial metal detectors market.

One of the noticeable advancements in metal detection systems is incorporating multi-coil arrangements in metal detectors to improve the signal obtained by the receiver. Multi-coil structures can improve instrument detection performance by up to 20 per cent compared to a single transmitter with two receivers. The number and placement of such coils or antennas can be optimized using electromagnetic field simulation software, making detecting smaller metal foreign objects more straightforward while reducing false rejections. A metal detector with a multi-coil architecture has a higher sensitivity.

Developed countries like the US, EU, and Japan have been monitoring the metallic impurities for several years by following the ICH Q3D guideline [effective from Dec 16, 2014]. In this, elements are classified into three classes [Class 1, Class 2A, 2B and Class 3] based on the Permissible Daily Exposure values. Further, USP has also introduced in general chapter from 1st Jan 2018 for Elemental testing [Metals].

India, on the other hand, is on the same page as that of developed countries in terms of metallic control and detection for products to be supplied to them. In terms of the domestic market, Indian pharmacopoeia [IP] has also played a key role in the implementation of metals testing by highly accurate and reproducible techniques.

"In general, in India most of the manufacturers for starting materials are testing for heavy metals such as Sodium and Potassium by Flame Photometer and for Lead [Pb] by using Atomic Absorption Spectroscopy [AAS]. However, big pharma

Indian companies have procured expensive instruments i.e., ICP-MS/ICP-OES mainly for regulatory markets," said Panwar.

"For drugs [in terms of finished formulations], chances of metallic contamination is low. However, there is a possibility of metallic contamination from both the process and starting materials [mainly from the sieves, excipients, APIs and equipment material i.e., all that is in direct contact of the drugs]. Such transfer is managed by well-designed, high-detection capacities of metal detectors used in drug manufacture of drug products", he further stated.

Challenges for metal detection

Although India's metal detection industry is in a phase of transition, it is still lagging in implementing advanced metal detection technology in pharmaceutical products. Only a few sophisticated metal detection systems in place. However, as more pharmaceutical and raw material processing industries procure and implement the most advanced metal detectors in their manufacturing and packing units, demand for metal detectors will rise in the coming days. As the future of the metal detectors segment appears bright, the

Indian metal detection industry is bound to experience a positive trend shortly.

"Since the cost of testing instruments for metallic impurities is high, small- and medium-sized companies may not be able to afford them for in-house and need-based purposes; they might be reliant on outside contract laboratories for testing purposes. Since the cost of drug production is impacted by the cost of metals testing and that of online metal detectors required in the manufacturing set-up, the cost of drugs escalate", said Panwar.

The most crucial challenge is the contamination of metal detection. Like any other industrial production process, the pharmaceutical industry is highly susceptible to metal contamination. Metal contamination in pharmaceutical manufacturing units can occur due to mixing process errors, machinery failures in the tablet and capsule forming and filling process, and ingredient contamination, said Aggarwal.

Because the pharmaceutical industry is so strictly regulated, metal detectors are required by law. The checklist cannot be completed simply by installing metal detectors; instead, a full-proof mechanism is necessary to ensure that these detectors are functioning correctly.

A strong pipeline of blockbuster drugs is not enough for a pharmaceutical company to make a significant global impact. Adopting robust and best-in-class inspection systems throughout drug production is critical to meeting regulatory directives set by regulatory bodies and remaining in compliance with Good Manufacturing Practices (GMP).

Because of the increased number of product recalls and inspection checkpoints throughout the production line, the pharmaceutical industry has seen a significant increase in implementing automated inspection systems for metal detection. The inspection machines market is expected to grow to \$871 million by 2025, up from \$671 million in 2020, at a CAGR of 5.4 per cent.

Due to changing international regulations, stringent government policy, and growing consumer awareness about consumer safety and product efficacy, the industrial segment is expected to remain the largest end-use industry in the metal detector market. Product launches, mergers, and collaborations are priorities for manufacturers of industrial metal detectors.