

# **NEUROBAN Challenger**

## *Impact Mitigation Headwear*

*Deceleration always refers to acceleration in the direction opposite to the direction of the velocity. Deceleration ALWAYS reduces speed!*  
ISAAC NEWTON

### **PRODUCT SELECTION AND TESTING**

#### **PURPOSE:**

To provide data in order to select a suitable material to use in the production of NEUROBAN Challenger.

#### **PRODUCT SELECTION:**

Several materials were considered with desired characteristics of them being they would be waterproof, UV stable, soft to touch, light, tear resistant, elastomeric and be capable of cushioning forces of various magnitude.

#### **METHOD:**

- To evaluate the compression characteristics of materials to be considered for utilization in the project, an apparatus was constructed to replicate kinetic energy produced in any given collision. Additionally, the weight of various head sizes from that of young children to large adults must be considered as it directly contributes to the value of forces required to counteract the kinetic energy produced by the abrupt cessation of motion. Results of tests using a custom built Drop Tower can be found below.
- An untested piece of material was positioned in a central position at the base of the Drop Tower and was replaced for each and every test rotation.
- To simulate a human head, the Travel Cartridge was pre-loaded with weight according to a nominated Head Size.
- The bottom of the Travel Cartridge was fitted with a 38mm diameter rigid Impact Plate.
- The Travel Cartridge was dropped from a height of 98mm to 2451mm according to the gravitational speed required for each individual test.
- An Activating Arm was securely connected to the Travel Cartridge for the purpose of operating an audible buzzer when the Impact Plate reached within 1mm of full compression.

#### **SUNDRY:**

- Testing Parameters: designed by Ted Herbert
- Drop Tower design & manufactured by Ted Herbert
- Testing effected by Ted Herbert
- Material: EVA closed cell foam
- Material Hardness: Not provided \*\*

#### **REFERENCES:**

OMNI Calculator/Physics/Free fall: Gravitational speed calculations

\*\* IP Australia patent reference: 2024227186

DROP TOWER IMPACT TEST:

\*Denotes test material provided deceleration of kinetic forces

\*Denotes Test material reached full compression

| BODY<br>WIDTH | THICK<br>NESS | HEAD<br>WEIGHT | COMPRESSION<br>PLATE<br>DIAMETER mm | VELOCITY<br>5 kph | VELOCITY<br>10 kph | VELOCITY<br>15 kph | VELOCITY<br>20 kph | VELOCITY<br>25 kph | VELOCITY<br>30 kph |
|---------------|---------------|----------------|-------------------------------------|-------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| 35            | 14            | 4.0            | 38                                  | *                 | *                  | *                  | *                  | *                  | *                  |
| 35            | 14            | 4.5            | 38                                  | *                 | *                  | *                  | *                  | *                  | *                  |
| 35            | 14            | 5.0            | 38                                  | *                 | *                  | *                  | *                  | *                  | *                  |
| 35            | 14            | 5.5            | 38                                  | *                 | *                  | *                  | *                  | *                  | *                  |
| 35            | 14            | 6.0            | 38                                  | *                 | *                  | *                  | *                  | *                  | *                  |