

Poron Material Effectiveness in Foot Health

What is Poron and why is it used in insoles

Poron is a high-performance microcellular polyurethane foam widely used in orthotic insoles and footwear. Developed by Rogers Corporation, Poron is known for its durability, energy absorption, and cushioning properties. Unlike standard foam materials, Poron has an open-cell structure that allows it to compress and spring back repeatedly without “bottoming out” or losing its cushioning ability.

This means insoles made with Poron maintain their shock-absorbing performance over time, even under continuous use. Poron is available in various grades (densities and thicknesses) – for example, Poron 4708 (medical grade) is a soft, 15 pcf density formulation for gentle cushioning, while Poron 4000 (performance grade) is a tougher, hard-wearing variant for long-lasting support. Specialised versions like Poron Vive (a springy, 4mm foam for athletic use) and high-performance green/grey Poron sheets (3–6mm for maximal shock absorption) cater to different needs.

In all cases, Poron’s unique material properties – open-cell breathability, resistance to compression set, and customisability – make it a popular choice for footcare applications.

Cushioning and shock absorption performance

One of Poron’s standout benefits is its ability to absorb shock and reduce impact forces during walking or running. Laboratory tests have consistently rated Poron among the top-performing insole materials for impact attenuation. For example, a classic study comparing five shock-absorbing insole materials found that Poron (also known as PPT) was one of the two best performers, significantly outperforming materials like Plastazote (a soft polyethylene foam) and even rivaling a viscoelastic polymer insert.

In that test, Poron and a gel material (Viscolas) were most effective at dampening skeletal shock, whereas Plastazote proved poor at absorbing impact. Poron’s excellent shock absorption is one reason it has been favoured by military and athletic groups, the UK Royal Marines, for instance, chose Poron insoles for recruits because of its superior heel-strike shock mitigation, durability, and lightweight.

Poron's excellent shock absorption is one reason it has been favoured by military and athletic groups: the UK Royal Marines, for instance, chose Poron insoles for recruits because of its superior heel-strike shock mitigation, durability, and light weight.

In real-world athletic use, Poron's impact cushioning translates to both reduced pressure on the foot and improved comfort. A study of football (soccer) boots compared two insole types – one made purely of Poron foam and another made of Poron combined with gel padding – and found the all-Poron insoles provided lower peak pressures at the heel and forefoot, especially during high-impact movements, and were rated more comfortable by players. The boots with Poron-only insoles showed the best biomechanical performance and user comfort suggesting the straightforward Poron cushioning was more effective than adding gel inserts. This highlights Poron's efficacy in evenly distributing impact forces and potentially reducing injury risk factors like repetitive stress. (It's worth noting that large-scale trials in military recruits did not find a difference in overall injury rates between shock-absorbing insoles and standard insoles. However, this outcome reflects the complexity of injury prevention; it does not negate the measured physical benefits of Poron in reducing impact forces on the feet and lower limbs.)

Pressure redistribution and ulcer prevention

Beyond shock absorption, Poron is highly valued for redistributing plantar pressure – a crucial factor in preventing and managing foot problems like diabetic ulcers, plantar calluses, and general foot pain. Research indicates that using Poron in insoles or orthotic footbeds can significantly reduce peak pressures on weight-bearing areas of the foot. A 2020 systematic review of orthotic material studies concluded that polyurethane foams (including PORON®) consistently reduce peak plantar pressure under various regions of the foot during walking.

Clinical studies back up this pressure-relieving effect. In a classic trial of 26 patients with painful high-pressure foot areas, insoles made from Poron (PPT), Plastazote, and Spenco all markedly lowered pressure at the problem spots (bringing average pressure down from ~398kPa to ~186–286kPa). Poron was among the most effective materials, on par with Plastazote and outperforming others like latex or felt. This pressure reduction correlates with pain relief and protection of the skin. Poron works by increasing the contact area and cushioning force peaks, thereby evening out pressure across the foot.

