Title
Overview: The Manual Peeling Process

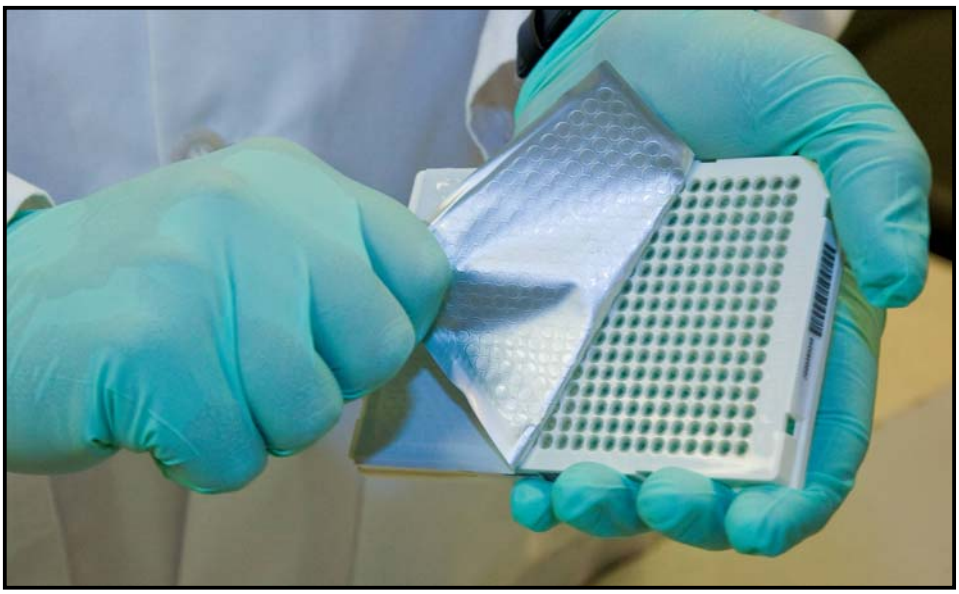
Authors
Roberts, Simon R.
West, Mark
Petermann, Karl
et al.

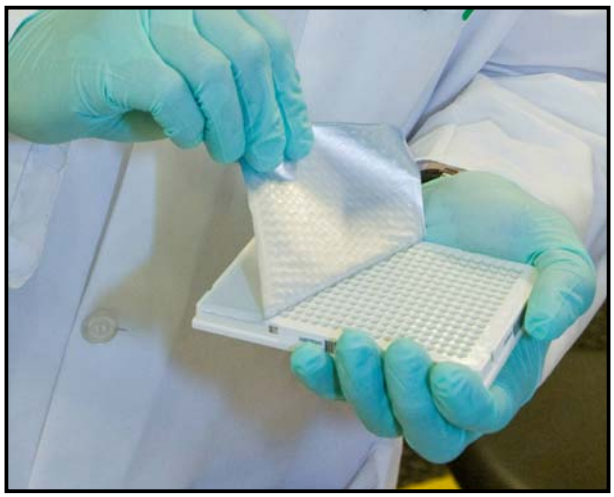
Publication Date
2008-03-10

OVERVIEW:
The Manual Peeling Process

Purpose of sealing & peeling plates:

- Plates are sealed to prevent evaporation of reagents.
- The process of "peeling" plates involves operators removing thermal foil seals from the top of sample plates.





Risk

- Force required is 21.75 lbs to remove seal with one hand.
- Strain Index of 29.3
- Grip plate with wide (3-4”) grip span.
- Awkward wrist postures.
- Fine pinch grips.
- Peeling done in 3 steps of the production line.
- Each step processes 120 – 320 plates per shift

LLNL-POST-401755

This work was performed under the auspices of the US Department of Energy's Office of Science, Biological and Environmental Research Program, and by the University of California, Lawrence Berkeley National Laboratory under contract No. DE-AC02-05CH11231, Lawrence Livermore National Laboratory under Contract No. DE-AC52-07NA27344, and Los Alamos National Laboratory under contract No. DE-AC02-06NA25396.

DESIGN PROCESS: An Evolution of Solutions

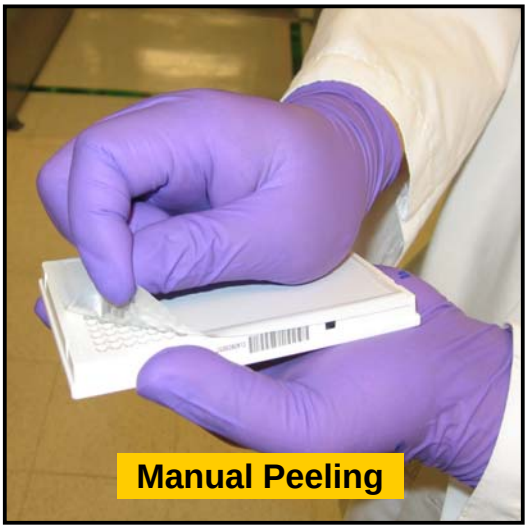
DOE JOINT GENOME INSTITUTE
US DEPARTMENT OF ENERGY
OFFICE OF SCIENCE

Simon Roberts, Mark West, Karl Petermann, Charles Reiter, Christine Naca, Megan Kennedy, Gerald Ilog, Martin Pollard, Michael Pintor, Laura Sandor, Kathryn Bowser, Ira Janowitz, Debra Rosett, Roy Kaltschmidt

• First the seal was lengthened, providing a tab to hold onto.

