# Concept Review: Example

## Design Configuration Downselect Process

- Generate sufficiently detailed sketches of potential configurations to permit reasonably accurate assessment
- Develop assessment matrix categories that include accounting for all appropriate system requirements
- Define the meaning of the categories
- Weigh the importance of the categories
- Perform all analyses needed for the categories
- Rate each candidate configuration in each category
- Calculate the composite rating
- Check to make sure it makes sense!

# Concept Review: Example

## Some Rating Categories

- Mechanics:  Minimum natural frequency, load capacity, weight
- Performance:  Size, speed
- Risk:  Technological familiarity, Schedule risk
- Ilities:  Reliability, Repairability, Maintainability
- Manufacturability:  Parts count, Cost, Assembly
- Marketability:  Ease of Growth, Design Uniqueness

# Concept Review: Example

## Some Rating Category Descriptions

- Technological familiarity: Are the materials and components similar to your experience base or are they new to you (or new to other industries)?
- Schedule risk: Is the vendor a known quantity? Can you purchase a component or system rather than design and build your own?
- Reliability: Are the components reliable? Are there a lot of them?
- Repairability/Maintainability: How easy is access, diagnosis, adjustment, alignment, etc?
- Parts count: Multiple parts, similar parts, existing parts can be a plus.
- Ease of Growth: Are there clear ways to increase the product's capacity or features in the future?

# Concept Review: Example

Sample Rating System

| Rating | Meaning |
| --- | --- |
| 4 | Very Good in this category |
| 3 | Good in this category |
| 2 | Average |
| 1 | Below Average |
| 0 | Bad at this category |