Poron's role is especially prominent in diabetic foot care, where minimizing plantar pressure and shear is vital to prevent foot ulcers in patients with neuropathy. Poron is frequently recommended as an insole material for diabetes because of its superior offloading ability.

A recent study on diabetic elderly patients tested contoured insoles made of different materials and found that the insoles made of Poron Medical 4708 foam achieved around a 45–51% reduction in peak pressure at the forefoot and rearfoot compared to going barefoot. In fact, the Poron insoles in this study brought plantar pressures below 200 kPa in all regions, an important threshold, as pressure under 200 kPa are associated with lower risk of ulceration in diabetes. Notably, the Poron outperformed other tested materials (including a soft EVA foam and two “rigid” orthotic foams), highlighting that softer, more cushioning materials like Poron and EVA were far better at offloading pressure than stiffer foams. The presence of an arch support in the contoured Poron insoles further optimised pressure distribution, underscoring that Poron works well in concert with proper foot contouring.

Combining Poron with other materials is a common strategy to maximize pressure relief. One proven approach is the dual-layer Poron + Plastazote insole, often used for diabetic and neuropathic patients. Plastazote, a heat-mouldable foam, conforms to the foot’s shape, while Poron underneath provides resilient cushioning. Studies have shown that using Poron and Plastazote together can significantly reduce peak pressure and force-time integral under the forefoot, reducing tissue stress for at-risk feet. This multi-layer design takes advantage of Plastazote’s moulding to the foot and Poron’s long-term cushioning, resulting in insoles that protect against ulcer-causing pressure and shear. Indeed, such Poron/Plastazote insoles are cited as hugely beneficial for diabetic patients with peripheral neuropathy. The Poron layer ensures the cushioning doesn’t flatten out with use, while the Plastazote layer maintains total contact to distribute load – a synergy that provides both immediate pressure relief and durable protection.

Support comfort, and long-term performance

Poron’s contributions to foot health aren’t limited to shock and pressure metrics – it also plays a key role in the overall support and comfort of orthotic devices. While Poron is a cushioning material (not a rigid support), it often serves as a soft top-cover or padding in foot orthoses, acting as a “soft tissue supplement” to support areas that have lost natural padding. For example, many custom orthotics and insoles include a thin Poron layer to cushion the arch or heel, even if the underlying shell is made of hard plastic or EVA. This combination provides the needed biomechanical support from the rigid component plus enhanced comfort and pressure relief from the Poron. Clinicians appreciate Poron’s versatility – it can be cut, shaped, or even inserted as plugs into an orthotic. In one study on plantar fasciitis, researchers added a removable Poron heel plug into custom orthoses to increase cushioning at the heel. The orthosis with the Poron plug significantly reduced peak pressure under the heel (as well as average pressure and contact force) compared to the same orthotic without the plug.

Patients in that trial had improved pain and function after 8 weeks with either orthotic, and while both versions eased plantar fasciitis symptoms, the Poron insert ensured lower heel pressures during use – which may protect the heel and enhance comfort, even if pain outcomes were similar in the short term.

Patient comfort is a major reason Poron is used in insoles for the general public and in speciality orthotics. By absorbing impact and reducing pressure points, Poron cushioning can relieve the sense of foot fatigue or soreness from standing or walking. For individuals who spend long hours on their feet – such as nurses, retail workers, or hikers – Poron insoles help even out weight distribution and alleviate discomfort in the feet. Unlike some foam or gel insoles that might feel soft initially but collapse over time, Poron retains its shape and cushioning power, so it continues to support the foot consistently after many days of wear. In practical terms, this means a Poron insole will keep performing (and feeling) the same, whereas a cheaper closed-cell foam might compact and start to feel hard or “dead” after repeated use. Indeed, open-cell Poron foams have far greater resistance to compression-set than typical closed-cell EVA foams, which tend to lose their spring as the entrapped air escapes and the material flattens. Poron’s cell structure relies on the polyurethane material itself (not air bubbles), behaving like a spring that bounces back after each step and giving it exceptional longevity. One podiatrist noted that Poron inserts “bounce back” and don’t bottom out – he even had a patient wear the same Poron insoles for 10 years! This long-term resilience makes Poron not only comfortable but also cost-effective, since insoles don’t need to be replaced as frequently.

