

HISTORICAL BUILDING RESTORATION: HIGH-FREQUENCY ACTIVE FIBER LASER FOR STADHUIS LEIDEN, NETHERLANDS.

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Abstract

The objective of this work is to experience laser cleaning with an innovative tool, initially designed for industrial paint stripping on metals substrates, and since some years applied in Nederland in the field of Cultural Heritage.

The focus is the restoration intervention of the Leiden's city hall (1595) which underwent a serious fire in 1929. The building was rebuilt in 1932. The historic facade that remain is an area of about 650 square meters, made up of three different sandstone lithotypes and granite: German hardsteen, Oberkirgerzandsteen, Bentheimerzandsteen.

The laser employed is a High-frequency active fiber laser, emitting at a wavelength of 1064 nm with a pulse duration of 100 ns and frequencies variable between 5 and 100 KHz (Infinito 100W by El.En group). The state of preservation of the stone decorations was precarious; indeed the possibility of a laser cleaning in dry conditions was really significant.

The main conservation issues were the presence of biological growing, black crusts and thickness of black smoke particles from the fire. Thanks to the speed of action and the scan size of the laser, it was possible to obtain a considerable reduction of working time in comparison with chemical and mechanical traditional methods. The result and the controllability of the laser action was monitored with digital video microscope.