ECONOMISCHE EFFICIËNTIE MET TWIN-C

details how you can benefit from quality lighting solutions with Waldmann the TWIN-C concept.

TWIN-C

TWIN-C is the combination of intelligent lighting concepts with compatible components – to provide proper lighting in any environment. The benefits for organizations are compelling:

1 PRODUCTIVITY:

The correct lighting solution can increase a company's productivity up to 40%. TWIN-C lighting concepts make the most of any manufacturing environment by assuring the best illumination of production workstations.

2 SAFETY:

Imagine up to 66% fewer accidents in the workplace. Accurate lighting promotes safety by allowing employees and operators to clearly recognize objects and movement. The TWIN-C lighting concepts teaches how you can prevent errors, accidents and downtime.

3 GOOD HEALTH:

Considerably lower absenteeism! Light promotes a sense of well-being if it is customized for that specific environment. Waldmann demonstrates how TWIN-C lighting concepts can make work environments more ergonomical, promote a sense of well-being among employees and lower absenteeism.

4 ENERGY SAVINGS:

The TWIN-C concept can provide a high percentage in savings. In addition, adjusting the light levels across an entire factory can stop wasted energy. Waldmann demonstrates that, all things considered, the TWIN-C lighting concept can save energy and lower costs, while providing safer light levels.

Waldmann. The pleasant feeling of having a reliable partner.

In the industrial sector, proper lighting in the right location is a crucial factor for greater productivity and employee motivation. Waldmann develops and designs lighting solutions for increased corporate earnings, for the safety and health of the employees in production and for energy savings, while taking environmental aspects into account. As "Engineers of Light", Waldmann has stood for the highest level of German craftsmanship and engineering skill for decades. Waldmann offers "Light made to measure", oriented to the objective and environment. Industrial customers benefit from the exclusive nature of the solution and the broad application know-how, which is the result of the wealth of experience from hundreds of spot solutions and is accompanied by tremendous synergistic effects. As a medium-sized company directed by shareholders, Waldmann has become one of the world's leading lighting manufacturers. The Waldmann brand is synonymous with quality and reliability "Made in Germany". Waldmann products comply with all established standards. Our quality assurance process with the in-house test lab is exemplary, Waldmann's proverbial excellent service stands out through dedicated contact persons and a worldwide support and market presence. Waldmann, a reliable solution – from engineers for engineers.

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ECONOMISCHE EFFICIËNTIE MET TWIN-C

WERKTUIGMACHINES

Open-machine tooling environments are frequently equipped with general ceiling lighting for adjusting, measuring and testing activities. This type of lighting is particularly unsafe for the operators. TWIN-C offers the right solutions.

Before TWIN-C

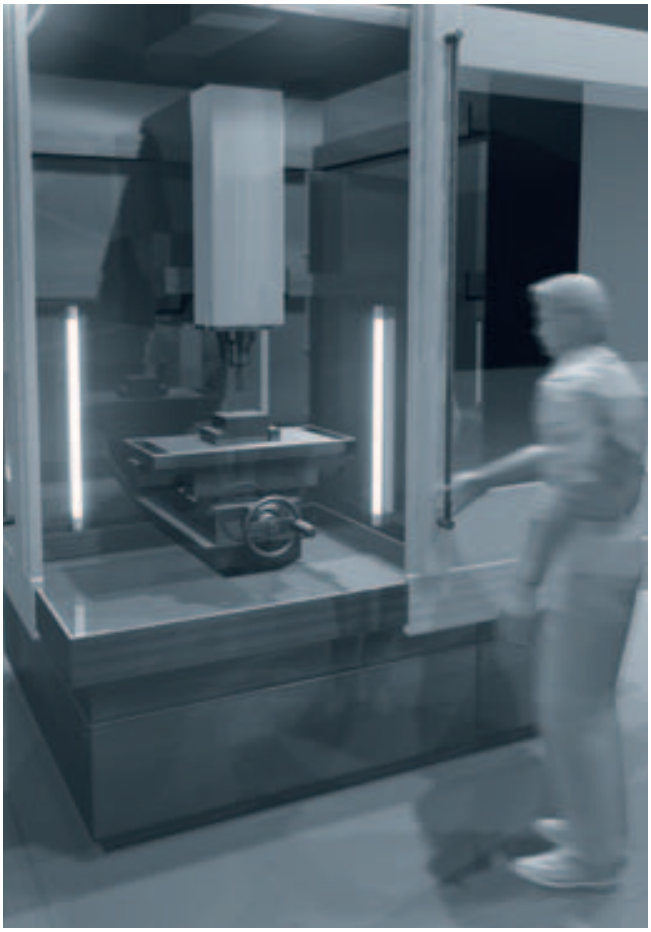
- General lighting on the ceiling.
- No lighting on the machine itself.
- The employees' individual lighting requirements have not been addressed.
- The different lighting needs of the employees remain without consideration.
- Energy consumption is extremely high.

