smith&nephew

POLARCUP®

Dual Mobility System

Product Information

Dual Mobility
30 Years of Clinical Experience

Concept combining an extended ROM, a low rate of dislocation and unexpectedly limited wear.

Prof. Bousquet and the Medical School of Saint-Etienne in France offered an answer to dislocation by creating the Dual Mobility concept in 1976: an insert locked on a femoral ball head and moving freely in a thin metallic shell. This Dual Mobility principle consists in combining the advantages of low friction with those of a big ball head.

This concept offers an extremely low dislocation rate, both for primary hip replacement and revision situations such as repetitive dislocations. It is recommended to only use a stem with an optimized polished neck design in combination with this cup system to reduce polyethylene insert contact wear and increase ROM.

The POLARCUP® components derived directly from Prof. Bousquet's concept including a range of cemented and non cementless cups. POLARCUP represents the third generation of implants, and with its well adapted instruments incorporates the know-how and implements the intentions of the surgeons of the GILES Group who originally developed the design.

Initially considered a curiosity, this principle has demonstrated its proven advantages over a period of more than 30 years.

The Dual Mobility System

Dual Mobility

Articulation Insert/Shell

Articulation Ball Head/Insert

Third Articulation

Articulation Neck/Insert

A polished neck without aggressive asperities is highly recommended

Low rate of dislocation

- The diameter of the joint becomes the insert's diameter.
- A superior-posterior 6° skirt under equatorial rim guarantees additional stability.
- The self-centering insert decreases the impingement with the femoral neck.
- The free insert more easily compensates slight deviation of the recommended cup positioning.

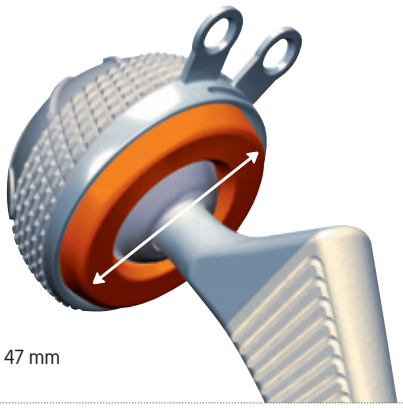
Low wear rate

- Due to the free insert, motion never occurs in articulation ① and ② at the same time.
- The optimized cup design prevents impingement with soft tissues and the femoral neck.
- The free insert eliminates transmission of tensions between bone (cement) and metallic shell.

Extended range of motion compared to standard cup systems

- The high head/neck ratio significantly increases the ROM.

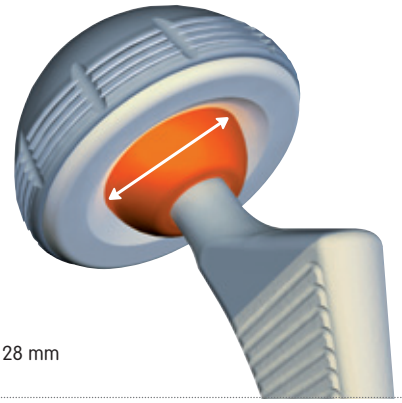
Low Rate of Dislocation



ø 47 mm

The diameter of the joint becomes the insert diameter!
This explains the low rate of dislocation: 0,1% in primary intention (Aubriot et æ, Acta Orthopaedica Belgica, Vol. 59 Suppl. I.,1993) and 4.75% in current revision cases (Fessy et æ, JBJS 2002, 84-B:sup)

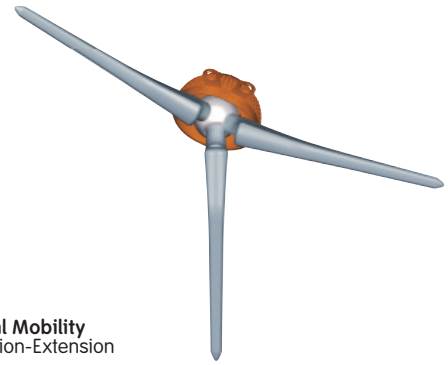
POLARCUP° ø 53 mm
Real head diameter: 47 mm = insert's diameter



ø 28 mm

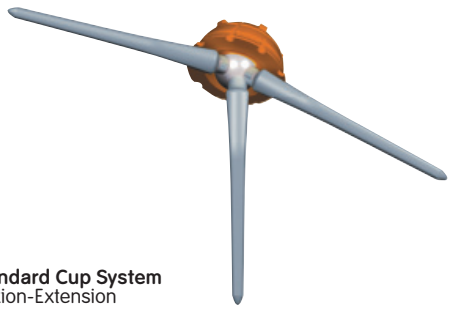
STANDARD CUP ø 53 mm
Real head diameter: 28 mm = Ball head's diameter

Extended ROM



Dual Mobility
Flexion-Extension

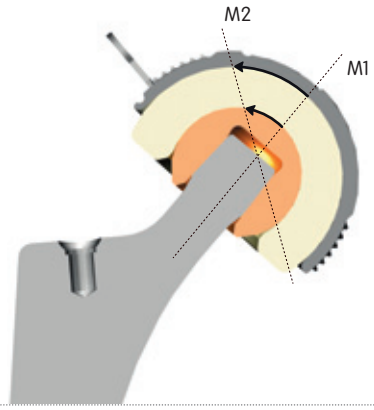
As the diameter of the joint becomes the insert diameter, the high head/neck ratio significantly increases ROM compared to standard hips.
The POLARCUP provides a head-neck ratio between 3.7* for the smallest size and 6.1* for the largest.
*(measured with a 10 mm neck for the stem and a 28 mm ball head)
Test performed on CAD system according to ISO 12563 with the same stem and same ball head (28 mm)



