

# Engineered Precision Motion Systems



- Development collaboration
- Project management process
- Applications
  - Wafer metrology
  - Wafer inspection
  - Genomic - assaying
  - Flat panel inspection
  - Solar panel scribing
  - Semiconductor lead inspection



# Motion System Development

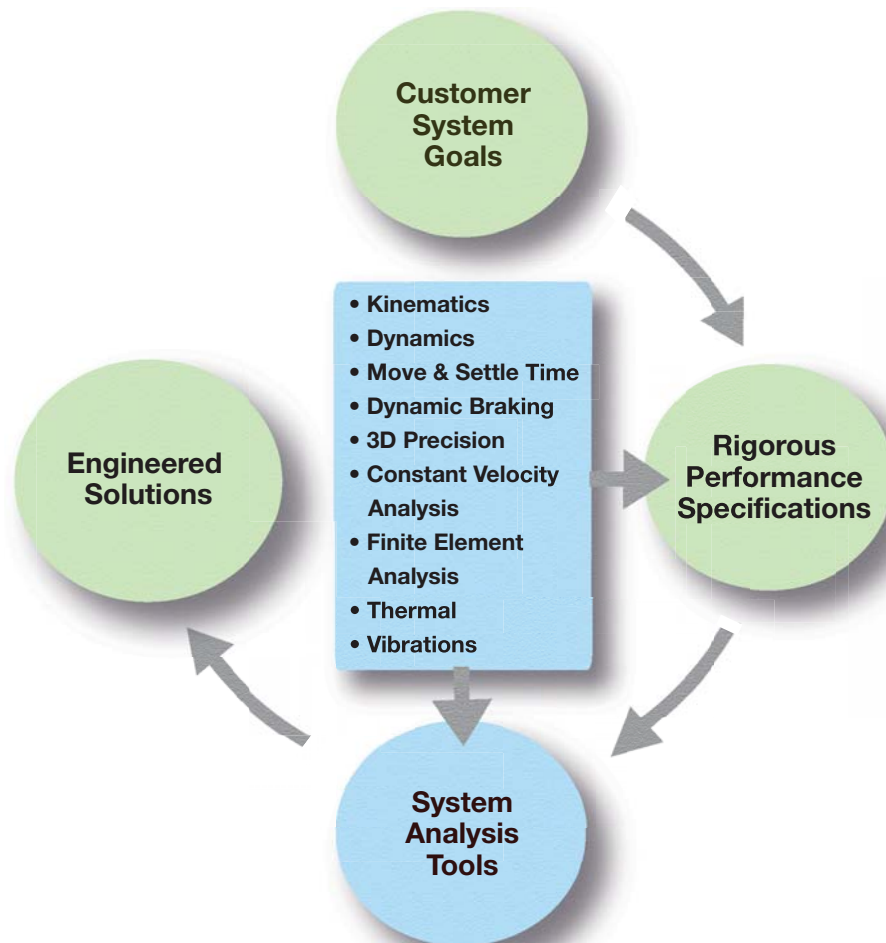
OEMs and manufacturers look to Parker because they know our extensive motion system design experience, systematic project management process, and global infrastructure ensure their needs are met.

Through years of motion system design and manufacturing, we have developed a collaborative development cycle and systematic six-step project management process that lead the motion industry.

Since our technology enables our customer's technology, we build strategic partnerships and strictly maintain confidentiality with our customers.

Parker's Engineered Solutions incorporate air-bearing, linear motor, and pneumatic technology with composite or conventional materials to create a total solution.

## Collaborative Development Cycle



## Parker's Six-Step Project Management Process

Parker recognizes the critical value of bringing your technology to market quickly, and our systematic approach allows our engineering team to maintain a strict timeline to develop and execute your project.

This six-step process includes:



### 1. Understanding Your Needs

Based on a review of your goals, we help develop a rigorous definition of system requirements.



### 4. Project Management

A project manager assigned to your project uses a secure, web-based tool to manage progress and keep everyone in the loop.



### 2. System Analysis

Proprietary software analyzes the proposed system value and optimal component sizing.



### 5. Acceptance Test Procedure

This mutually agreed upon document outlines the procedures, tools and methods used to verify that all project performances meet desired specifications.



### 3. Solution Proposal

We document the system requirements, cost effectiveness of options, proposed system design and analysis, price quotation and delivery schedule.



### 6. After-Sales Support

Includes: an engineer on site during delivery, machine inspection, training, maintenance and 24/7 support.



