US Industrialization Status

Jim Kerby, Fermilab

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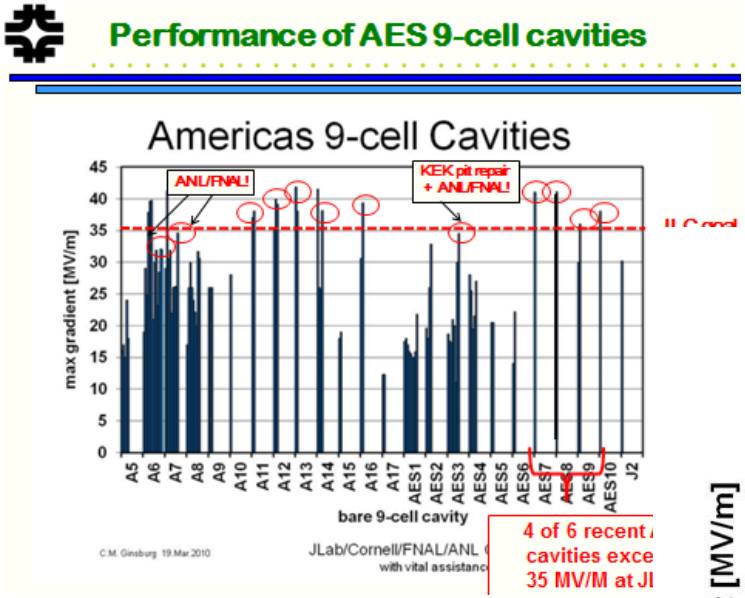
Note…

- This talk is incremental in that I am trying not to repeat content already given by others at the meeting.
- The US Industrialization cavity progress over the past few years is impressively represented in the progress talks given yesterday from Cornell, JLab, and Fermilab, and in the Plenary Session.
- The US industrialization cryomodule progress is less tangible from the talks here at ALCPG11, but follows the CM1 presentations being given today and tomorrow. We hope to have more in future meetings!
- Many thanks to my collaborators for their continued contributions, efforts, and of course the slides I've stolen.

US Industrialization Goals

- Develop multiple US vendors with capability to fabricate cavities for ILC, Project X, …
  - Encourage competition
  - Increase capacity and availability
  - Early involvement for industrial process development
  - Better utilize respective strengths of industries and laboratories
    - Risks assumed by the best suited organization
- Fabricate, build and test completed cryomodules
  - CM1 (DESY kit) currently under test
  - Parts for CM2-6 in various stages of procurement / acceptance
- Majority of recent support through Generic SRF and ARRA funds
  - Challenge to maintain capabilities while project timing is sorted out

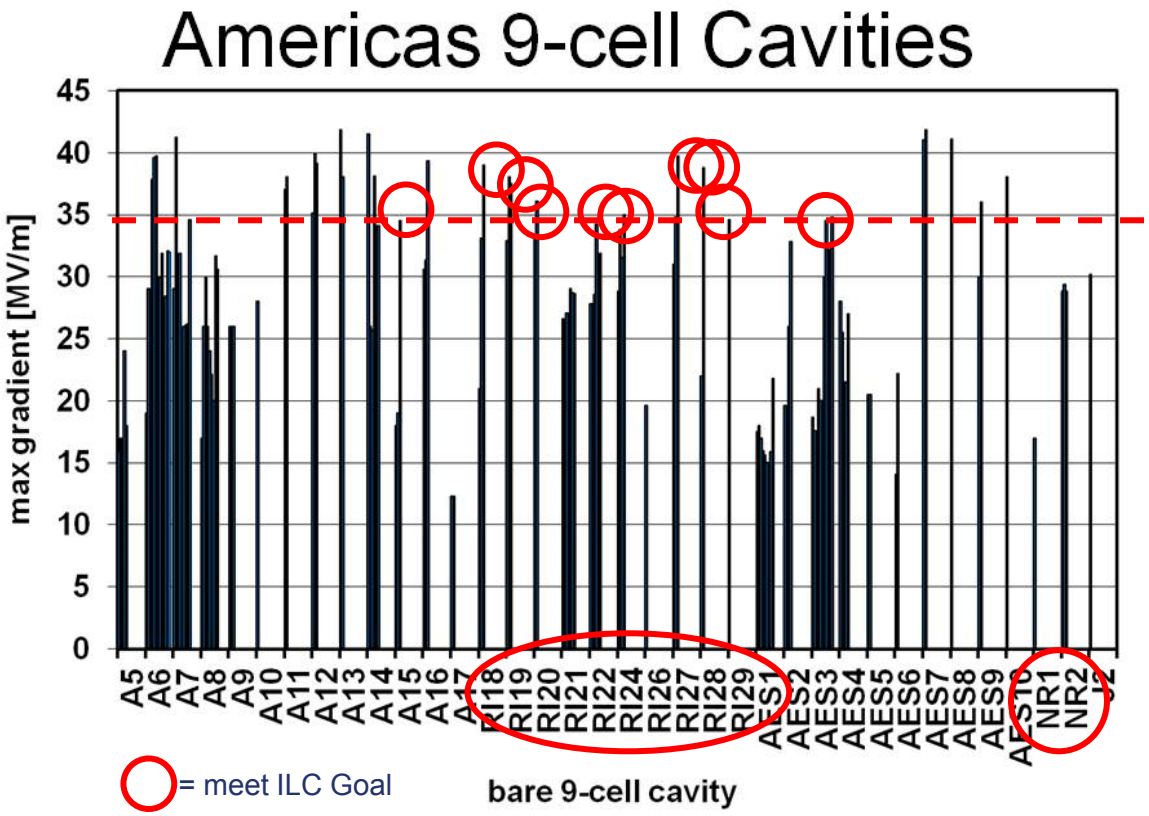
2010→2011



B. Kephart, LCWS 2010

2010-2011:

- JLab + FNAL/ANL processing of RI cavities
- Niowave Roark cavities
- Additional and more repeatable repair techniques



2011-2012

- Vendor qualification and cavity process development continue at a high rate
  - New, in-house and ready for processing: Two RI; four AES, four Niowave-Roark
  - ARRA purchases of 40 cavities from AES, Niowave Roark and PAVAC due later 2011 and 2012.

