

# Lawrence Berkeley National Laboratory

## Recent Work

### **Title**

Overview: Manual Plating Process

### **Permalink**

<https://escholarship.org/uc/item/9th427k1>

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## Plating Process:

- Pour glass beads onto bioassay plate.
- Pipette solution onto bioassay plate.
- Stack 4-5 plates together.
- Shake and rock the plates until the beads evenly spread the solution across the agarose gel on the plate.
- Remove the glass beads.

## Purpose of Plating:

- “Sub-clone sheared fragments” which means to grow millions of copies of bacterial colonies

## Plating Stats:

- 9”x9” bioassay plates
- Weight: 1.2lbs/plate (low profile) or 1.4lbs/plate (high profile)
- 40 plates per batch
- 4-5 plates per cycle
- 1-2 minute shake time per cycle
- Approx. 100 efforts/minute
- Total processing time 40 minutes

## Evolution of Shake’n Plate



BEFORE



CURRENT INTERVENTION



FUTURE  
Testing Automated System (in Progress)

- Manual process "plating" is a high risk task (Strain Index = 60.8).
- Solutions were initiated by production line operators' participation in the Ergonomics Working Group.
- These solutions eliminated sustained gripping of the sample plates, reduced the Strain Index to a 'safe' score of 2.3, and increased throughput by 25%.

## Problem

- Risk Factors:
  - High grip force when handling 5 plates/cycle
  - Wide (4") grip span (low profile)
  - Grip Force 30-41% of maximum voluntary contraction; Moore-Garg Strain Index = 40.5
- Musculoskeletal Problems:
  - Awkward hand and wrist postures to repeatedly tilt and rotate the plates for 40 min/batch
  - Reports of discomfort and fatigue in operators in upper extremities, shoulders, and back.
- Workstation Layout:
  - Conducted at a fume hood in a high traffic walkway
  - Does not accommodate a sitting workstation due to the lack of leg clearance.
- Process Efficiency:
  - 4 plates per cycle manually, limited by weight (8-10lbs) & awkward grip of plates

