OxyTech

TüV
INTERCERT
Group of TÜV Saarland
ISO 9001
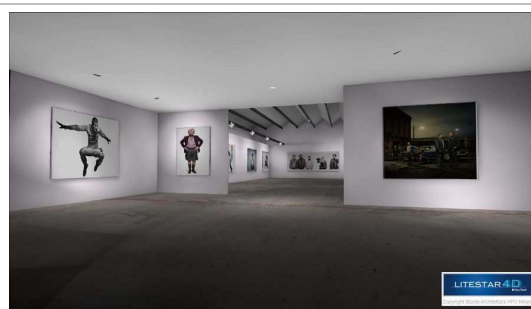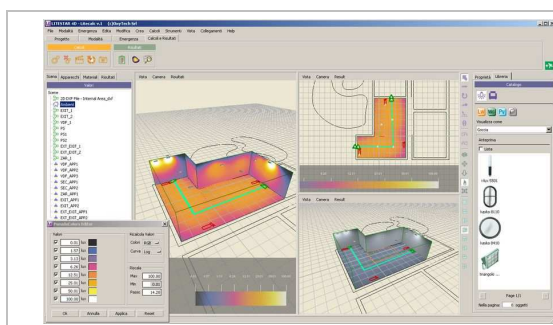Certificate N° 10-Q-10153-TIC

OxyTech Software Validation

OxyTech guarantees that the software of entirely its own production called LITESTAR from version 7 onwards has been developed according to the following International Recommendations and Norms:
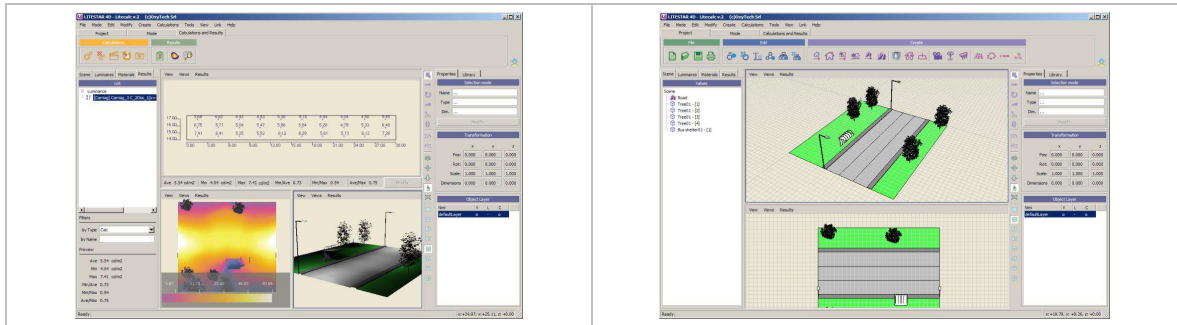
1.1 Lighting Calculations Module for Interiors

▶ CIE 24:1973	Photometry of indoor type luminaires with tubular flourescent lamps
▶ CIE 40:1978	Calculation for interior lighting – Basic method (basic calculation)
▶ CIE 52:1982	Calculation for interior lighting – Applied method (advanced calculation)
▶ CIE 55:1983	Discomfort glare in the interior working environment (glare calculation)
▶ EN 12464-1:2011	Lighting of work places - Indoor work places

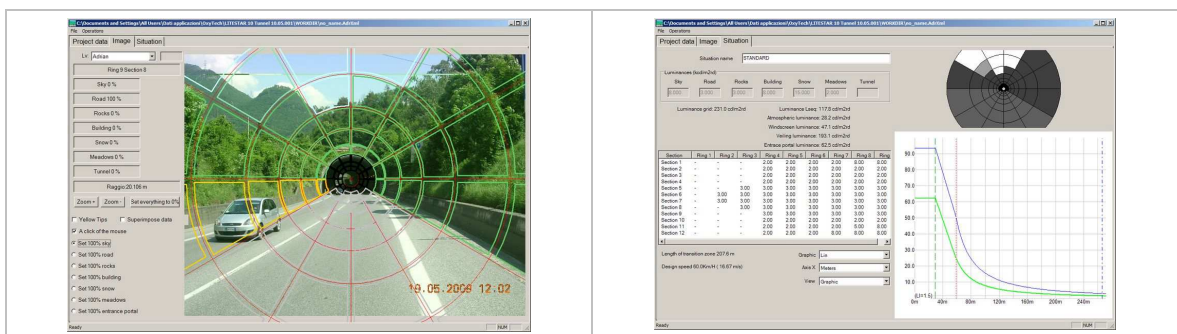### 1.2 Lighting Calculations Module for Roads

