

## APPENDIX 1

### LIST OF FORMULAE DEVELOPED BY OTHER RESEARCHERS

From the literature of Ji Hyun Sung et al (2010)

#### A. Strain Hardening Function

- |     |                        |      |   |
|-----|------------------------|------|---|
| (1) | Ludwik                 | 1909 | $\sigma = \sigma_o + K\varepsilon^n$  |
| (2) | Hollomon               | 1945 | $\sigma = K\varepsilon^n$   |
| (3) | Voce                   | 1948 | $\sigma = \sigma_o (1 - A \exp(B\varepsilon))$  |
| (4) | Swift                  | 1952 | $\sigma = K(\varepsilon + \varepsilon_o)^n$   |
| (5) | Ludwigson              | 1971 | $\sigma = K_1 \varepsilon^{n_1} + \exp(K_2 + n_2 \varepsilon)$                        |
| (6) | Hartley and Srinivasan | 1983 | $\sigma = \sigma_o + K(\varepsilon + \varepsilon_o)^n$                                |
| (7) | Baragar                | 1987 | $\sigma = \sigma_o + C \varepsilon^{0.4} + D \varepsilon^{0.8} + E \varepsilon^{1.2}$ |

where,  $K_1, K_2, n_1, n_2, A, B, C, D$  and  $E$  are constants;

$K, n$  has usual meaning.

#### B. Strain Rate Sensitivity Function

- |     |                           |      |   |
|-----|---------------------------|------|---|
| (1) | Kleemola and Ranta-Eskola | 1979 |   |
|     | Hosford and Caddell       | 1983 | $\sigma = \sigma_{\dot{\varepsilon}_o} \left( \frac{\dot{\varepsilon}}{\dot{\varepsilon}_o} \right)^m$  |
| (2) | Wagoner                   | 1981 | $\sigma = \sigma_{\dot{\varepsilon}_o} \left( \frac{\dot{\varepsilon}}{\dot{\varepsilon}_o} \right)^{m_o \sqrt{\dot{\varepsilon} \dot{\varepsilon}_o}^{m_1}}$ |
| (3) | Johnson and Cook          | 1983 | $\sigma = \sigma_{\dot{\varepsilon}_o} [1 + m \ln \left( \frac{\dot{\varepsilon}}{\dot{\varepsilon}_o} \right)]$  |