

## Sustainable Pavement Engineering



### OSCOP ENGINEERING PTY LTD

Oscorp Engineering Pty Ltd was founded by Managing Director Mr Mood on the principles that high level professional support combined with specialised testing equipment, incorporating the latest technology can be competitively priced and provide fit-for-purpose solutions.

Oscorp Engineering is currently at the forefront in pavement testing, investigation, rehabilitation and design fields with the following testing and design services capabilities:

- Falling Weight Deflectometer (FWD)
- Ground Penetration Radar (GPR)
- Pavement Laser Profiling (Roughness, Rutting and Surface Texture)
- Pavement Digital Imaging (Pavement Condition and Video Logging)
- Pavement investigation, rehabilitation and design

Oscorp Engineering acts as consultants to government agencies, major civil engineering contractors throughout Australia and the world. Our operation and team is dynamic, highly efficient and very flexible. Combined with cost-efficient methods of operation, this means we provide excellent service for our customers, for whom accuracy and reliability are critical.

#### OUR MISSION

- To exceed our customer's requirements and provide Fit-For-Purpose solutions.
- To provide world class professional services to our business partners
- To continually improve the quality of our products and services
- To continually improve the effectiveness of our Quality Management System and our business processes.





## PAVEMENT TESTING SERVICES

### FALLING WEIGHT DEFLECTOMETER

A Falling Weight Deflectometer (FWD) is a system used for performing non-destructive testing on pavements and measure the vertical deflection response of a surface to an impulse load to simulate the weight of a passing wheel load.

FWD's are commonly used on highways, local roads, car parks and airport runways, for a wide range of applications, such as pavement structural evaluation and design.

#### FWD Features

- Double Axle Trailer
- Hydraulic Brakes
- 2-cylinder 18-horsepower gasoline engine with 12 volt alternator permits high-speed and independent operation of the tow vehicle
- DGPS enabled
- 4 drop automated sequence in 30 seconds
- Data capture from 1-35 drops at each location with up to 35 forces
- Load Plate: 300mm
- Geophones Accuracy: 2% +/- 1 micron and Range: 0 to 2032 microns
- Force Measurement (Automatic Load Sensing) Accuracy: 1% +/- 0.07kN, Range 0 to 200 kN, Material: Stainless steel
- Temperature Measurement (Pavement) Accuracy: +/- 2% rdg, Range: -18 C to 400°C
- Temperature Measurement (Ambient) Accuracy: +/- 2% rdg Range: -18 C to 400°C

- Automatic Load Sensing, Computer automatically determines drop heights for varying loads up to 99 drops.
- Data Output, Data is outputted into AASHTO recommended file format Pavement Data Deflection Exchange (PDDX) format.
- Data Acquisition: 1.25 Msamples/second Up to 32 Differential A/D channels 2 Analog Outputs, 8 Digital I/O +/- 10V Input Range

#### Benefits of FWD's :

- Non destructive economical pavement testing
- Imparts a dynamic load to a pavement structure similar to a moving wheel load
- Measures deflection of the pavement surface
- Determine pavement structural capacity and pavement performance and remaining life
- Load transfer efficiency of joints in concrete and identify voids under concrete slabs
- Project and network pavement structural evaluation

### GROUND PENETRATING RADAR

Oscorp Engineering acquired the world's most advanced Ground Penetrating Radar (GPR), the GSSI SIR 30. Pavement layer thicknesses could be scanned at high speeds up to 100 Km/hr. This system can collect up to four channels of data simultaneously with uncompromised performance.

A GPR testing is a geophysical non-destructive testing that uses radar pulses (electromagnetic waves) to image the subsurface. Depending on the depths needed, the GPR pulses could be tailored to meet target depth levels. For example a 2 GHz GPR antenna will target the top 700mm of pavement with high resolution while a 200 MHz waves could travel to depths up to 18 meters.

As the basis of a high-speed data collection system, the SIR-30 is ideal for measuring pavement layer thickness, detection of cavities, airport runway assessment, bridge deck inspection, detection of ballast and utility detection. The SIR-30 GPR delivers high-speed data collection-capable of more than 1,375 scans/second, per channel with up to 500 GB data storage.