# Concept Review: Example

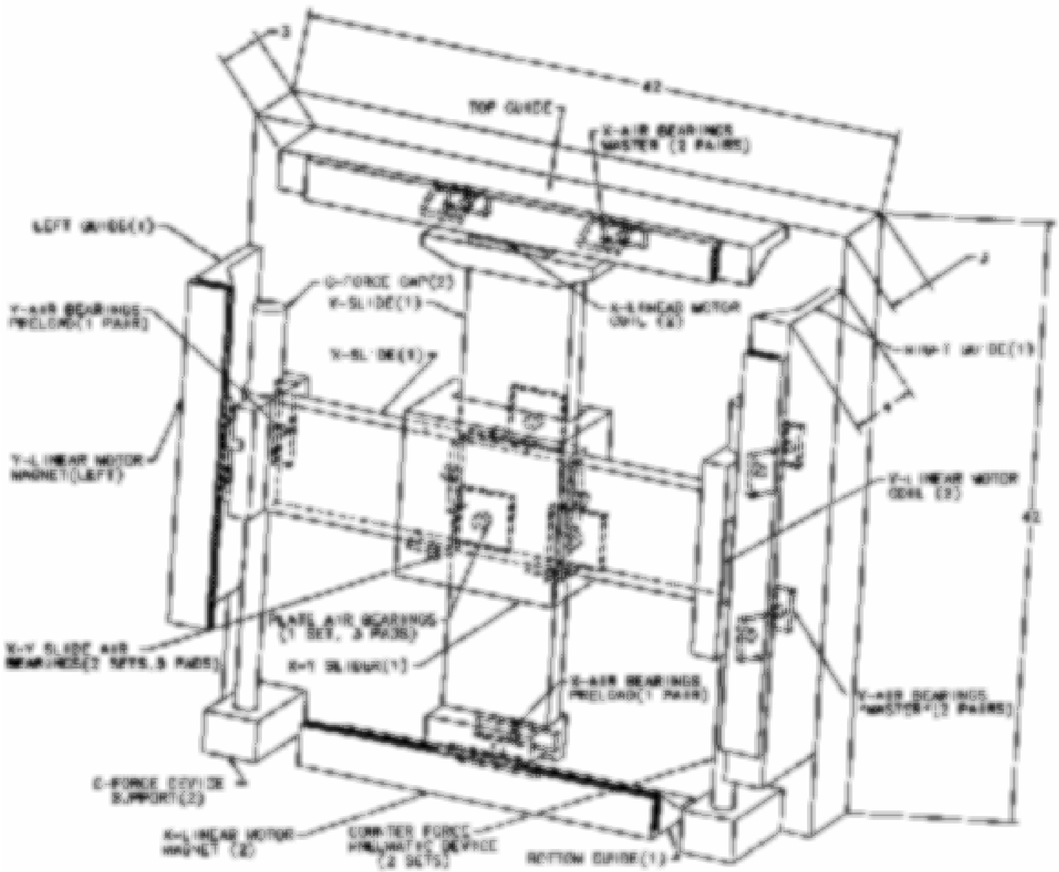
## Sample Decision Matrix

| | | | Wafer SubStages | | | |
|---|---|---|---|---|---|---|
| | | | A | B | C | D |
| | Category | Weight 0-4 | V Initial Concept | + Etch-a-Scan | H Horizontal Motor | I Vertical Motor |
| **Mechanics** | Fundamental Frequency >100 Hz | 4 | 3 | 2 | 2 | 2 |
| | Alignment Deviation (for Trav. Mirror) | 2 | 2 | 3 | 3 | 4 |
| | Moving Stage Weight (Re Accel) | 3 | 2 | 2 | 4 | 3 |
| | Order of Stages (C'Bal,PropF,Accel) | 1 | 3 | 4 | 3 | 2 |
| **Performance** | Footprint < 43 in wide | 2 | 3 | 2 | 2 | 3 |
| | 300/450 | 2 | 2 | 2 | 3 | 3 |
| **Risk** | Technology Familiarity | 3 | 3 | 3 | 3 | 3 |
| | Low Schedule Risk | 3 | 2 | 2 | 2 | 2 |
| **Ilities** | Reliability | 4 | 2 | 1 | 2 | 2 |
| | Repair/Maintainability | 3 | 2 | 2 | 3 | 3 |
| **Manufacturability** | Parts Count | 1 | 2 | 0 | 2 | 2 |
| | Cost | 2 | 2 | 1 | 3 | 3 |
| | Assembly | 3 | 2 | 1 | 3 | 3 |
| **Marketability** | Ease of Growth | 1 | 2 | 3 | 2 | 2 |
| | | | | | | |
| | **Total (W*R)** | | **78** | **65** | **90** | **90** |

