Explain ESWL and the concept in the determination of the equivalent wheel load.

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ESWL stands for Equivalent Single Wheel Load, which is a concept used in pavement design to estimate the damage caused by a moving wheel load on a road surface. The ESWL is the static load that causes the same damage to the pavement as the dynamic load created by a moving wheel.

The determination of the ESWL is based on the concept of stress and strain caused by a wheel load. A moving wheel load creates a dynamic loading on the pavement surface, which causes a stress wave that propagates downwards into the pavement layers. The stress wave is attenuated with depth, and the magnitude of the stress decreases as it moves further away from the wheel load.

The equivalent wheel load is determined by comparing the stress and strain caused by the dynamic load of a moving wheel with the stress and strain created by a static load. The static load that causes the same maximum stress and strain as the dynamic load is considered

to be the ESWL.

The ESWL is determined using various mathematical models and empirical equations, which take into account the characteristics of the pavement layers, subgrade soil, and the properties of the wheel load. The ESWL is expressed in terms of the number of repetitions of a standard axle load, such as an 18 kN axle load, which is equivalent to a single wheel load.

The ESWL is an important parameter in pavement design, as it is used to estimate the fatigue life of the pavement under repeated loading conditions. The pavement design is based on the allowable number of repetitions of the ESWL, which depends on the strength and thickness of the pavement layers, subgrade soil, and the traffic volume and characteristics.