



Marble Slabs Classification System Based on Image Processing (Ark Marble Mine in Birjand)

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Abstract

Marble is one of the semi-precious stones that has been used in decorating building façade and making decorative things. This stone is present in the nature in the form of rock or layered stone. Examining the kind of stone, extent of impurity and different streaks in white marble is a widely confronted subject by those who are involved in this industry. Obtaining the extent of impurity of white marble using methods of detecting and analyzing material is expensive and time-consuming. In this research carried out on white marbles of Ark Mine in Birjand, it has been attempted to present very fast method using Image Processing Techniques so that while preserving identity and appearance of stone and without any damage to it, we compute the impurity level and different streaks on white marble surface. The proposed method includes two stages; in the first stage applying image processing functions, it is attempted to segment the present impurities and streaks on marble surface from the stone background and in the second stage, the area of these impurities and streaks is computed. Results obtained in this paper (97.8%) in comparison with other researches and experimental methods indicate acceptability of this algorithm.

Keywords: White Marble; XRD; XRF; Image Processing.

1. Introduction

Stone is one of the most primary building materials that human being has used it for making tools, shelters and meeting his own needs. Ornamental stones are chosen based on beauty, price, persistence, resistance and popularity. Stone colors can be categorized from totally dark to so light and warm to cool. Stone textures also vary from gross grain to granule and dense. Marble is a kind of limestone (calcium carbonate, CaCO_3) found in different colors. White marble has been historically used in construction. Egyptians and Greek used this stone for building their own shrines. Iranian people also used marble in building their holy places. Another unique properties of this stone is its energy therapy features, the marble absorbs negative energy of the environment and diffuses positive energy, on the basis of this property, marble is used in rest and massage halls. This stone is stable against heat, coldness and rain. When limestone is under high pressure and heat in long term beneath the earth, is transformed and turned into the marble. The main constituent of marble is calcium carbonate. Other kinds of marble have 99 percent calcium carbonate. Presence of Aluminum and magnesium salts in marble cause variety of color in it. The pure marble is quietly white. Crystal textures of marble gives its color a special brightness as the light travels a short distance in the depth of the stone and is reflected by underlying crystals. This feature can be defined as internal reflection which is an appropriate distinction criterion for categorizing marble and limestone. For preparing marble, at first, marble rocks are divided into

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