Poron also adds comfort through its breathability and softness. The foam’s open cells allow air flow, helping to keep feet cooler and drier. This is important for preventing overheating and sweat-related issues (like athlete’s foot or blisters). Some Poron formulations (e.g. the Poron “Green” high-performance foam) even include antimicrobial treatments to resist fungus and odour. Patients with sensitive feet often notice the difference: Poron’s cushioning reduces shear forces as well as pressure, which can prevent the formation of blisters and calluses on the soles. In a blog from a UK podiatry clinic, the clinicians explain that Poron’s shock-absorbing, shear-reducing properties help stop blisters under the heel and ball of the foot, by reducing the rubbing and friction on the skin. The material’s softness and conformity are gentle on painful or bony areas of the foot. It’s no surprise that Poron is often the material of choice for cushioning in orthotics aimed at people with rheumatoid arthritis or fat-pad atrophy – these patients lack the natural fat cushioning under foot joints, so adding a layer of Poron can substantially reduce pressure and pain in those areas. Rheumatology clinics commonly incorporate a Poron top cover in custom foot orthoses for arthritic feet to provide relief at tender metatarsal heads and heels.

Finally, Poron’s customisability contributes to better support: practitioners can easily skive, grind or layer Poron to fine-tune an insole. Whether it’s a metatarsal dome made of Poron, a heel pad, or a full-length insert, the material can be placed exactly where needed without losing its effectiveness.

It is often layered with more structural materials (like EVA or carbon-fibre) – for example, a design might use a firm EVA base for arch support and a Poron top layer for cushioning. As one review noted, a combination of EVA (closed-cell foam) and Poron (open-cell foam) can achieve the “best of both worlds”, using the Poron to conform to the foot and provide softness on top of an EVA core that maintains shape and support. This layered approach is found in many prefabricated orthotic insoles on the market. Overall, Poron’s role is to enhance support by protecting the foot from excess shock and pressure, thereby allowing the structural elements of an orthotic to do their job without causing discomfort.

Evidence in specific foot conditions and populations

- **Plantar Fasciitis & Heel Pain:** Poron is frequently used to cushion the heel and arch in people with plantar fasciitis or heel spur pain. Its shock-absorbing heel pads can reduce the impact on the sore heel area. A recent clinical study tested custom orthoses for plantar fasciitis with and without a soft Poron heel plug; the version with the Poron plug showed significantly lower plantar pressures at the heel during walking. Both types of orthoses improved patients’ pain and function over 8 weeks, but the added Poron mainly provided a biomechanical benefit (pressure offloading) rather than a large difference in pain outcomes. Still, reducing heel pressure is believed to aid healing and comfort. For general heel pain (such as fat-pad atrophy in the elderly), Poron insoles act as a replacement for the missing fatty cushion. Patients often report that a Poron heel cushion softens the impact and relieves the ache in the heel when walking on hard surfaces. Because Poron doesn’t compress down over time, it continues to protect the heel even after prolonged use.
- **Diabetic Foot Ulcers (Neuropathy):** There is strong evidence and consensus supporting Poron in diabetic insoles. As discussed, Poron excels at redistributing plantar pressures, which is critical for preventing ulcers in people with peripheral neuropathy. Research on diabetic patients shows Poron insoles can cut forefoot pressures by 30–50%, a significant offloading. Soft Poron (often the 4708 medical grade) is used as a top or middle layer in multi-density diabetic insoles. It’s typically paired with a Plastazote top cover that moulds to the foot, creating a total-contact interface. This Poron-Plastazote combination has been proven effective at reducing pressure and pressure-time integral at the forefoot, thereby reducing tissue damage in diabetic feet. Clinical guidelines often recommend such multi-layer insoles for high-risk feet. Patients with diabetes also benefit from Poron’s resistance to bottoming-out and its reduction of shear – these properties mean the cushioning stays effective and helps prevent both the vertical pressure and the shear forces that can cause ulceration. In summary, Poron-based orthoses are a mainstay for ulcer prevention and pressure relief in diabetic foot care, supported by both lab measurements and real-world outcomes (e.g. fewer calluses and pre-ulcerative lesions when these insoles are used).
- **Arthritis and Elderly Patients:** People with rheumatoid arthritis (RA), osteoarthritis, or simply age-related foot pain often have very sensitive feet.