▶ CIE 27:1973	Photometry of road lighting luminaires (photometric data table)
▶ CIE 30.2:1982	Road lighting calculations (Stan program)
▶ CIE 34:1977	Road lighting lantern and installation data: photometrics, classification and performance
▶ CIE 66:1984	Road surfaces and lighting (road surfaces determination)
▶ CIE 140:2000	Road lighting calculations (version 9.00)
▶ D.M. 23/12/13	Criteri ambientali minimi per l'acquisto di lampade a scarica ad alta intensità e moduli led per illuminazione pubblica, per l'acquisto di apparecchi di illuminazione per illuminazione pubblica e per l'affi damento del servizio di progettazione di impianti di illuminazione pubblica - aggiornamento 2013 (Italian decree)
▶ EN 13201:2003	Road Lighting

| ▶ R.D. 1890-2008	Reglamento de eficiencia energética en instalaciones de alumbrado exterior y sus Instrucciones técnicas complementarias EA-01 a EA-07 (Spanish Standard)
▶ UNI 10819:1999	Inquinamento luminoso del cielo (Italian Standard)

1.3   Lighting Calculations Module for Tunnels

▶ CIE 27:1973	Photometry of road lighting luminaires (photometric data table)
▶ CIE 30.2:1982	Road lighting calculations (Stan program)
▶ CIE 34:1977	Road lighting lantern and installation data: photometrics, classification and performance
▶ CIE 66:1984	Road surfaces and lighting (road surfaces determination)
▶ CIE 88:2004	Guide for the Lighting of Road Tunnels and Underpasses
▶ CIE 140:2000	Road lighting calculations (version 9.00)
▶ EN 13201:2003	Road Lighting
▶ UNI 10819:1999	Inquinamento luminoso del cielo (Italian Standard)

1.4 Lighting Calculation Module for Floodlights - Outdoor

▶	CIE 43:1979	Photometry of floodlights
▶	CIE 57:1983	Lighting for football
▶	CIE 83:1989	Guide for the lighting of sports events for colour television and film systems
▶	CIE 112:1994	Glare evaluation system for use within outdoor sports and area lighting
▶	UNI 9316:1989	Sports lighting (Italian Norm)
▶	EN 12464-2:2007	Lighting of work places - Outdoor work places
▶	EN 12193:2008	Sports lighting
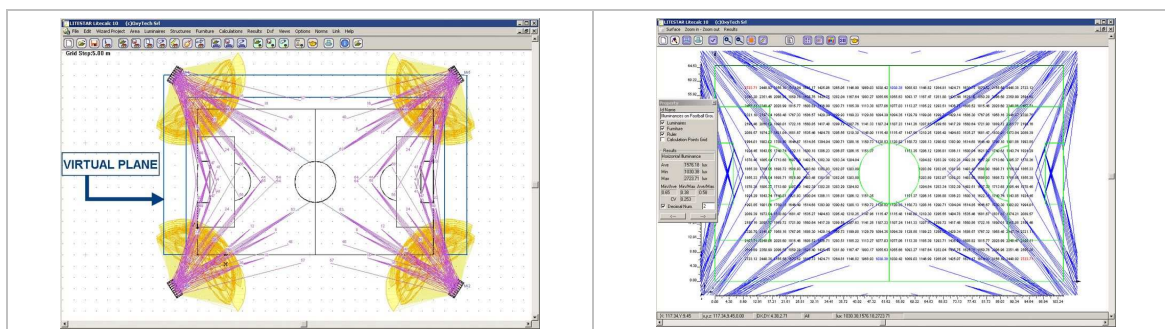
1.5 General

▶ IES LIGHTING GUIDE

▶ EN 13032 Measurement and presentation of photometric data of lamps and luminaires

2 Collaboration

The program has been developed with the collaboration of the following companies or corporations:

▶ Milan Polytechnic –Industrial Design Faculty –Light and Color Dept.: Rendering Module (from vers.6.00)

3 Field Tests

The program has been tested on the field by OxyTech on various occasions showing high levels of correspondence between measured and calculated values.

The program has further been tested by OxyTech clients, whether lighting device manufacturers, corporations, designers or specialized retailers over the last 10 years who have confirmed the validity of the program procedure results up to the present day.

Correspondence in comparisons between lighting engineering calculations and real cases is valid in the case of equal secondary parameters (voltage applied to the luminaires and their working temperature, surface reflectance values etc.): it is therefore advisable to consider a margin of error of $\pm$ 10%.

4 Comparative Tests with CIE Inspection Procedures

OxyTech has carried out comparative tests with the standard inspection procedure foreseen by CIE40-52 Recommendations finding perfect correspondence with forecast values. This inspection has been carried out in parallelepiped shaped areas and has been taken as reference sample for the development of all successive modules. Comparative tests have also been carried out on the roads module with the procedure foreseen by the STAN program of CIE30 Recommendations, finding, also in this case, perfect correspondence with forecast values.

5 **Tests with Similar Software**

OxyTech has over the years carried out comparative tests with similar software generally finding excellent correspondence with the values calculated with the various systems.
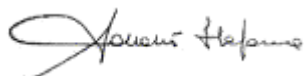
6 **Quality System Iso 9001:2008**

OxyTech has adopted the procedures of Iso 9001:2008 Norm for the development of its software and the quality manual is fully operational. The manual is available to anyone who is interested.

The present Validation Declaration neither annuls nor limits the terms of the License Contract.

Cornaredo (Milan), April 17th 2015

OxyTech Srl

(Dr. Ing. Stefano Borsani)

(President)