## Road map for optimal positioning solutions

### Positioning System Performance Requirements

#### STATIC

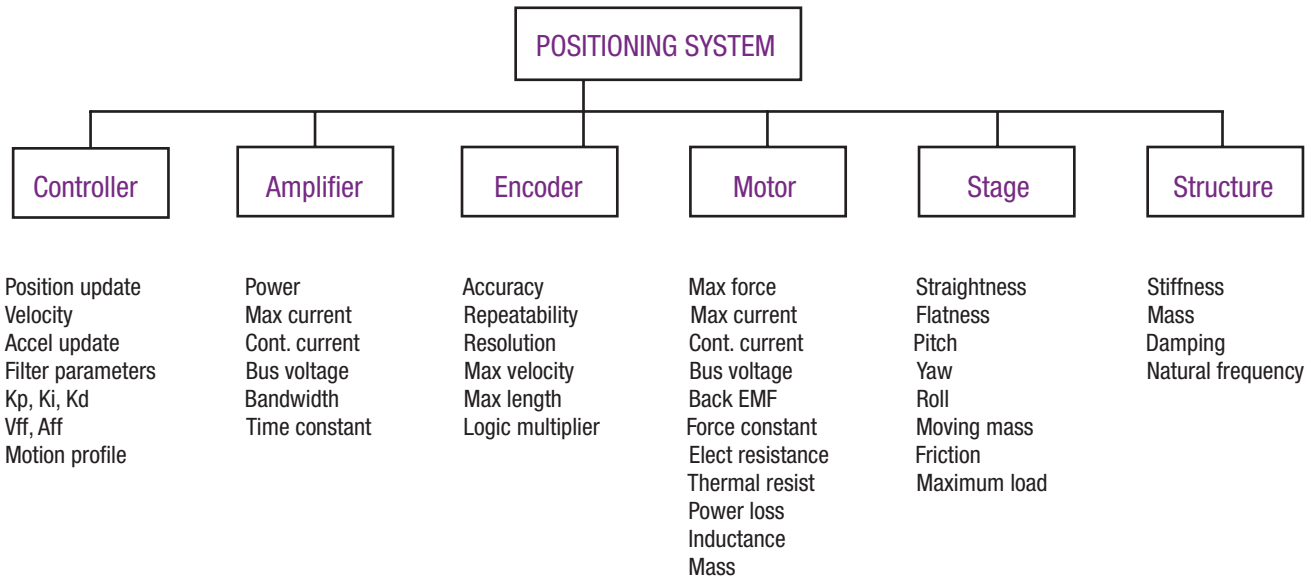
Accuracy  
Repeatability  
Resolution  
Max load  
Size

#### SERVO

Closed loop bandwidth  
Settling-time  
Constant velocity

#### DYNAMIC

Max travel  
Max velocity  
Max acceleration  
Step size  
Dwell  
Cycle time jitter



### Motion Control Component Parameters

#### System Analysis Tools

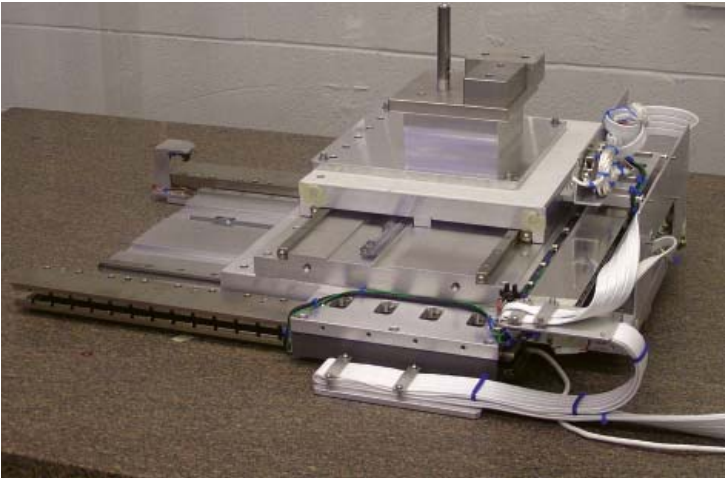
- Kinematics
- Dynamics
- Move & settle
- Dynamic braking
- 3-D precision
- Constant velocity
- Flying sheer
- Strength FEA
- Thermal
- Vibrations

#### Automatic Optimal Stage Sizing Tools

- Comprehensive Data Base of Stage Test Data
- Configuration Selection
- XYZ 5-step Motion Profile Optimization
- 3-D Precision Optimization
- 3-D Force Optimization
- Cost / Performance Optimization

## Semiconductor - E-Beam Inspection

- Modified Ultra 400 x 300 mm
- +/- 0.5 micron repeatability +/- 3-micron accuracy
- +/- 2 micron flatness / straightness
- +/- 5 arc sec pitch +/- 2 arc sec yaw
- Vacuum  $10^{-7}$  Torr, 100 mGauss, 90 Kg moving weight
- 3 U amplifier box, and PCI motion controller