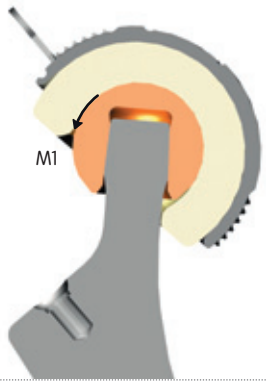
Standard Cup System
Flexion-Extension

	POLARCUP	Standard Hip
Flex – Ext	198°	166°
Add – Abd	130°	113°
Rot. Int – Ext	231°	190°

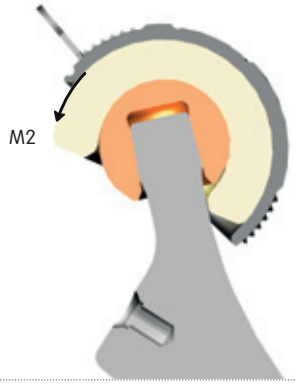
Low Wear Rate



Articulation in neutral position
Due to the different ratio between contact surfaces, M1 is always smaller than M2.



Articulation femoral head-insert up to neck contact
Under physiological loading conditions M1 is the first to be mobilized until the stem neck contacts the inner PE insert rim. M2 remains in neutral position.
80% of motion is performed in M1.

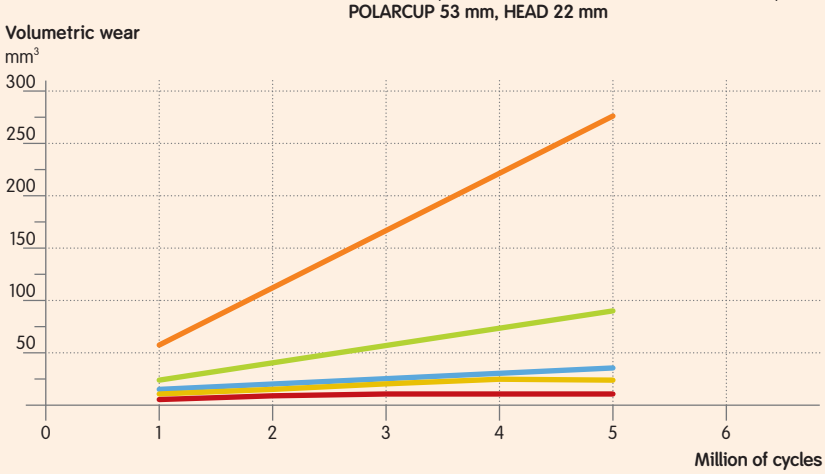


Articulation insert-shell
When the stem neck contacts the insert rim, M2 gains momentum, while M1 rests in position. This only occurs when a large range of motion is required (e.g. climbing stairs, getting up from a chair, etc.)
20% of motion occurs in M2.

- CHARNLEY WITH STANDARD PE
- **POLARCUP** PE AIR VACUUM
- METAL ON METAL
- **POLARCUP** PE CROSSLINKED*
- CERAMIC ON CERAMIC

* POLARCUP insert is not yet available in cross-linked PE. A prototype insert was used for these tests

Multiaxial hip simulator (ISO 14242 Standard – 5 million cycles)
POLARCUP 53 mm, HEAD 22 mm



Reference
Adam P and al, CHU St Etienne
Surface analysis of 50 retrieved PE dual mobility cups
Resume of Communication, 75e Sofcot Congress (Nov, 2000)

Results
In the cases that had led to PE dislocation, gross analysis revealed an impingement with the metallic shell and marked wear of the PE collar. In these cases, stems with pronounced tapers were observed.

Analysis of the convex surface of the PE did not disclose significant wear exceeding the tolerance limit required during manufacture. The average wear of the concave surface was 0.088 per year. This wear was not correlated to the patient's weight but to patient's level of activity and age.

One cup four ways of use

- **Flanges broken off (using flange cutter)**
- **Flanges bent over upper acetabulum rim**
- **2 impacted pegs and 2 screws in flanges**

Mirror-polished surface reducing wear to a minimum. (3)

(1) High surface roughness for good primary stability and osteointegration.

Biomechanical optimized equatorial macrostructures and antirotational fins. (4)

(2) Optimal load transmission due to dome orientation in the same direction as load resultant.

Product Overview

HA coated with pegs and flanges

Titanium-Plasma coatedwith pegs and flanges

Titanium-Plasma coated

Stainless steel for use with cement only

Screw

Peg

PE mobile insert

POLARCROSS°

ø mm	43	45	47	49	51	53	55	57	59	61	63	65	67
HA coated, with pegs and flanges	•	•	•	•	•	•	•	•	•	•	•	•	•
Titanium coated, with pegs and flanges	•	•	•	•	•	•	•	•	•	•	•	•	•
Titanium coated	•	•	•	•	•	•	•	•	•	•	•	•	•
Stainless steel, cemented	•	•	•	•	•	•	•	•	•	•	•		
PE insert for 22 mm ball head	•	•	•	•	•	•	•	•	•	•	•	•	•
PE insert for 28 mm ball head			•	•	•	•	•	•	•	•	•	•	•
POLARCROSS					•		•		•		•		

Materials

POLARCUP Shells
Stainless steel M30NW according to ISO 5832-9
Coating
Titanium vacuum spray according to ISO 5832-2
HA
According to ISO 13779-2

Pegs
Stainless steel 316LVM according to ISO 5832-1
Screws
Stainless steel 316LVM according to ISO 5832-1
Insert
UHMW PE according to ISO 5834-2

POLARCROSS
Stainless steel M30NW according to ISO 5832-1
PMMA plugs
According to ISO 5833

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For further information please
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