# Materials


Our standard planetary fixture has 4 planets 200 mm in diameter. Each planet "orbits" the sun gear using a non-integral gear ratio. Each time the planet passes through a given position within the orbit, it will be clocked differently. It takes 47 revolutions around the sun gear before it returns to its original position. The non-repeating nature of this rotation produces film thickness uniformities better than ±0.5%.

Planetary motion is controlled using a servo motor with a typical rotation speed of 0.3 rps. The motor and controller are fully integrated with the control software, which also monitors for excessive torque and other alarms.

We offer an optional through-hole feature which allows for Optical Monitor in-situ measurement and control. Each planet has the ability to hold and coat substrates up to 50 mm thick.

## ROBUST CONSTRUCTION

The drive shaft utilizes a high reliability ferro fluid solid shaft feedthrough. The gears are low carbon UHV stainless steel designed for low particle generation. In situ bearings on each planet are lubricated using industry standard PFPE (oxygen and heat resistant) grease. Two radiation shields protect the gears from heat and protect the optics from unwanted particles.

## SPECIFICATIONS

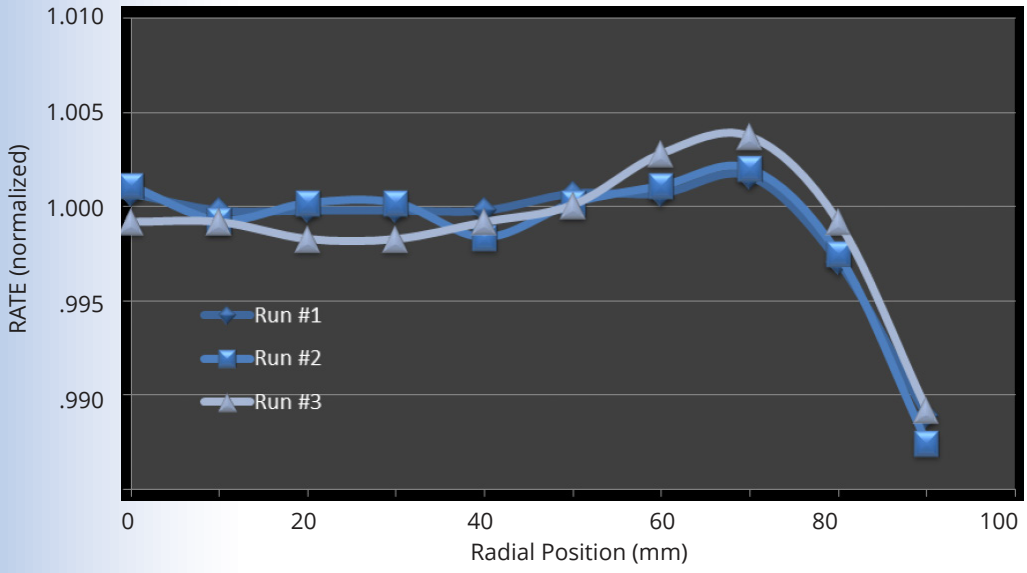
| | |
|---|---|
| Model | 38004A |
| Planets | 4 x ø200 mm |
| Rotation | 0.2 to 0.4 revolutions per second |
| Gearing | 151:47 |
| Water Cooling | None |
| Weight | 65 kg (140 lbs.) |

## MATERIAL DATA @ STANDARD PLANETARY DEPOSITION CONDITIONS

| TYPE | | BEAM | | PROPERTIES | |
|---|---|---|---|---|---|
| Target | Material | Voltage (V) | Current (mA) | Rate (Å/s) | index (@ 630nm) |
| Si | $SiO_2$ | 1250 | 600 | 1.86 | 1.46 |
| $SiO_2$ | $SiO_2$ | 1250 | 600 | 1.85 | 1.46 |
| Nb | $NbO_2$ | 1250 | 600 | 3.07 | 2.2 |
| Ta | $Ta_2O_5$ | 1250 | 600 | 2.0 | 2.13 |
| Ti | $TiO_2$ | 1250 | 600 | 1.65 | 2.8 |

### *Uniformity*

Nominal uniformity is ±0.5% for the materials out to an 80mm radius. Back-to-back coatings show differences in rate of ± 0.06 Å/s and uniformity of less than 0.2%. Planet-to-planet uniformities are less than 0.2%.




RUN TO RUN UNIFORMITY