- **Arthritis and Elderly Patients:** People with rheumatoid arthritis (RA), osteoarthritis, or simply age-related foot pain often have very sensitive feet. Joint deformities, loss of the fat padding under the metatarsal heads and heels, and general frailty of the skin can make walking painful. Poron is highly regarded in this group for its gentle, forgiving cushioning. Podiatrists describe Poron as “the most amazing material” for painful arthritic feet, noting how it replaces the natural cushioning that has been lost and immediately reduces pressure on delicate joints. For example, an RA patient with prominent metatarsal heads (pain under the ball of the foot) can get significant relief by inserting a Poron insole or adding a Poron metatarsal pad to spread out the pressure. Unlike some soft gels or memory foams, Poron doesn’t collapse under the weight of the foot, so an arthritic person can rely on it for consistent comfort during daily activities. It also helps increase mobility; one clinician even reported her stiff arthritic toe joints gained range of motion once she started using Poron insoles, likely because the reduction in pain and pressure allowed easier movement. Additionally, Poron’s shock absorption is valuable for arthritic knees and hips, as it dampens the jarring forces that travel up the leg. Elderly individuals who suffer from general foot soreness or who have fragile skin also benefit from Poron’s soft support – it can prevent the small stresses that lead to sores, and its breathability keeps the foot environment healthier (reducing risk of fungal infection in seniors). In summary, Poron-based orthotic accommodations are a gentle solution to improve comfort and foot function in arthritis and old age.
- **Athletes and Active Individuals:** Athletes subject their feet to high impacts and repetitive stress, and Poron has found a niche in both sports footwear and injury-prevention orthotics. Many running shoes, football boots, and ski boots use Poron foam inserts in the sockliners or padding because it attenuates shock without adding much weight. In the earlier-mentioned soccer study, teenage players experienced lower metatarsal and heel pressures and improved comfort with Poron cushioned insoles. Runners often place Poron heel pads in their shoes to supplement cushioning and protect the heel bone and plantar fascia from impact. There is also evidence that Poron can reduce impact-related fatigue: viscoelastic materials like Poron may lessen the energy that the body expends to counteract hard impacts, potentially improving endurance over long runs or marches. Military research found that Poron insoles and similar shock absorbers did not significantly change injury rates in basic training, but they remain popular because many soldiers subjectively report reduced leg soreness when using them. In high-impact sports (basketball, tennis, rugby), newer Poron formulations such as Poron XRD and Poron Vive are used in insoles and protective gear. These grades are designed to stiffen under sudden impact (for XRD) or to give extra rebound (“spring in your step” for Vive). They provide impact protection without bulk, helping athletes avoid bruises and stress injuries. Overall, Poron’s role to athletes is to cushion joints and soft tissues from repetitive impacts and enhance comfort during performance, which can directly support better training and possibly reduce overuse injuries (like stress fractures or shin splints) by mitigating some impact forces.