#### Examples of GPR Uses in:

- Pavement management
- Pavement performance and remaining life
- Setting maintenance and rehabilitation priorities
- Main input in overlay design
- Distress Forensics
- As built thickness construction
- Locating buried concrete pavements
- Deterioration in asphalt covered bridge decks
- Pavement Rehabilitation (identifying changes)
- Defects in Hot Mix layers (air voids, trapped moisture)
- Evaluating pavement structure after milling
- Areas of high moisture contents i.e. seepage





## PAVEMENT LASER PROFILING AND DIGITAL IMAGING

Oscorp system consists of modular components and software, with Class 1 Inertial Profilers consisting of 15 fully integrated lasers (for full transverse highway measurement) and of two Laser Profilometers, Class I, Inertial Profilers for use in construction control surveys and large scale network surveys (or whenever high accuracy roughness data is required). Oscorp laser pavement data collection system can be used to collect a wide range of asset and condition data, which includes.

- Roughness surveys
- Measure pavement profiles (continuous measurements of longitudinal and transverse profiles, rut depth and macro texture).
- Travel time and congestion surveys
- Condition rating surveys
- Inventory surveys
- Moving traffic surveys
- Video log surveys
- Recording the location of digital photographs
- Creating voice records which are associated with road attributes
- Collecting GPS/GNSS data

### Features

- Invisible laser fires vertically at surface at sampling speed
- Internal optical target senses reflected spot
- Height of spot related to its horizontal position on the target
- For roughness the laser samples at 16kHz
- The Laser is designed specifically for road measurement applications. The dynamic range is a large  $\pm 128$  mm, important to prevent data clipping due to suspension movement
- Triple high speed Analogue to Digital Converters are used with high 16-bit resolution
- There is no skew between channels during sampling – channels are sampled simultaneously
- Data all fully controlled from software so can be used simultaneously with other instruments like GPS, Video, and Rut Depth with TPL etc. Also only one calibration required for distance measurement instrument (DMI) for both Laser input
- Laser Safety features include – Mechanical shutter to isolate the laser beam – Keyed switch to power Laser – Configurable low speed cut-off to laser activation input
- The laser and accelerometers are both contained in an IP65 rated housing

### Oscorp Data Collection system consists of.

#### Laser Profilometer (Inertial Reference)

- Used to measure road Roughness and Surface Texture

#### Laser Transverse Profile Logger (TPL)

- Used to measure Road Transverse Profile (Rut Depth)

#### Video Logging Module with High Resolution Cameras

- Right Of Way Camera (ROW) used for forward view Video Logging
- Pavement View Camera (PV) used for pavement Video Logging

#### GPS Receiver

- Trimble DGPS Receiver

#### Hardware

- Computer
- A hardware interface
- All necessary electrical plugs/sockets and cabling
- Distance measuring instrument (DMI) with accelerometers

#### Software

- Software (DataView)

#### Vehicle

- Nissan Patrol 2013 for transporting and operating the test equipment





## PAVEMENT INVESTIGATION, REHABILITATION AND DESIGN

Oscorp Engineering Pty Ltd founder and Managing Director Mr Ossi Mood is a dedicated pavement engineer with a focus on staying lean, innovative, and current on pavement engineering practices, technologies and standards.

Ossi is an accomplished Pavement Design Specialist Engineer, trainer and a leader in non-destructive pavement investigation and testing with over twenty years experience and portfolio of over three thousands pavement investigation, rehabilitation and design projects valued of one billion dollars.

Ossi has written, awarded and administered large-scale tenders within private and government sectors. Ossi have planned, designed, managed and delivered large-scale civil infrastructure projects in Australia and Overseas.

## PAVEMENT REHABILITATION AND DESIGN

Oscorp Engineering aims to provide fit-for-purpose pavement design solutions in accordance with client design brief requirements and also focus on value engineering and reducing overall project costs.

Subject to Client requirements, generally our pavement design report will cover the following topics, but may not be limited to:

- Introduction
- Scope
- Location
- Design References
- Road Conditions
- Climate
- Visual Inspection Results
- Design Traffic Loads
- Parameters for Design
- Calculated Design Traffic
- Testing Assessment
- Detail each testing method and results
- Pavement Design
- Detail pavement treatment option(s)
- Material specification
- Back Calculations using Deflection Analysis of Pavement Structures (DAPS)
- Mechanistic design output calculations
- Pavement Treatment Recommendation
- Recommend a preferred treatment
- Safety in Design Report
- Certification of the design

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