Summary of the SCRF Cavity Technology and Industrialization Workshop

23 May 2010, held as a satellite meeting to IPAC 2010

http://ilcagenda.linearcollider.org/conferenceDisplay.py?confId=4530

The purpose of the workshop was to bring together Laboratory and Industry leaders to better understand the current state of SCRF cavity technology, the scope of the ILC cavity production, and the definition of the interface between laboratory and industry during production. Though the discussion largely centered on SCRF cavities, there were talks on cryomodules and other components, and the input and lessons will apply to much of the main linac components.

For cavity production, it was presented that a reasonable split would be 6 manufacturers, two in each of the three regions, each producing ~3000 cavities over the course of 5 years. Even with this split, each manufacturer is producing at a rate of ~5-6 times more cavities per year than the current world maximum expected in the upcoming 5 years. This level of production, though appearing large to our current vendors and the ILC community, is actually only mid-level to modern large scale production (cars, electronics…), and will be best served by flexible workshops and flexible cells of manual work.

However, the level of production is well beyond what industry sees as a sustainable level for business…meaning that the ILC will be treated as a 'project', not a 'business', such that plant costs associated with scale up and tear down will have to be born by the ILC.

The laboratory / industry interface was the subject of considerable discussion, both at a detail level as it relates to cavity and cryomodule production plans, but also in a more general sense as it pertained to other recent large science projects such as ITER, the XFEL, or the LHC.

Throughout all the discussions it was emphasized that involving industry as early in the process as possible was good, even in the development phase, however where industry excels in delivering the best value is when it can quantify the risk. Industry can add value particularly in areas of cost reduction, alternative methods, shortening production times, and technical performance when involved early. However, to do so the item and process should be relatively well understood. In places where research is ongoing, or the risk can not be well quantified, the laboratory should bear the burden of the effort. This is not to say that the boundary is fixed; on the contrary, as research progresses, it may be more and more possible for industry to assume the role—an example of this in cavity production is the current effort to move EP to industrial locations in Europe and now in the USA.

The CERN model of an integrated supply chain, where CERN in fact assumed the overall responsibility, but then contracted to industry either with build to print or build to specification contracts. A major portion of this is CERN's EDMS system, which maintains an electronic record of all specifications (examples of each type are readily available). As industrial contracts were developed, CERN evaluated the contract and the

risk, and then tailored the relationship to get the best value from industry within CERN procurement rules.

An interesting revelation was the amount of information sharing that occurred between the LHC dipole vendors during production. All vendors found it in their interest to share information, but this only occurred after the build to print contracts were let and production had started. Important boundary conditions for such information transfer include the build to print contract, and that the industries do not see a follow on business where a competitive edge would matter.

There were several production models that have been developed, estimating the size and number of components in production facilities for cavities and cryomodules that had been developed in all three regions. It was agreed that cross checking such models would be beneficial, and further the cross checking the models with XFEL production experience will be extremely valuable in making better projections of the ILC needs.

Finally, it is left to ILC management to review the existing RDR VALUE estimate with the information gained at this workshop to review both what production model is included in the VALUE estimate, and the R&D plan to see if the current ILC-industry relationship is the best possible under the time and economic constraints imposed on the TDP-2 phase but leading to a production ready stage for the ILC.