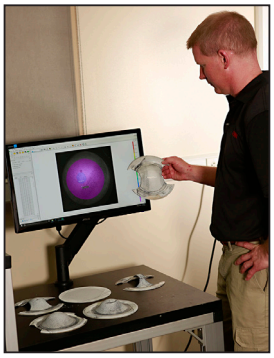
# EWI Forming Center: Material Formability Testing

EWI's Forming Center offers material formability testing of various types of sheet material including steel, aluminum, titanium and nickel alloys. These tests include cup draw testing, biaxial bulge testing, and FLD testing. EWI engineers evaluate the results of these tests (and others) to provide recommendations on lubricants, coatings, and materials for your specific application.



## Cup Draw Testing

| | | MACHINING INCLUDED | |
|---|---|---|---|
| **Name** | **Reference** | **Description** | **Rate**** |
| Cup Draw Test* | N/A | Evaluation of the material drawability and/or the performance of stamping lubricants. Nine (9) blanks are required for each lubricant or sheet material. Maximum sheet thickness for this testing is 2.54-mm (0.1-in.). Maximum tensile strength for this testing is 1200-MPa (i.e. 170-ksi) with a maximum gage of 1.2-mm (0.048-in.). | $5,455 |
| Cup Draw Test, Additional Materials* | | Additional Cup Draw Test with the pre-defined testing conditions (i.e. forming speed, blank holder force and lubricant) | $2,331 |
| Cup Draw Test at Elevated Temperatures* | | Standard Cup Draw Test at Elevated Temperature (up to 750 F) | $8,182 |
| Cup Draw Test at Elevated Temperatures, Additional Materials* | | Additional Cup Draw Test at Elevated Temperature using the pre-defined testing conditions (i.e. forming speed, blank holder force and lubricant) | $3,496 |
| Cup Draw Test w/ Strain* | | Standard Cup Draw Test with 3-D strain measurement data obtained using an ARGUS optical strain analysis system (DIC). | $7,405 |
| Cup Draw Test w/ Strain, Additional Materials* | | Additional Cup Draw Test w/Strain using the pre-defined testing conditions (i.e. forming speed, blank holder force and lubricant). | $3,553 |
| Cup Draw Test w/ Strain at Elevated Temperatures* | | Cup Draw Test w/Strain at elevated temperatures (up to 750 F) | $11,575 |
| Cup Draw Test w/ Strain at Elevated Temperatures, Additional Materials* | | Additional Cup Draw Test w/ Strain at Elevated Temperature using the pre-defined testing conditions (i.e. forming speed, blank holder force and lubricant). | $5,343 |

## Biaxial Bulge Testing

| | | MACHINING INCLUDED | |
|---|---|---|---|
| **Name** | **Reference** | **Description** | **Rate** |
| Biaxial Bulge Test* | | Equi-biaxial tension test to obtain the stress-strain curve of the sheet material. A set of five (5) 10-in. square specimens are required for this testing. Maximum sheet thickness for this testing is 2.54-mm (0.1-in.) Maximum tensile strength for this testing is1200-MPa (i.e. 170-ksi) with a maximum gage of 1.2-mm (0.048-in.) | $3,702 |
| Biaxial Bulge Test, Additional Materials* | | Additional Biaxial Bulge Testing with the pre-defined testing conditions. | $1,933 |

* Not included in scope of A2LA accreditation.
** Rates are subject to change. Additional charges may apply.

# EWI Forming Center: Material Formability Testing, continued

## FLD Testing

| | | MACHINING INCLUDED | |
|---|---|---|---|
| **Name** | **Reference** | **Description** | **Rate**** |
| Forming Limit Diagram (FLD) Test* | ISO-12004 | Standard Limiting Dome Height testing to obtain a full scale FLD. A set of 15 specimens (i.e. 8-in. x 8-in.) is requred for this testing. | $8,342 |
| FLD Test, Additional Materials* | ISO-12004 | Additional FLD Test with pre-defined testing conditions. | $5,986 |
| FLD Test at Elevated Temperatures* | | FLD Test at Elevated Temperature (up to 750 F) | $12,592 |
| FLD Test at Elevated Temperatures, Additional Materials* | | Additional FLD Test at Elevated Temperature using the pre-defined testing conditions. | $8,736 |

## Hole Expansion Testing (Member Rates)

| | | MACHINING INCLUDED | |
|---|---|---|---|
| **Name** | **Reference** | **Description** | **Rate** |
| Hole Expansion Testing (HET)* | | 3” Diameter HET. Includes testing of one material with three repetitions. Test report includes video screen-captures as well as force and displacement measurements. | $4,993 |
| Hole Expansion Testing (HET), Additional Materials* | | Additional HET (one material, three repetitions) using predefined test conditions. | $2,379 |

* Not included in scope of A2LA accreditation.
** Rates are subject to change. Additional charges may apply.

For additional information or a quote please contact Hyunok Kim, Senior Engineer at hkim@ewi.org or Brad Nagy at bnagy@ewi.org. 614.688.5000 / 1250 Arthur E. Adams Drive, Columbus, OH 43221 EWI.org/technologies/labservices

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