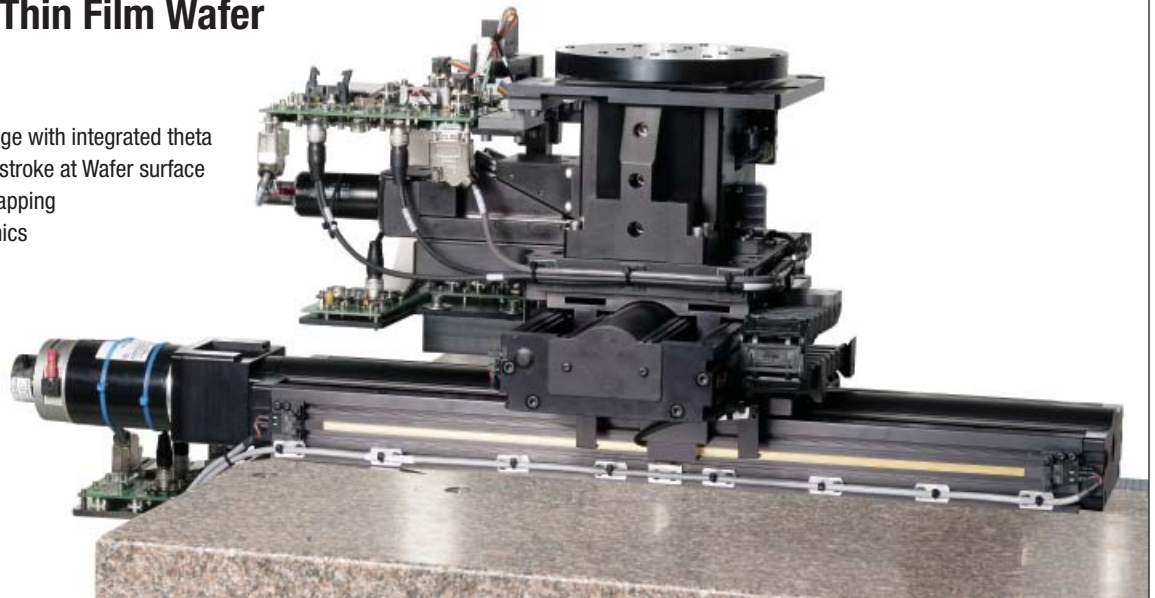
## Genomics, High-Throughput Screening

- Luge LM XYZ travel 1,200 x 600 x 90 mm
- 500 mm/ sec velocity 0.6 g acceleration
- +/- 25 micron accuracy +/- 5-micron repeatability
- 3 U amplifier and PCI motion controller



## Semiconductor - Thin Film Wafer Metrology

- XY Luge LM with special Z wedge with integrated theta
- Repeatability +/- 1 micron full-stroke at Wafer surface
- Accuracy +/- 5-micron after mapping
- Integrated to customer electronics





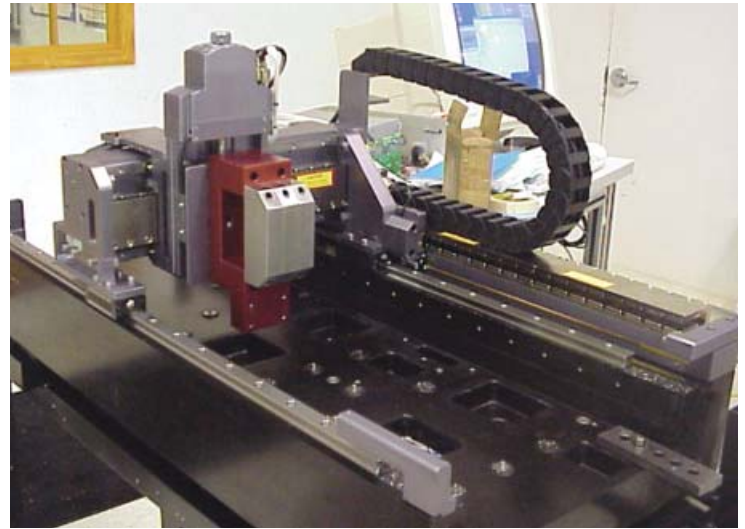
## Flat Panel Gen 5 Metrology

- XY Open-frame gantry (1900 x 600 mm)
- Flatness +/- 50 micron, yaw +/- 3 arc sec
- Accuracy +/- 30 micron, repeatability +/- 6-micron
- Vacuum -  $10^{-3}$  Torr
- 3 U amplifier box, and PCI motion controller



## Semiconductor - Vision-Based IC Lead Verification

- XYZ composite-base gantry
- Straightness +/- 5um per 400mm
- Flatness 1.27um per 25mm
- Constant velocity +/- 0.5% per 25um interval
- Digital current loop integrated motion controller



## Solar Panel Scribing

- Linear motor driven XY stages
- Travel 1.5m x 1m
- Accuracy +/- 12um (full travel)
- Bi-directional repeatability +/- 3um
- Straightness +/- 10um
- Flatness +/- 5um