• Then a plate holder was made to allow both hands to pull the seal & equally distribute the pinch force.

• Pliers were modified to eliminate pinch grip.



Manual Peeling

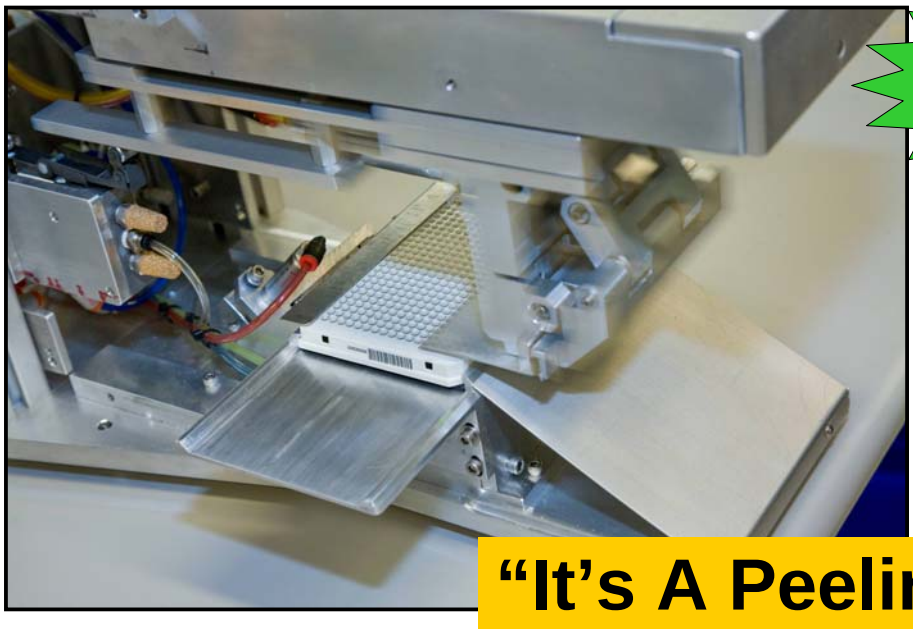
SI = 29.3 (peeling hand)

Two-handed peeling

SI = 9.0 (both hands)

Strain Index

Automated peeler eliminates high pinch forces.



It's A Peeling

SI= 3.4

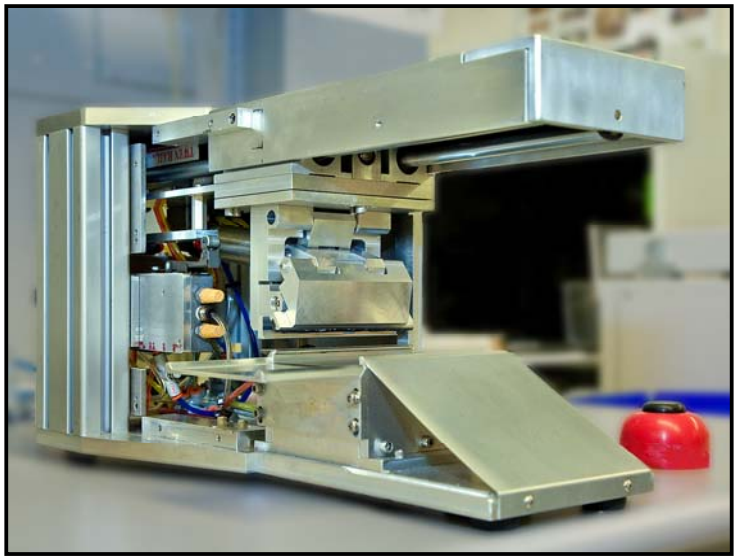
"It's A Peeling"

LLNL-POST-401755

This work was performed under the auspices of the US Department of Energy's Office of Science, Biological and Environmental Research Program, and by the University of California, Lawrence Berkeley National Laboratory under contract No. DE-AC02-05CH11231, Lawrence Livermore National Laboratory under Contract No. DE-AC52-07NA27344, and Los Alamos National Laboratory under contract No. DE-AC02-06NA25396.

FINAL PRODUCT BENEFITS:
It's A Peeling

Before



After

Safety	• Grip Force 104-109% of maximum voluntary contraction. • Strain Index = 29.3	• Pinch Force 0% of maximum voluntary contraction • Strain Index = 3.4 to load/unload the peeler
Quality		• Sample quality did not change.
Efficiency	• Process 50 plates in 20 minutes manually.	• Process 50 plates with peeler in same time.
Cost	• $548,000 for labor costs and injuries.	• $366,000 for labor costs with 50% reduction in injury costs.
Medical	• Common musculoskeletal complaints due to load on forearm and hands.	• Reduced the risk of injury in high risk area. • Reduced severity of any injuries.

LLNL-POST-401755

This work was performed under the auspices of the US Department of Energy's Office of Science, Biological and Environmental Research Program, and by the University of California, Lawrence Berkeley National Laboratory under contract No. DE-AC02-05CH11231, Lawrence Livermore National Laboratory under Contract No. DE-AC52-07NA27344, and Los Alamos National Laboratory under contract No. DE-AC02-06NA25396.