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PAPER TITLE Secondary Optical Radiation of High Power Laser Beam Welding

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ABSTRACT (See instructions overleaf)

With laser materials processing, direct exposure to the laser beam is usually not the main hazard. The high power laser beam is enclosed up to the surface of the workpiece and the workstation is usually shielded. Secondary hazards such as UV-radiation, ozone and fume produced by the laser-workpiece interaction are more serious due to the every-day, long term exposure of the worker.

In this paper, results of spectroscopic measurements of the secondary optical emissions associated with CO_2 laser welding of steel and aluminum will be presented. Spectral measurements of the plasma emission at a distance of 50 cm showed that the allowed dose for UV-radiation and short wavelength visible light ("blue light hazard") per work day can be exceeded in as short as a few seconds and tens of seconds, respectively. Particularly high exposure levels were found when the welding process became instable and plasma shielding occured. Model calculations showed that the plasma temperature is at the order of 13,000 K, hence the maximum of the spectral irradiance is in the UV region. The visible part of the radiation is relatively low, which could cause a feeling of false security, because it possible to look into the plasma without closing the eyes.