- **The “H” and “I” Configurations score highest.**

# Concept Review: Example

## SubStage Concept B: “Etch-a-Scan” or “+”

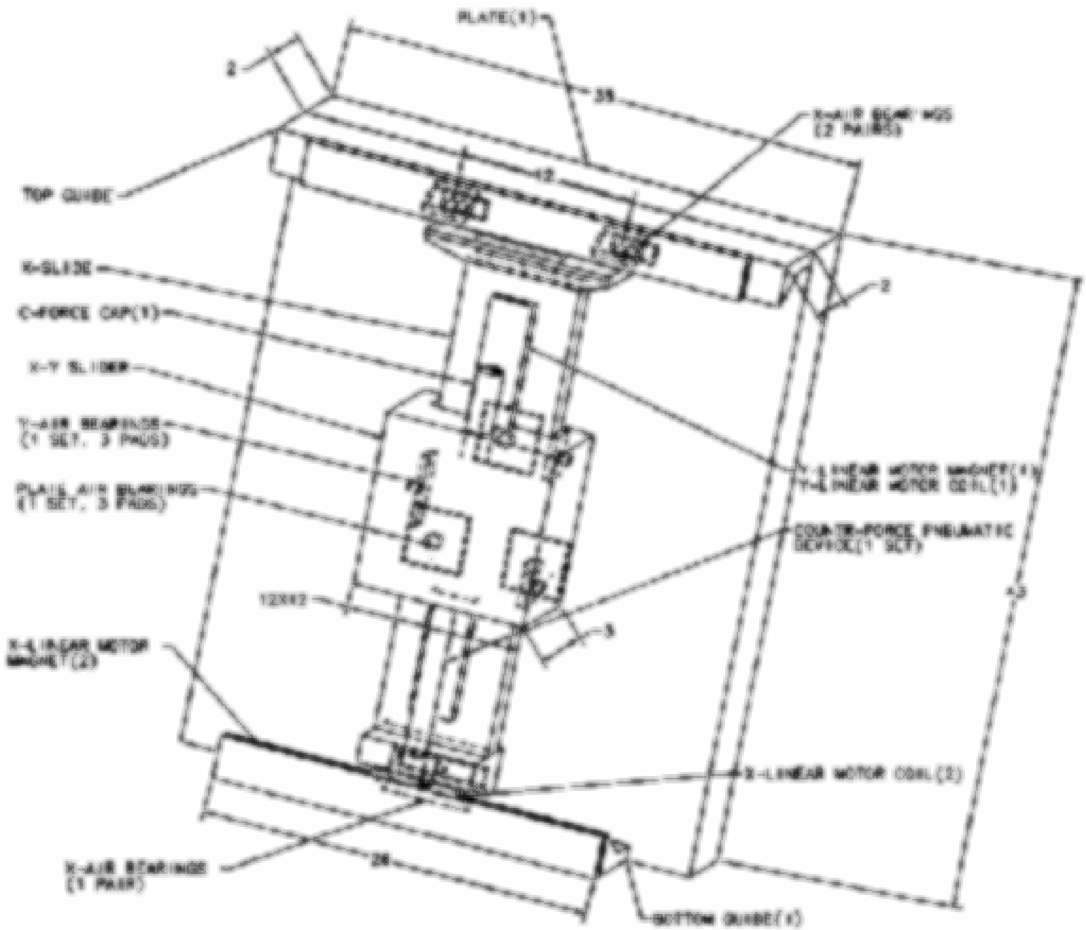


+ Lowest weight XY Slider
+ Dual X & Y-drive motors
+ Stationary Counterforces

- Many bearings needed
- Wide footprint
- Four linear motors required
- Two Counterforces required

# Concept Review: Example

## SubStage Concept D: “I“ Configuration

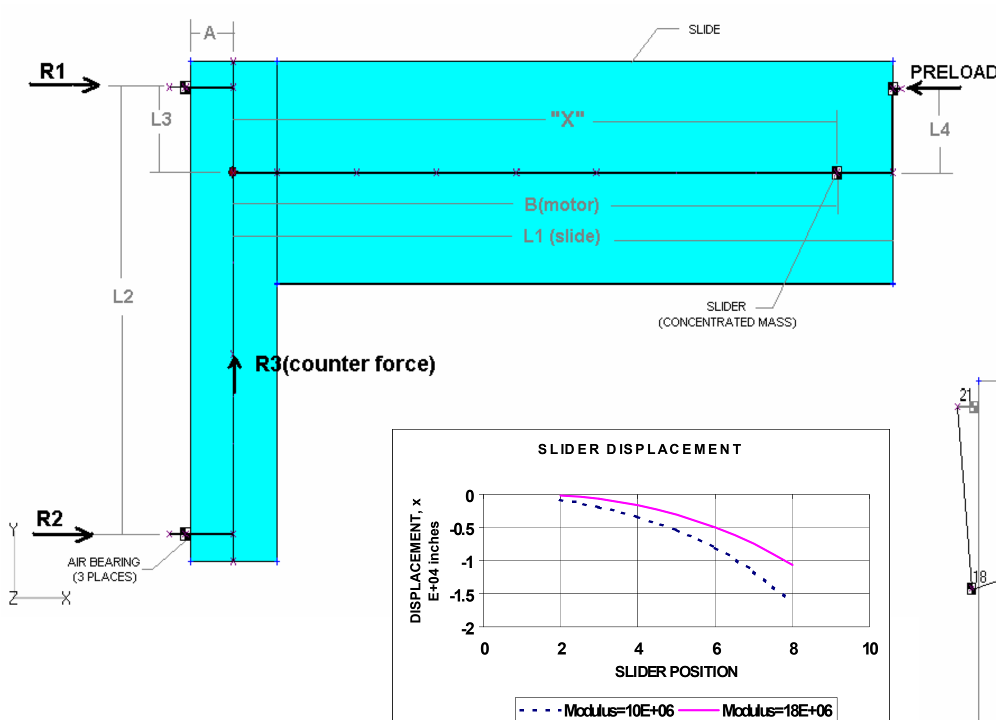



+ Narrow footprint
+ No X-Guide deflection due to X Slider traverse
+ Dual X-drive motors
+ Single Counterforce
+ Low Y mass

