

# Biomechanical Engineering

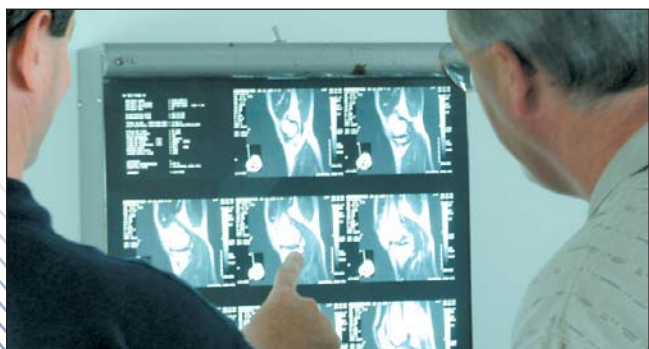
The ESI Biomechanical Engineering Team has conducted investigations pertaining to the mechanism and causation of injury in the transportation (aeronautical, automotive, RR/Train), consumer product, industrial, construction, agricultural, marine, and recreational industries.

Analyses have encompassed the interaction of people with their environment, and injuries to many aspects of the human body, including the head, neck, low back, upper/lower extremities and torso.

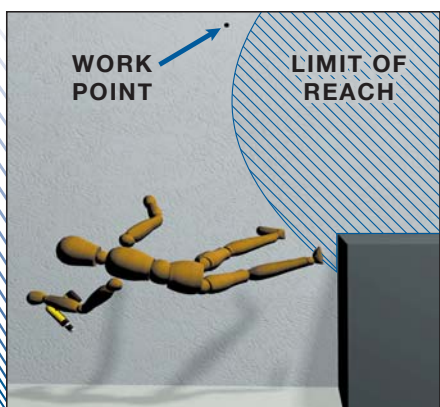
Our biomechanical team utilizes specialized testing, photographic and video analysis, computer graphics, simulations, animations, and literary research in the investigation and reconstruction of accidents.



*Match occupant environment with injuries*



*Analyzing injuries*



*Full in-house animation*



*Human surrogate testing in ESI's high bays (above) and laboratory facilities (below)*



## Areas of Specialization

### Accident Investigation and Reconstruction

- Crashworthiness
- Human Factors and Ergonomics
- Mechanical Testing and Failure Analysis
- Biomedical Instrumentation

### Bioelectrical Shock

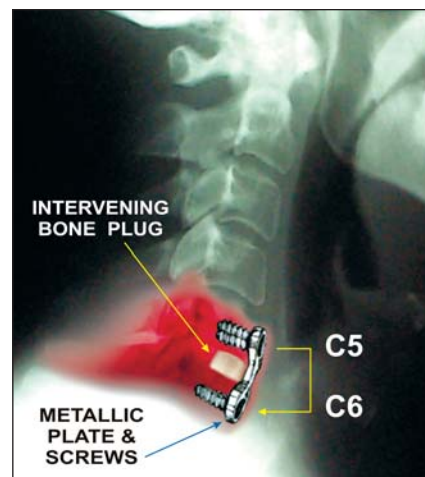
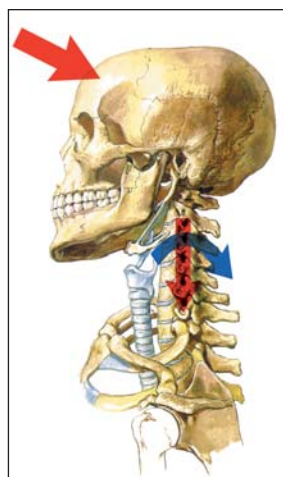
### Human Motion Analysis

### Human Kinetic (force) Analysis

### Human Performance

### Injury Causation/Mechanisms

### Occupant Kinematics



*Technical graphics to explain*

# Biomechanical Engineering

ESI regularly conducts many significant biomechanical, biomedical and human factors evaluations to help determine, confirm, justify or disprove accident and injury statements.

## Evaluations

Airbags

Biomedical Instrumentation

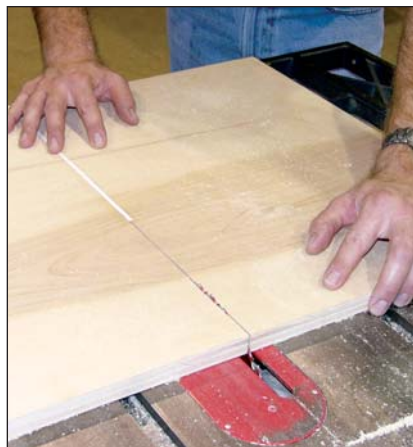
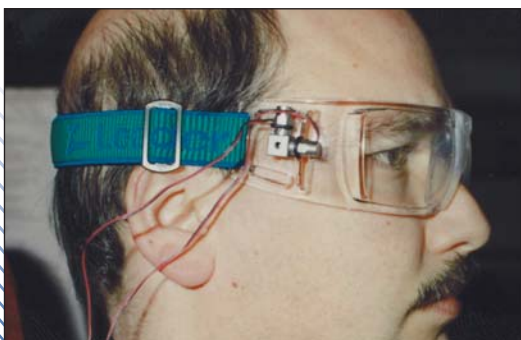
Child Products Evaluations

Compare incident forces with ADL  
(Activities of Daily Living)

Conspicuity Analysis



*ESI capabilities encompass such tests as sled testing (above) and accelerometers (below).*



*Investigate all types of hand and power tool injury situations*



*Anthropometric Test Devices (ATDs) are among many in-house test methods.*

- Dynamic Analyses
- Electric Shock Effects
- Ergonomic Risk Factors
- Fracture Mechanisms
- Head and Neck Biomechanics
- Human Factors
- Human Motion Analysis
- Manual Materials Handling
- Occupational Safety
- Pedestrian Accidents
- Perception Reaction Analysis
- Product Interaction
- Restraint System Performance
- Risk Analyses
- Seat Performance
- Slip/Trip Fall Analyses
- Soft Tissue Injuries
- Spine Biomechanics
- Standards Compliance
- Warnings Evaluation
- Work Place Evaluation
- Work-Related Musculoskeletal Disorders

## Involve Biomechanical Engineering Early

Determining injury facts can often occur sooner when a Biomechanical Engineer is involved at the outset of an investigation. Often the best course of action is to simply call ESI and find out if a biomechanical engineer can help your situation.

## *Providing Clear Answers Through Insights and Multidisciplinary Excellence*

Assignments vary from national disasters to simple evaluations. We address complex issues with a multidisciplinary approach and the sharing of knowledge. Add to that research specialists, laboratories, test facilities, first-class modeling and graphics, and you have the best advice and support available in this industry...right here at ESI.

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