

# Hip Joint Implant Testing



## What Is Hip Joint Implant Testing?

**Hip joint implant testing** is vital for ensuring the hip joint implants can withstand **several loading scenarios** during daily activities or **under worst case conditions**. Hip joint implants must undergo the necessary testing to see if they comply with international standards.

[Applus+ Laboratories](#) provides a **complete testing service** for [medical devices](#), helping clients with their **hip joint implant development** to improve it for testing, as well as providing the full lifecycle simulation testing to prepare it for the body.

## What Hip Implant Testing Services Do We Offer?

At Applus+ Laboratories, hip joint implant testing involves **static and fatigue testing**, **wear testing**, and [corrosion assessment](#) to put the implant through its paces. These tests are performed against **ISO and ASTM standards** that evaluate the overall **safety and durability** of the implant for patients.

### Static and Fatigue Testing for Hip Joint Implants

Hip joint implants are tested to see how they cope under **single, heavy loads** as well as **repetitive loads** in order to simulate what an implant will go through during its lifetime. We test against the following standards:

- **ISO 7206-4**  
Dynamic femoral hip stem tests to **determine the endurance properties** by simulating proximal loosening.

- **ISO 7206-6**  
Dynamic femoral hip neck tests to determine the endurance properties of the **neck region**.
- **ISO 7206-10**  
Static test to **assess the fixation strength** of the femoral head-taper interface **against tensile loading**. In addition, **compression testing** determines the ultimate compression strength under static compression.
- **ISO 7206-12**  
Static **uniaxial load testing** to evaluate the **deformation characteristics of acetabular shells** with and without insert.
- **ISO 7206-13**  
Static test to **assess the fixation strength** of the femoral head-taper interface against torsional loading.
- **ASTM F1820**  
Where we measure the forces required to **disassemble modular acetabular components** using defined push-out, lever-out and torque out methods.
- **ASTM F2345**  
Static and dynamic compression test for ceramic femoral heads for determination of **ultimate compressive strength** in pristine and post-fatigue conditions.
- **ASTM F2582**  
**Dynamic impingement** between femoral and acetabular components in a hip replacement to assess **qualitative damage modes** and if necessary qualitative changes in modular component attachment strength.

## Wear Testing for Hip Joint Implants

We perform wear testing on hip joint implants to assess the **material degradation and wear over a defined period**. We simulate the same **pressures, stress, and general wear** that a hip joint would ordinarily go through in order to test for the implant's durability. We perform wear testing against the following standards:

- **ISO 14242-1**  
Here we simulate the wear of the hip joint under **normal walking conditions**.
- **ISO 14242-2**  
We conduct **gravimetric analysis** to evaluate the wear of hip joint implants and perform **detailed particle analyses** to assess the wear particles produced.
- **ISO 14242-3**  
Here we recreate **additional loading scenarios** like **edge loading** in order to test the hip joint implant for its endurance against **localised stress** and **deep bending or twisting**.
- **ISO 17853/ASTM F1877**  
Assessment of the morphology of particles generated during wear testing.

## Corrosion Testing for Hip Joint Implants

Since a hip joint implant often consists of several modular [metallic components](#), **corrosion assessments** are important to investigate the **fretting corrosion resistance** even when non-corrosive medical metal alloys are combined. We test hip joint implants against:

- **ASTM F1875**

Testing of femoral hip stems to determine the **amount of damage** by measurement of the production of corrosion products and particulate debris from **fretting and fretting corrosion under cyclic loading**. Damage is also assessed by characterisation of the damage to the bore and cone surfaces of the hip system.

Here we test the hip joint implant according to **simulated bodily conditions** for **temperature, pH levels, and proteins**, to see how chemical reactions might degrade the metallic surfaces over time.

## Our Testing Facilities and Equipment for Hip Implant Testing

At Applus+ Laboratories, we perform hip joint implant testing using **state-of-the-art equipment** that accurately and dependably simulates **real-world use** as well as comply with the necessary standards.

Our **multi-station hip wear simulator** is equipped with **5 controllable axes**, allowing for simultaneous testing of **up to 16 different implants**. This enables us to assess the implants' responses to different fitting types, fixation methods, and articulating material combinations.

Our facilities allow for hip joint implants to be **loaded for up to ten million cycles** in the anatomically correct position under physiologic conditions in our laboratories, **accurately simulating a lifetime's use** in a few weeks.

## What Are the Benefits of Hip Implant Testing?

Given that hip joint implants need to be **durable and safe for patients** to benefit from, performing the necessary tests is imperative to get your product to market as quickly as possible.

### Improving Safety and Efficacy for Hip Joint Implants Testing

With **more innovative materials** for implants being tested, hip joint implant testing is a sure-fire way to make sure the materials and designs for implants are safe and **comply with regulations**. Undergoing the stringent tests can assess the safety and efficiency of [materials](#) to both foster innovation and **bring safer products to patients**.

## Compliance with International Standards for Hip Joint Implants

Complying with international standards means being able to expand [market access](#) for your hip joint implants allowing a much faster development to market pipeline when it comes to expanding abroad. Since **these standards are internationally recognised**, complying with them **bolsters your credibility** in the global marketplace.

## Why Choose Applus+ Laboratories for Hip Joint Implant Testing?

Choosing Applus+ Laboratories for your hip joint implant testing means partnering with **a leader in medical device testing solutions**.

We provide **high-quality, ASTM and ISO-compliant testing services** that ensure the accuracy and reliability of your hip implant products. Our comprehensive range of testing capabilities, coupled with our **commitment to client service**, makes us the ideal partner for all your hip implant testing needs.

Applus+ Laboratories **strives to be a one-stop shop for medical device testing**, offering a full range of services that can speed up your time to market. We offer:

- Development testing and advice on improvements
- Full lifecycle testing
- Product and process qualification with batch release tests
- Contract Manufacturing Organisation services

With a **presence in multiple countries**, we can deliver our testing services to customers around the world, ensuring you have access to the best in hip implant testing no matter where you are.

Let Applus+ Laboratories be your trusted partner for all your hip implant testing needs. We can support your projects with our high-quality services and expert guidance.