Collection and detection of fine gold particles of size ≤ 10 μm have always been a great challenge due to its less dense and finely spread form. The rare and precious fine gold particles (≤ 10 μm) generated during metal working operations such as rolling, wire drawing, stamping, casting, bench working, filing, stone setting & polishing, to get its final shape as jewellery, are difficult to collect due to its tendency to fly away. Metal detectors are usually ineffective for detecting fine particles of gold as they are less dense and very feeble to be detected. Collection of the fine gold particles at source of generation has higher chances of recovery. However, our existing facility does not help much with the irrecoverable loss accounted from the operations such as filing and polishing. The challenge is to contain and collect these fine particles at the respective stages (Bench-working such as filing, rubber wheel grinding, stone setting, buffing and polishing). Apart from the recovery from the operations point of view, we also intend to recover fine gold particles getting away with employees in the form of deposits. It is desired to obtain a solution that provide a fool-proof detection system to scan employees for fine gold particles, while exiting the shop floor.

At present, hood & suction and high sensitive metal detection units, installed at many locations, have been used to detect and collect fine gold particles from the factory. However, the current technology used in detection of gold is not very effective as the gold particles are very small. Therefore, we seek suitable environmental-friendly solution to resolve challenges faced in the detection and collection of fine gold particles.

- **Options tried to solve before:**

<u>Particle collection at source:</u>
Hood and suction units have been installed at bench working and polishing locations to collect gold particles. Apart from that, the fine gold particles are also recovered from sticky floor mats, special coats which are washed, finger stalls (gloves), slippers, industrial floor washers. All materials like papers, covers, disposables, etc. are checked, burnt and refined to ensure maximum gold recovery.

<u>Particle detection:</u>
High sensitive metal detector, working on electromagnetic induction principle, have been tried. But, it is not effective since the size of the gold particles is very small.

- **Future State:**

1) 100% efficient collection of fine gold particles.
2) Environmental friendly, safe process and automated.

3) Easily cross deployable across multiple locations.
4) Fool-proof detection of gold in any form and in any quantity.

- **Success criteria:**

1) 100% collection of the material removed at source.
2) Alternate process to conventional filing and polishing, to eliminate production loss of gold particles.