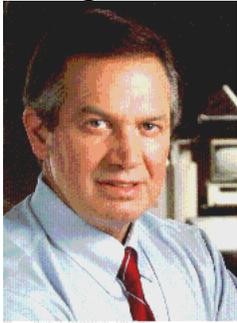




## Background



**Ariel Dynamics Inc. (ADI)** invented the first computerized Movement Analysis System, known as the Ariel Performance Analysis System (APAS), in 1968. The System's inventor, Dr. Gideon Ariel, developed the first online electronic digitizing system for reducing each frame of motion in a video sequence into its kinematic components. Since 1971, Ariel Performance Analysis System has assisted medical professionals, sport scientists and athletes to understand and analyze movement using its advanced video and computer motion measurement technology. It surpasses all other video systems for quantitative accuracy and scientific excellence for the most cost effective choice in major medical and research institutions around the world.

**Kinematic Consultants, Inc. (KCI)** was founded in 1985, specializing in objective test and measurement techniques. Kinematic Consultants has worked with numerous clients including Insurance Companies, Risk Managers, and Workers' Compensation Managers to save countless dollars by providing precise, objective examinee assessments. The introduction of computerized kinematic analysis including; APAS and the use of force plates, dynamic EMG and other state-of-the-art test and measurement instruments in Physical Medicine, has been an exciting and revolutionary process. Many traditional



Traditional Functional Capacity Evaluations are based upon subjective Examiner observations and Examinee response. Kinematic Functional Capacity Evaluations stand apart from these traditional FCEs by providing objective and scientifically supported data collection and analysis of the examinee, with critical management information regarding validation of examinee effort and reliability.

## APAS System

APAS is a 3D video-based movement analysis system, which accurately quantifies function and provides objective data that professionals may use to justify or evaluate treatment. Areas of successful application for APAS include human performance, injury and rehabilitation assessment, quantification of loss for compensation claims, equipment or product development, determination of potential or actual risks for products and activities for liability/litigation management, as well as applied research in the areas of orthopedic medicine, therapeutics and physical training.

APAS integrates state-of-the-art computer and digital video processing hardware with specialized software modules that perform objective data collection, analysis, and presentation. Objective quantifiable documentation is provided for both 2-Dimensional and 3-Dimensional analysis. Specific points of interest can be digitized with user intervention, or automatically, using contrasting markers. A 3-D model of the Examinee's body is generated for in-depth analysis and can be synchronized with graphs delineating movement during kinematic protocols. Additionally, up to 32 channels of analog data (i.e., force platform, EMG, goniometry) can be synchronized with both graphs and model to provide a complete overall view of the Examinee's movement.

The APAS System demonstrates significant advantages over other common approaches to movement systems:

- Except for specific applications requiring dynamic EMG, it is non-invasive. No wires or sensors need be attached to the subject.
- The system is portable and rarely requires any modification of the performing environment. Cameras can be transported to the site and positioned so as not to interfere with the subject.
- The scale and accuracy of measurement can be set to the levels required for the activity being performed. Digital video technology currently available is sufficient for applications requiring accurate motion analysis and is normally the least expensive option, particularly when two or more cameras are needed

The ability to record the activity as a picture has a number of advantages:

- It allows the medical professional to make intellectual decisions regarding the joint center at each frame
- Subsequent quantification will be possible since the digital video can be re-examined at any time.
- 3-D models of the Examinee's body can be overlapped with the digital video pictures for effective result presentations.

Applications of the APAS System include, but are not limited to, the following:

- Sport or athletic applications have included baseball, softball, volleyball, soccer, American football, tennis, track and field events, horse racing and jumping, and golf.
- Job quantification
- Task improvement
- Post-injury assessment
- Employment evaluations
- Risk assessment
- Worker's compensation
- Disability evaluations
- Ergonomic evaluations of job tasks
- Job standardization can be useful in the workplace
- Artistic endeavors such as playing the violin, the harp, and the piano, have been examined biomechanically.
- Forensic analysis has included injuries sustained in football, gymnastics, horse racing, and running shoes.
- Space Research has included a number of research studies at NASA.
- Rehabilitative usage include pre- and post-hip replacement functioning, gait analysis, and comparisons of bilateral functions.



## **Kinematic Functional Capacity Evaluation Module**

Kinematic FCEs are used to assist decision-making in a number of occupational areas such as:

- Early Return to Work Decisions
- Determining Safe, Altered Duty Assignments
- Determining Maximum Medical Improvement
- Determining Examinee Maximum Effort
- Verification of Subjective Complaints
- Job and/or Work Site Evaluations
- Post-offer Physical Examinations
- Fitness for Duty Exam
- NIOSH Lift Task Evaluation
- Case Closure



The APAS System can be used in any number of areas, such as Physical, Orthopedic, Neurological, Pediatric, and Geriatric Medicine:

- Kinematic Gait Analysis
- On-Site Ergonomic Job Analysis.
- Balance Evaluation and Biofeedback Programs.
- EMG Muscular Biofeedback Programs.
- Pain Management.
- Center of Pressure Postural-Gram
- Gait Training and Biofeedback.
- Sports Reconditioning and Pre-return to Play Analysis.
- Ground Reaction Force Gait Evaluation
- Custom Orthotics Fabrication and Analysis
- Prosthetic Fabrication, Adjustment and Analysis
- Invoked Reflex Response Analysis
- Post Concussion Syndrome Analysis