After TWIN-C

- Reduced general lighting on the ceiling with the addition of workstation individual lighting.
- **Increased Productivity:** Higher performance, considerably fewer production and assembly errors.
- **Better Safety:** Reduced risk of accidents due to optimized visibility.
- **Improved Health:** Individually adjustable.
- **Energy savings:** Only those areas where work is performed and light is required are illuminated.

MACHINES MET BEHUIZING

The lighting of enclosed machinery and especially of the machining area with the required 500 lx is not always guaranteed. In addition, these areas are frequently subject to glare and shadows. TWIN-C demonstrates how these machines can be properly and evenly illuminated.



Before TWIN-C

- First problem: Achieving uniform brightness levels of 500 lx (according to EN 1837) is difficult, especially where the work is performed.
- Second problem: Attaching the light in the area of the visual task.
- Partial glare effects and also shadowing.
- High energy demand to provide general lighting of the machine space.

After TWIN-C

- Correct installation of a compliant protective-tube or recessed lighting will provide basic illumination. In addition, another component should be used to properly illuminate the machine area.
- **Productivity:** No defects during adjustment or measurement procedures.
- **Safety:** In the machining area 500 lx for lower risk of accidents.
- **Health:** Sufficient illumination,glare-free and no stroboscopic effects.
- **Energy savings:** Due to the separate light in the machining area, the general lighting in the machine can be reduced.

WERKTUIGMACHINES

WERKPOSTEN

Only using ceiling lighting for manual inspections and detailed assembly work is not a good solution and wastes energy. Waldmann has the correct lighting solution for all your custom workstation needs.

Before TWIN-C

- General lighting permanently installed on the ceiling.
- The employees' individual lighting requirements have not been addressed.
- The flexible configuration of the assembly line has not been considered.
- High energy consumption because the lighting level must be very high in order to reach the employee (EN 12464-1 assembly work with average details= 500 lx).

After TWIN-C

- Reduced general lighting on the ceiling with the addition of workstation individual lighting.
- **Increased Productivity:** Higher performance, considerably fewer production and assembly errors.
- **Better Safety:** Reduced risk of accidents due to optimized visibility.
- **Improved Health:** Individually adjustable, satisfied and motivated employees.
- **Energy Savings:** Due to reduced general lighting.

WERKPOSTEN

LICHTVEREISTEN PER TOEPASSING

Excerpt from DIN EN 12464-1 regarding the illumination of indoor workplaces.
The listed values are requirements.

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ENGINEER OF LIGHT.

Traffic zones and general areas inside of buildings

Type of room, task or activity	$\bar{E}_m$	R_a
Traffic areas and hallways	100	40
Stairs, escalators, moving walkways	150	40
Loading ramps, loading areas	150	40

Warehouses and cold storage rooms

Type of room, task or activity	$\bar{E}_m$	R_a
Storage and warehouse rooms	100	60
Shipping and packing areas	300	60

(High-bay) Racking

Type of room, task or activity	$\bar{E}_m$	R_a
Tracks without passenger traffic	20	40
Tracks with passenger traffic	150	60
Control room	150	60