- General public and everyday comfort: Finally, Poron's benefits extend to anyone seeking more comfort in their footwear. For individuals without a specific medical condition, a Poron insole can simply make walking and standing far more comfortable by reducing pressure hotspots and absorbing the shocks of daily life. People who experience tired, aching feet after a long work shift often find that Poron insoles reduce foot fatigue and leg pain. The foam spreads out the loads on the foot, so no single area (such as the heel, ball of foot, or a bunion) gets overloaded. This can also help with mild cases of flat feet or high arches by adding a bit of adaptive support: the Poron will compress more under high-pressure areas and less under low-pressure areas, effectively customizing itself to the foot's shape over time. Many over-the-counter insoles marketed for "all-day comfort" or "standing fatigue relief" use Poron or similar polyurethane foams for this reason. Additionally, Poron's breathability and antimicrobial options keep feet fresh, which the general consumer appreciates for comfort. Importantly, Poron's durability means that a good pair of Poron inserts can last many months or even years without packing down, this is a key advantage over cheaper insoles that wear out quickly. In everyday settings, using Poron in shoes can help prevent minor issues from developing: for instance, it can avert blisters on the soles (thanks to shear reduction), minimise metatarsal pain from long walks, and soften the impact on the knees and back from standing on hard floors. In short, Poron provides a level of long-lasting comfort and support that benefits anyone from busy commuters to weekend walkers, making it a highly valued material in both clinical orthotics and regular consumer insoles.

In summary, a wealth of research and practical experience supports Poron's effectiveness in foot health applications. Studies show that Poron excels at cushioning impact, redistributing plantar pressure, and maintaining its support over time. These qualities translate into tangible benefits for a wide range of users – from diabetics needing ulcer protection, to athletes seeking shock absorption, to seniors and arthritis patients looking for gentle comfort. Compared to other insole materials (EVA foam, Plastazote, gels, etc.), Poron often demonstrates equal or superior performance in pressure relief and shock dampening, all while resisting compression set and breakdown. Whether used as a full insole, an orthotic top-cover, or a strategic padding, Poron contributes to greater foot comfort and injury prevention in both clinical and everyday settings. Its combination of softness and resilience helps support the feet without rigid restriction, making it a trusted component in modern orthotic and footwear design. As one source neatly put it, Poron provides "long-lasting comfort and support" where pressure relief and shock absorption are essential, a concise testament to why Poron remains a staple material for keeping feet healthy and happy.