→Decide on proper balance between production and new process development

- CM1 Testing (current)
- CM2, 3 assembly
  - Completion of HTS testing

Standard Fabrication / Process

- AES, Niowave Roark, Pavac
  - Recently—light BCP by AES, NR (also bulk EP by RI)
  - AES EP facility thru ARRA

- JLab, FNAL/ANL, Cornell
  - Most processing and test still at labs
  - Incremental process improvements
  - Improved diagnostics through efforts of all ILC collaborators

	Standard Cavity Recipe
Fabrication	Nb-sheet (Fine Grain)
	Component preparation
	Cavity assembly w/ EBW
Process	BCP + 1st (Bulk) Electro-polishing (>120um)
	Ultrasonic degreasing with detergent, or ethanol rinse
	High-pressure pure-water rinsing
	Hydrogen degassing at > 600 C
	Field flatness tuning
	2nd Electro-polishing (~20um)
	Ultrasonic degreasing or ethanol rinse
	High-pressure pure-water rinsing
	Antenna Assembly
	Baking at 120 C
Vertical Test	Performance Test with temperature and mode measurement →inspection, reprocessing, other remediation

Industry

Inspection & remediation

Current Tumbling Process

First iterations!..will track as process is more developed in preparation for 2012 report—tumbling goal greater than current status

- Currently replaces only Bulk-EP step
  - May be technically more repeatable
  - Reduced chemical footprint for whole process
  - Potentially more defined handoff from industry to lab

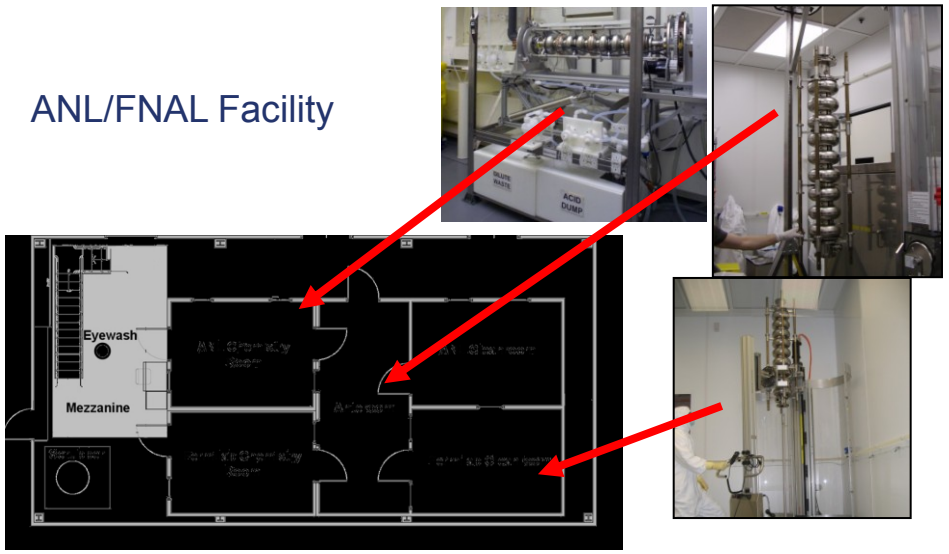
Note: other ARRA eco-friendly surface processing design studies underway

	Standard Cavity Recipe
Fabrication	Nb-sheet (Fine Grain)
	Component preparation
	Cavity assembly w/ EBW
Process	TUMBLING
	Ultrasonic degreasing with detergent, or ethanol rinse
	High-pressure pure-water rinsing
	Hydrogen degassing at > 600 C
	Field flatness tuning
	2nd Electro-polishing (10-40um)
	Ultrasonic degreasing or ethanol rinse
	High-pressure pure-water rinsing
	Antenna Assembly
	Baking at 120 C
Vertical Test	Performance Test with temperature and mode measurement →inspection, reprocessing, other remediation

Tumbling v. EP

- Current tumbling process for a single cavity:
  - each media step takes 3 m-hours for changeover
  - total duration ~1 week
- EP currently 14 m-hours/cavity over 2 days
- In addition to direct cost comparison tumbling may prove to be
  - More Scalable
  - More Measureable
  - Less Infrastructure
  - Less EP required

ANL/FNAL Facility



Summary

The US Industrialization effort supports SRF development for the ILC and other projects

- FNAL/ANL processing joins JLab as ‘production capable’
- AES cavities demonstrate good performance; Niowave-Roark and PAVAC first articles in the system
- ARRA funds provide 40 additional US vendor cavities for 2011-2012
- Incremental process development continuing, using improved test, diagnostic, and repair capabilities

We continue to work on alternative techniques, that have potential benefits in

- Economics
- Increased industrial participation
- Infrastructure requirements
- Environmental impact

US Industry have been and expect to be active participants in industrialization studies through documented studies and participation In our workshops