Industrial and craftsmen activities Ceramics, tiles, glass, glasswares

Type of room, task or activity	$\bar{E}_m$	R_a
Drying	50	20
Material processing, general machine work	300	80
Enameling, rolling, pressing, molding simple parts, glazing, glass marking	300	80
Grinding, engraving, buffing glass, molding small parts, production of glass instruments	750	80
Grinding of optical glasses, crystal, manual grinding and engraving, working on medium-sized parts	750	80
Detailed work, e.g. grinding ornamentation (ornamental grinding), manual painting	1000	90

Industrial and craftsmen activities Ceramics, tiles, glass, glasswares

Type of room, task or activity	$\bar{E}_m$	R_a
Production/processing of synthetic precious stones	1500	90

Chemical industry, plastics and rubber industry

Type of room, task or activity	$\bar{E}_m$	R_a
Processing systems with remote control	50	20
Processing systems with occasional manual intervention	150	40
Continuously occupied workplaces in processing systems	300	80
Precision measuring chambers, laboratories	500	80
Drug manufacture	500	80
Tire production	500	80
Color testing	1000	90
Cutting, reworking, control work	750	80

Electrical industry

Type of room, task or activity	$\bar{E}_m$	R_a
Cable and wire production	300	80
Winding		
▪ large coils	300	80
▪ medium-sized coils	500	80
▪ fine coils	750	80
Impregnating of coils	300	80
Electroplating	300	80
Assembly work		
▪ rough, e.g. large transformers	300	80
▪ medium-sized, e.g. control panels	500	80
▪ detailed, e.g. telephones	750	80
▪ very detailed, e.g. measuring instruments	1000	80
Electronic repair shops, testing, adjusting	1500	80

LICHTVEREISTEN PER TOEPASSING

Food, beverage and tobacco industry

Type of room, task or activity	$\bar{E}_m$	R_a
Workplaces and work zones in ▪ Breweries, on malting floors ▪ for cleaning, for bottling in barrels, for cleaning, for straining, for peeling ▪ for boiling in canning and chocolate factories ▪ Workplaces and work zones in sugar factories ▪ for drying and fermenting raw tobacco, fermenting cellars	200	80
Sorting and washing products, milling, blending, packaging	300	80
Workplaces and critical zones in slaughter houses, butcher shops, dairies, mills, on filter floors in sugar refineries	500	80
Cutting and sorting fruit and vegetables	300	80
Production of delicatessen products, kitchen work, production of cigars and cigarettes	500	80
Inspection of glasses and bottles, product inspection, garnishes, sorting, decorating	500	80
Laboratories	500	80
Color inspection	1000	90

Foundry and metal casting

Type of room, task or activity	$\bar{E}_m$	R_a
Walkable underground tunnels, cellars etc.	50	20
Platforms	100	40
Sand processing	200	80
Workplaces on the cupola melting furnace and the mixer	200	80
Casting houses	200	80

Foundry and metal casting

Type of room, task or activity	$\bar{E}_m$	R_a
Emptying stations	200	80
Machine molding	200	80
Hand and core molding	300	80
Diecasting	300	80
Prototyping	500	80

Jewelry production

Type of room, task or activity	$\bar{E}_m$	R_a
Processing of precious stones	1500	90
Production of jewelry	1000	90
Watch-making (manual)	1500	80
Watch production (automatic)	500	80

Leather and leather products

Type of room, task or activity	$\bar{E}_m$	R_a
Working on vats, barrels, mines	200	40
Scouring, splitting, sanding, fulling the skins	300	80
Saddler work, shoe-making: stitching, sewing, buffing, pressing, cutting to size, stamping	500	80
Sorting	500	90
Tanning (automatic)	500	80
Quality control	1000	80
Color testing	1000	90
Shoe-making	500	80
Glove production	500	80