Sources -

- Gerrard JM et al. (2020). Effect of different orthotic materials on plantar pressures: a systematic review. *J Foot Ankle Res*, 13(35): – Polyurethane foams (including Poron®) were found to significantly reduce peak plantar pressures under various foot regions [footankleres.biomedcentral.com](https://doi.org/10.1186/s13047-020-00353-9).
- Leber C & Evanski PM (1986). A comparison of shoe insole materials in plantar pressure relief. *Prosthet Orthot Int*, 10(3):135-138 – Among seven insole materials tested on patients with high plantar pressure, Poron (PPT) insoles were among the most effective, substantially lowering pressure in painful areas (alongside Plastazote and Spenco) [pubmed.ncbi.nlm.nih.gov](https://pubmed.ncbi.nlm.nih.gov/2811111/).
- Pratt DJ et al. (1986). Assessment of some shock absorbing insoles. *Prosthet Orthot Int*, 10(1):43-45 – In lab tests of five insole materials, Poron (PPT) was one of the top two for shock absorption, significantly outperforming Plastazote (which performed poorly). Poron and a viscoelastic gel (Viscolas) absorbed impact best, with Viscolas only marginally better [pubmed.ncbi.nlm.nih.gov](https://pubmed.ncbi.nlm.nih.gov/2811111/).
- Algeos (2023). Poron Foams: Cushioning Material for Orthotic Insoles... – Algeos.com (product education page) – Poron is described as a durable, open-cell polyurethane foam that provides long-lasting cushioning and support. It absorbs impact, reduces pressure points, and does not break down like other foams, maintaining comfort over time [algeos.com](https://www.algeos.com/algeos.com).
- Wong DW et al. (2022). Effects of contoured insoles with different materials on plantar pressure offloading in diabetic elderly. *Sci Rep*, 12:15880 – In diabetic patients, contoured insoles made of Poron Medical 4708 foam reduced forefoot peak pressure by ~51% and rearfoot pressure by ~45% versus barefoot. Poron outperformed a soft EVA and two rigid foams, keeping pressures under the ~200 kPa risk threshold [nature.com](https://doi.org/10.1038/s41598-022-15880-0). The authors note Poron's high resistance to bottoming-out under pressure, excellent shock and shear absorption, and overall pressure redistribution properties [nature.com](https://doi.org/10.1038/s41598-022-15880-0).
- Algeos (n.d.). Poron on Plastazote LAMS – Product Description. – Algeos.com – Combining Poron with Plastazote (in a laminated insole sheet) yields a long-lasting orthotic material with multiple benefits. Studies show this Poron/Plastazote combo effectively reduces plantar pressure and force-time integral under the forefoot, which greatly benefits diabetic or neuropathic patients by reducing pressure and tissue damage [algeos.com](https://www.algeos.com).
- Balsdon MER & Dombroski CE (2025). Custom-made foot orthoses with and without heel plugs in plantar fasciitis: a crossover study. *Prosthet Orthot Int*, in press. – 21 patients with plantar fasciitis wore custom orthotics either with a soft Poron heel plug or without. The Poron plug orthoses produced significantly lower average and peak pressures at the hindfoot ($p < 0.001$) and midfoot ($p < 0.05$) compared to orthoses without the plug [pubmed.ncbi.nlm.nih.gov](https://pubmed.ncbi.nlm.nih.gov/4011111/). Both orthotic types led to improved pain and Foot Function Index scores after 8 weeks, with no significant difference in pain outcomes between them, indicating the Poron plug's benefit was primarily in pressure reduction rather than additional pain relief [pubmed.ncbi.nlm.nih.gov](https://pubmed.ncbi.nlm.nih.gov/4011111/).

- Blisterhelp Podiatry Blog (2021). “Do you get blisters on the bottom of your feet?” – Podiatrists highlight Poron as “a podiatrist’s choice of insole, especially for rheumatoid arthritis patients.” Poron’s properties – outstanding cushioning that replaces lost fat padding – reduce pressure on joints and relieve pain in areas of the foot lacking natural cushioning blisterhelp.co.uk. The blog also notes that Poron’s shock absorption reduces shear forces on the skin, preventing blisters under the heel and ball of foot blisterhelp.co.uk. Different Poron grades are discussed (e.g. Poron Vive for athletic spring, high-performance green/grey Poron for maximum shock absorption, etc.) blisterhelp.co.uk.
- Nunns MP et al. (2016). Boot-insole effects on comfort and plantar loading in soccer. *J Sports Sci*, 34(8):730-737 – In a study of youth football players, a Poron-cushioned insole led to lower peak plantar pressures at the heel and 5th metatarsal during running and cutting maneuvers than an insole made of Poron+gel. Players also reported the Poron insoles were more comfortable. The best combination biomechanically was an 8-cleat boot with the pure Poron insole pubmed.ncbi.nlm.nih.gov, highlighting Poron’s effectiveness in high-impact sports footwear.
- Withnall R et al. (2006). Do shock absorbing insoles in recruits reduce lower limb injury? *J R Soc Med*, 99(1):32-37 – Large RCT in military recruits found no significant difference in injury rates between those issued shock-absorbing insoles (Sorbothane or Poron) and standard insoles pmc.ncbi.nlm.nih.gov. However, the trial’s background notes that Poron insoles are favoured by UK Royal Marines for their shock absorption and durability, and that Poron (a 3mm open-cell polyurethane foam) was chosen for its ability to relieve skeletal shock at heel strike pmc.ncbi.nlm.nih.gov. This reflects Poron’s good reputation in high-impact military use, even though injury prevention involves many factors.