- Moving Counterforce
- Awkward cable drop

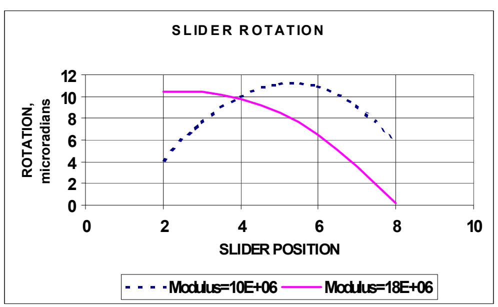
# Concept Review: Example

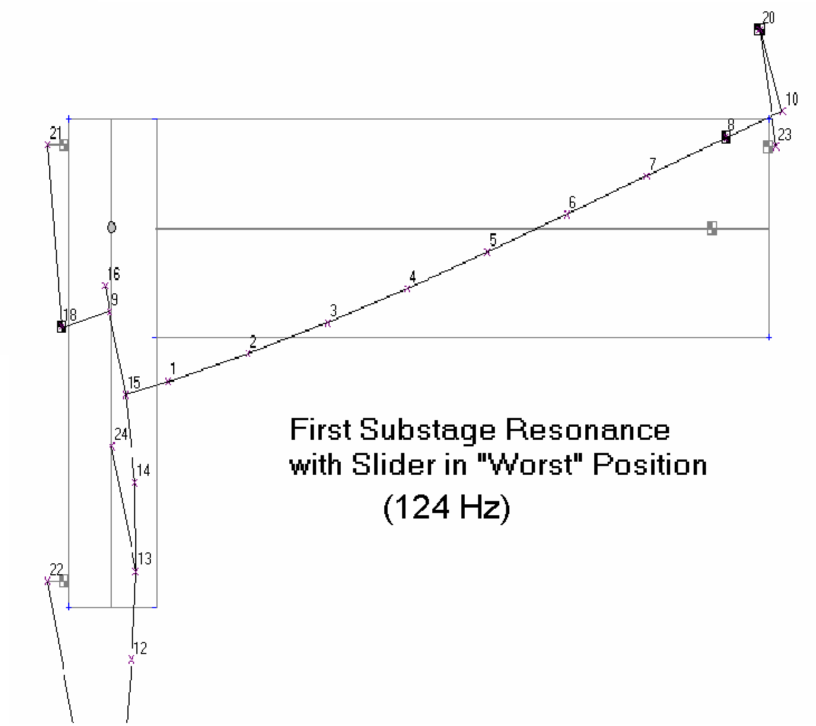
## Sample Structural Analysis




| X | R1 | R2 | R3 |
|---|---|---|---|
| inches | lbs | lbs | lbs |
| 5.70 | 128.16 | 71.84 | 73.90 |
| 28.00 | 72.41 | 127.59 | 73.90 |

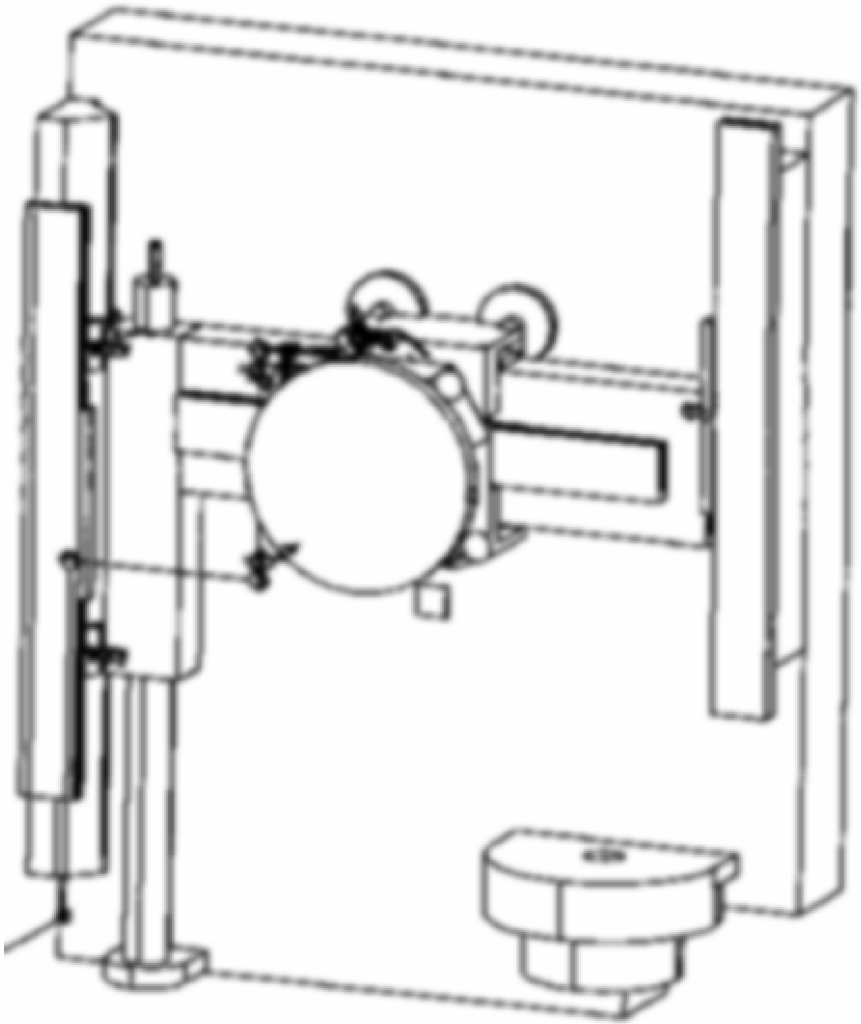
**TABLE II**
**BEARING FORCE REACTIONS**



# Concept Review: Example

## Selected Approach



## Major Features

- Dual Y-drive linear motors for proportional drive
- Single, stationary counterforce
- High stiffness and resonant frequency
- Lightweight moving stage
- Stiff, light chuck
- Access pivot