LICHTVEREISTEN PER TOEPASSING

Metal cutting and metal working

Type of room, task or activity	$\bar{E}_m$	R_a
Free-form cutting	200	60
Drop forging	300	60
Welding	300	60
Rough and average machine work: Tolerances ≥ 0.1 mm	300	60
Fine machine work, grinding: tolerances < 0.1 mm	500	60
Tracing, inspection	750	60
Wire and pipe drawing, cold forming	300	60
Machining heavy sheet metal: thickness ≥ 5 mm	200	60
Machining lightweight sheet metal: thickness < 5 mm	300	60
Production of tools and cutlery	750	60
Assembly work:		
▪ rough	200	80
▪ medium	300	80
▪ fine	500	80
▪ very fine	750	80
Electroplating	300	80
Surface machining and painting	750	80
Production of tools, gauges and devices, precision and micro mechanics	1000	80

Paper and paper products

Type of room, task or activity	$\bar{E}_m$	R_a
Working on beaters, edge runners, wood grinding machines	200	80
Paper production and processing, paper and cardboard machines, cardboard box production	300	80
General book-binding work, e.g. folding, sorting, gluing, cutting, stamping, sewing	500	80

Power plants

Type of room, task or activity	$\bar{E}_m$	R_a
Fuel supply facilities	50	20
Boiler houses	100	40
Machine shops	200	80
Secondary rooms, e.g. pump rooms, condenser rooms etc.; switching systems (in buildings)	200	60
Switch rooms	500	80
Outside switch rooms	20	20

Print shops

Type of room, task or activity	$\bar{E}_m$	R_a
Cutting, gold-plating, stamping, etching of printing plates, working on stones and plates, printing machines, matrix production	500	80
Paper sorting and block printing	500	80
Type-setting, retouching, lithography	1000	80
Color inspection during multi-color printing	1500	90
Steel and copper engraving	2000	80

Rolling mills, smelteries and steel mills

Type of room, task or activity	$\bar{E}_m$	R_a
Production facilities without manual intervention	50	20
Production facilities with occasional manual intervention	150	40
Production facilities with continuous manual intervention	200	80
Slab warehouse	50	20
Furnace	200	20
Rolling mill, swifts, shearing/separating stations	300	40
Control platform, control stands	300	80

LICHTVEREISTEN PER TOEPASSING

Rolling mills, smelteries and steel mills

Type of room, task or activity	$\bar{E}_m$	R_a
Testing, measuring and inspection stations	500	80
Walkable underground tunnel, conveyor roads, cellars etc.	50	20

Textile production and processing

Type of room, task or activity	$\bar{E}_m$	R_a
Workplaces and work zones on baths, bale openers	200	60
Carding, washing, ironing, working on the shredder, stretching, combing, finishing, lacing cords, prespinning, jute and hemp spinning	300	80
Spinning, twining, spooling, winding	500	80
Warping, waving, braiding, knitting	500	80
Sewing, fine-gauge knitting, taking up stitches	750	80
Drafting, designing	750	90
Underlaying, dying	500	80
Drying chamber	100	60
Automatic textile printing	500	80
Napping, looping, stripping	1000	80
Color inspection, textile inspection	1000	90
Invisible mending	1500	90
Hat manufacture	500	80

Automobile production

Type of room, task or activity	$\bar{E}_m$	R_a
Body production and assembly	500	80
Painting, spray booths, grinding booths	750	80
Painting: touch-ups, inspection	1000	90
Upholstery	1000	80
Final inspection	1000	80

Woodworking and wood processing

Type of room, task or activity	$\bar{E}_m$	R_a
Automatic processing, e.g. drying, laminated wood production	50	40
Steaming beds	150	40
Saw frame	300	60
Working on the planing bench, gluing, assembly	300	80
Grinding, painting, joiner's shop	750	80
Working on wood processing machines, e.g. turning, grooving, true running, rabbeting, cutting, sawing, milling	500	80
Selecting veneer wood	750	90
Marquetry, wood inlay work	750	90
Quality control	1000	90

Explanations:

$\bar{E}_m$: Average brightness level. The quotient of the luminous flux and the surface with which it meets corresponds to the brightness level. In general, it is determined on horizontal and vertical surfaces and listed in the unit of measure of lux.

R_a: Color rendering index, which was introduced for the objective identification of the color rendering properties of a light source. The highest possible R_a value is 100. This value decreases with decreasing color rendition quality.