Duraloc® is now the world’s most widely used cementless cup, with over ten years of clinical experience. The Duraloc® design concept for maximum polyethylene integrity has been proven in use for hundreds of thousands of patients.

Today’s Duraloc® combines expert design with the most advanced polymer and ceramic liners, for prolonged implant life.

References
Proven Duraloc cup design has been developed to include a choice of advanced Enduron™ and Marathon™ liners.

Marathon™ reduces polyethylene wear by 86%.

1. The clinical success of Duraloc® is matched by its primary choice of liner material: Enduron™. Enduron™ has been clinically proven to be a stable and durable bearing surface, well suited to the demanding environment of the reconstructed hip joint.

2. Careful development and prolonged evaluation of polyethylene has produced a new partner in the range. Marathon™ brings a reduction in polyethylene wear of 86%—an important step forward in the fight against osteolysis and cup loosening. Both of these advanced materials are available in a range of liner options.

"Over the past ten years the simple yet well-engineered Duraloc® concept has recorded unsurpassed survivorship. It offers a reliable solution for both primary and revision surgery, with an extensive range of options to meet the individual needs of patients. The adoption of Biolox® Forte manufactured ceramic and the introduction of optimised polyethylene liners adds a new dimension to the range, ensuring continuing success in this challenging field." Charles A Engh MD.
By optimising irradiation dose and formulating a crosslinked polymer, the resistance to abrasion and wear is improved. Enduron™ polymer technology has stood the test of time with remarkable success. Its use with Charnley® and AML® implants has led to low wear rates and a low incidence of aseptic loosening. 3,4 The formulation of Marathon™ maintains these established material characteristics, and improves upon them.

The gas plasma sterilisation process established in use with Enduron™ has significantly reduced wear rates while maintaining the material’s mechanical properties. Enduron™ polyethylene shows a linear wear rate of 0.0087 mm per million cycles, compared to 0.059 mm for conventional polyethylenes. 5 This takes the volume of polyethylene debris generated by wear down from 36.36 mm$^3$ to 5.35 mm$^3$ per million cycles, improving on the wear rate of up to 15 mm$^3$ seen in arthroplasties surviving at 25 years. 5

The use of ceramic for the production of an artificial femoral head has dramatically improved the wear characteristic of the bearing couple. Ceramic on ceramic is now an accepted concept, and one that is now integrated into the Duraloc® system as an important option for more demanding, young or active patients. The Duraloc® system offers the ceramic bearing within the Duraloc® Option range of cups.

**Neutral liner:**
- Allows the surgeon to maximise the range of motion.

**10D liner:**
- Allows the surgeon to change the angle of abduction and anteversion to increase joint stability.

**20D liner:**
- Allows the surgeon to further change the angle of abduction and anteversion and offers the benefit of a lip to further protect against dislocation.

**+4 liner:**
- Allows the surgeon to lateralise the hip by 4 millimetres to increase joint stability. Available as a Neutral and 10D liner (shown).

**Constrained liner:**
- Allows the surgeon to capture the femoral head to address recurrent dislocation.
Duraloc® maintains its exceptional surface coating and purpose designed shell options for primary and revision surgery.

Alumina Ceramic on ceramic – the most efficient and wear resistant bearing surface available for orthopaedic surgery.

Biolox®Forte Alumina is the chosen ceramic bearing surface for Duraloc®. It is a bio-compatible material that can be given an extremely smooth surface, making it an ideal bearingsurface for the hip. Bone turn-over is particularly apparent in younger patients. Hip simulator studies for ceramic on ceramic show a wear rate of 0.09 mm³ per million cycles compared to 40.8 mm³ per million cycles for metal on UHMWPE.

There is now over twenty years of clinical experience using ceramic on ceramic bearing surfaces. The Duraloc® Option cups, which are designed for the Biolox®Forte ceramic liner, leave the surgical technique for implantation virtually unchanged. The same straightforward and accurate technique is used to implant the entire Duraloc® range.

From the start, Porocoat® has played a key role in the success of the Duraloc® concept. While the load transfer function of the shell to its protected inner liner minimises polyethylene fatigue, the cup’s outer, textured metaphysial stem interface for implantation is usually unfractured. The same simplified and accurate technique is used to implant the Porocoat® range.

Duraloc PR 14/07/00 14/7/00 3:15 pm Page 12
Porocoat® and DuoFix™ builds on the proven performance of Porocoat to enhance extensive osteointegration of implant to host bone.

Proven Duraloc® dome loading and locking principles are maintained, within an increased range of shell and liner options.

DuoFix™ surface coating accelerates ongrowth and stimulates rapid osteo-integration for Duraloc® 100 and Duraloc® Sector cups.

The effectiveness of Porocoat® as a factor in the biological fixation of acup can be measured in terms of its success in permitting bone ingrowth, the security of the bone implant interface, and the long-term retention of the coated implant.

DuoFix™ surface coating accelerates ongrowth and stimulates rapid osteo-integration for Duraloc® 100 and Duraloc® Sector cups.

The DuoFix™ hydroxyapatite is a highly amorphous, bioactive chemical formulation with a mineral composition similar to that of natural bone. The surrounding bone rapidly bonds with this highly bio-compatable material, bridging gaps of up to 2 mm.

DuoFix™ HA coating is applied using plasma spray flame technology, in 'line-of-sight' with the beaded surface to produce a consistent 30 micron layer. This avoids clogging the surface pores and so maintains the established ingrowth characteristics of Porocoat®.

The result is an accelerated rate of ingrowth and stronger bone interlock that forms a seal against the ingress of both fibrous tissue and particulate debris.

However durable we make the polyethylene liner, ultimately it is the design of the shell and the stresses transferred from shell to liner that determine the life of the cup.

At 5 years, Fisher reported a 98% survival for the Duraloc® cup. In 1990 Duraloc® introduced a new standard for shell and liner component integrity. More than ten years on, the Duraloc® principles of dome loading, congruency at the metal to liner interface, secure liner locking, optimal polyethylene liner thickness, and increased range of options have made it one of the world’s leading implants for cementless primary and revision acetabular reconstruction.

A comparison of the interface shear strength of various surface treatments clearly indicates superior results for the DuoFix™ combination after only short implantation periods.

Histological studies show that a dense cortico-cancellous interlock is achieved within months of implantation (original magnification x 25).

Key:
- New Bone
- DuoFix™

98% survivorship at 5 years

Porocoat®'s unique coating achieves rapid osteo-integration, excellent bond strength at the implant to bone interface - significantly greater than that achieved using any other porous coating.

In summary, Duraloc® can be marketed as a revolutionary, leading edge component system that is matched only by its performance...
The long-term success of Duraloc® has proven that dome loading, or fully congruent metal-to-plastic contact, combined with optimumpolyethylene thickness reduces the stresses and micro-motions that lead to failure. The Duraloc® Option shell configuration maintains this designphilosophy. This ensures that loadis distributed across the surface ofthe liner. FEA analysis shows that dome load transfers stress to the linerevenly across the entire surface of the liner, avoiding damaging peak stresses and prolonging the life of the cup.

Meeting the challenges of primary and revision surgery

Duraloc® liner under load

Duraloc® standard shell

Duraloc® Option shell

Duraloc® 100

Duraloc® 300

Duraloc® Bantam

Duraloc® Sector

Duraloc® DuoFix ™ Sector

Duraloc® DuoFix™ 100

Duraloc® 1200

Duraloc® Option

Duraloc® DuoFix ™ Option

Duraloc® PR 14/07/00 14/7/00 3:15 pm  Page 20