Porphyry is a stone material, volcanic in origin, characterised by its development along parallel planes (photo n. ). This characteristic allows for it to be used as a semi-finished product (untreated photo n. ) as well as after "splitting". Porphyry's considerable resistance to wear and tear, due to atmospheric agents, is the feature that has consented to its diffusion in street furniture but also in the home.

The majority of European porphyry is extracted and processed in a geological area known as the “Atesina, porphyritic platform”, which is located in the Province of Trento (the Autonomous Region of Trentino Alto Adige). Porphyry extraction began after 1940, but after 1970, it took on industrial dimensions with the progressive introduction of “splitting” machinery used in the production of blocks and tiles. After 1980, processing was introduced by cutting, a characteristic typical of marble and granite. There are currently one hundred and ten companies that extract or process porphyry and employ about one thousand two hundred workers.

To mark the occasion of a contractual renewal, in 1992, the Joint Health and Environment Committee was incorporated, which was made up of eight members: four appointed by the Employer Associations and four by the Trade-Union Organisations that executed the Contract, itself. The Commission deals with problems relative to the working environment and, in particular, the risks concerning health and safety, but also the impact on the environment caused by the extraction of stone materials. The companies in the sector sustain the Committee by annually paying a percentage of the total salaries.

All the various types of porphyry working processes depend on the extraction and grading phase that precedes them (known as the “initial working process”). Up until a few years ago, this working process was exclusively performed manually and began with a large amount (about one cubic meter) of material being laid on the ground, which came from the front of the quarry (after demolition using explosives). The worker carried out three operations: 1) the extraction of the workable material, separating overlapping layers of porphyry with the use of a sledge hammer, uphand hammer and froe; 2) the grading of the workable material; 3) the stacking, in various containers (four to six in number) according to the next working process. (photos n. ).

The first, porphyry working process leads to a high risk of spinal column and limb pathologies, mainly due to the weight and the lay-out of the blocks on the ground, which are worked and moved, but, also, due to the prolonged bending of the trunk, forwards and downwards. It has been estimated that a single worker moves between 150 and 300 hundred weight of material a day, mainly in a position bent forward. Furthermore, the working process is performed outside and is, therefore, subject to sometimes extreme weather conditions. The stacking phase leads to the movement of blocks over an extremely irregular and unstable surface. Besides the considerable physical commitment, this working condition induces a high risk of spinal column and limb disorders and pathologies. In turn, this condition leads to the spontaneous or forced selection of labourers, with a not indifferent frequency of cases of medical unsuitability for the job due...
to osteo-articular pathologies. The lack of the workers professional qualifications, on the other hand, leads to difficulty in placing them in other occupations.

The Joint Health and Environment Committee, believes that the initial, working process constitutes a priority in the porphyry sector’s preventive requirements. The risk clearance process began in 2002, when the Joint Health and Environment Committee conducted research into and the realisation of a system prototype aimed at raising the working surface. This system foresaw that the material coming from the front of the quarry was unloaded using a hopper’s mechanical loader. A hydraulic extractor fed a conveyor belt reinforced with a height of ninety centimetres. The material to be processed or graded was, then, put at the worker’s disposal, standing in the erect position. The belt’s progress was controlled by the operator. The waste material that was not removed by the worker, was dumped at the end of the belt (photo, Saltori and films). It would be expedient to report that the introduction of this system led, necessarily, to an electric line being brought into the working area, which had not been there before, inasmuch as the working processes had been purely manual.

This was followed up by a suitable experimentation period, in which the prototype was tested by a number of companies. The experimentation was monitored by gathering the employers and employees’ opinions, both with reference to the level of productivity as well as the reduction in fatigue and the overloading of the back-lumbar column (annex ?????).

In order to have a scientific evaluation of the benefits that had been introduced by the new system, the Joint Health and Environment Committee, in 2004, commissioned some research into the spinal column’s biomechanical overloading, during the initial working process, by the Department of Medicine and Public Health of the University of Verona (annex?????). The research quantified the risk of spinal column pathologies with and without the use of the prototype, using the application of the method put forward by NIOSH (The National Institute for Occupational Safety and Health), amended by EPM (Ergonomics, Posture and Movement). In consideration of a risk, which during the traditional working process, in some phases, exceeded the value of 4 (normal values are less than 1); the prototype’s use has led to a reduction of the risk indicators by about 60%.

Subsequently, a similar risk evaluation was carried out by INAIL’S (the National Insurance Institute for Industrial Accidents) Risk and Prevention Technical Assessment Advisory Body, using the O.W.A.S. (a method used in the evaluation of postural load during work) method, with the purpose of exceeding some of the application limits established by the NIOSH method, in particular, with reference to the evaluation of unsuitable posture (annex?????). The research was conducted by means of recording the extraction and grading processes on video, which lasted four hundred and twenty-six minutes. Some two thousand five hundred and fifty-six images were taken from the recording, by stopping the film every ten second. These images were, then, classified into four, increasing gravity categories, according to the O.W.A.S. method. Seventy-two percent of the postures adopted during the traditional working processes resulted as being placed in categories three and four (to be corrected as soon as possible or immediately), whilst this percentage was reduced to two point one percent, by using the experimental system. Furthermore, it was observed that the erect position was maintained during fifty-one percent of the working period using the system and only for twelve percent of the time during the traditional, working processes.

The clear utility of the system, which had been experimented in the reduction of risk for workers, was, thus, confirmed further to this evaluation.
In 2005, the Autonomous Province of Trento promoted the training of a working group (attach the resolution ?????) that involved the employers’ representatives as well as the major Trade-Union organisations (the CGIL and CISL), the Supervisory Authorities (the Health and Safety in the Workplace Operative Unit belonging to the Provincial Health Care Services and the Autonomous Province of Trento’s Mineral Service), INAIL and the University of Verona, with the objective of establishing the “best practices” for the companies in the sector, in adapting the systems, machinery and labour organisation. Further to the publication of the working group’s activities’ final document, (annex?????) in March 2006, the companies programmed and started the progressive introduction of the system into the production process.

At the same time, the towns involved in porphyry extraction, by means of the Quarry Management Consortium (SO.GE.CA.), conducted some research in all the quarries in order to evaluate the possibilities concerning the introduction of the experimental system, on the basis of the type of material extracted, inasmuch as the new system’s production yield may vary further to the unrefined product’s dimensions (annex ???). The research showed that the quarries, where the new system cannot be introduced, are extremely few.

In some cases, individual companies have created customised solutions which, in spite of satisfying the guidelines expressed by the working group, represented an evolution of the original idea. For example, the following items have been introduced:

- Suction cups aimed at moving heavy blocks  (photo, Dossalt)
- Mobile platforms to lift the worker and allow him to adopt a more ergonomic position in using the sledge hammer (photo, Dossalt);
- Variable level lifting equipment, in order to always consent to the items being loaded at the same height  (photo, Dossalt)