



# Miniature Bearings

## Australia

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## Engineering Measurement Balls

### Overview

In precision manufacturing, machining, and metrology, reference spheres attached to a shank—variously termed Tooling Balls, Fixture Balls, Inspection Balls, and Checking Balls—serve as permanent or semi-permanent datum points. While these terms are occasionally used interchangeably in the field, specific variations in design, tolerances, and mounting configurations delineate their primary engineering purposes.

### 1. Definitions & Breakdown

- **Tooling Balls (Construction Balls)**

**Design:** Typically constructed from hardened steel or carbide integrated onto a cylindrical shank (available in plain, tapped, or shoulder styles).

**Primary Use:** Utilised during machining and setup operations on CNC machinery. They are pressed or threaded into precision holes on a workpiece to establish an exact X, Y, or Z coordinate zero point (datum), particularly on complex geometries where physical edges cannot be reliably probed.



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- **Fixture Balls**

**Design:** Commonly feature a plain cylindrical shank designed for a slip-fit or press-fit alignment without an indexing shoulder.

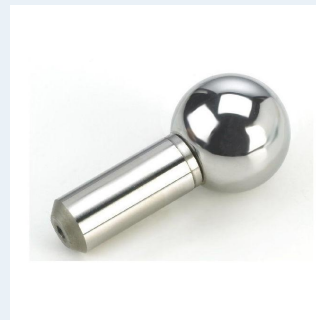
**Primary Use:** Dedicated strictly to locating, aligning, and verifying workholding jigs and fixtures. Rather than being positioned on the raw workpiece, they are integrated directly into the workholding hardware to ensure ongoing alignment relative to the machine table or multi-axis rotation centers.



- **Inspection Balls**

**Design:** Manufactured to extreme tolerances regarding sphericity and dimensional accuracy, often featuring short shanks optimized for metrological clearance.

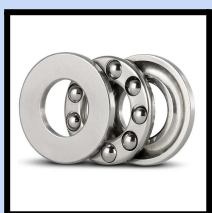
**Primary Use:** Used in conjunction with Coordinate Measuring Machines (CMMs) or optical scanning systems to inspect completed parts. They function as high-precision touch-off targets to correlate physical features back to the digital CAD reference model.



- **Checking Balls**

**Design:** Characterised by a highly precise, integrated reference shoulder or collar located immediately below the sphere.

**Primary Use:** Deployed within dedicated checking fixtures and quality gauges. The shoulder serves as a positive mechanical stop, providing an exact, repeatable vertical and horizontal distance from the base mounting surface to the center of the sphere.



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## 2. Comparison Summary

| Ball Type              | Primary Phase          | Key Defining Feature                | Main Application                                           |
|------------------------|------------------------|-------------------------------------|------------------------------------------------------------|
| <b>Tooling Ball</b>    | Machining / Setup      | Versatile shanks (tapped/plain)     | Setting CNC/mill datums on raw or angled parts             |
| <b>Fixture Ball</b>    | Workholding            | Plain cylindrical shank             | Locating and referencing modular assembly/machining jigs   |
| <b>Inspection Ball</b> | Quality Control        | Ultra-high sphericity / short shank | Probing and mapping finished parts via CMM                 |
| <b>Checking Ball</b>   | Gauging / Verification | Built-in reference shoulder         | Positive-stop positioning in dedicated inspection fixtures |



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