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MIT Cross Cutting Technologies Workshop Modular Construction Considerations

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Purposes

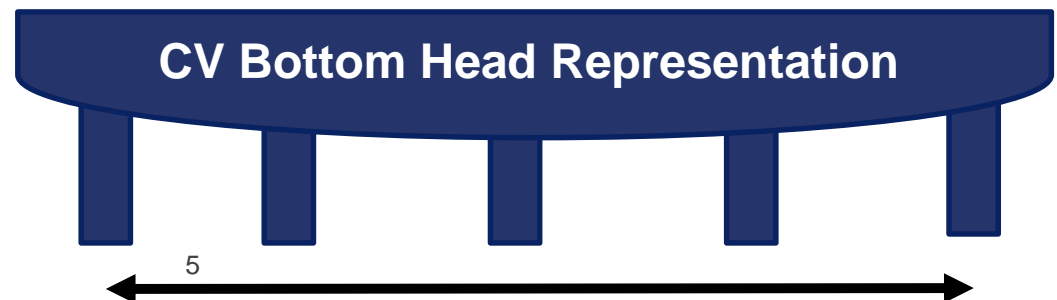
- Shorten the overall project schedule of “in hole” work by doing work elsewhere (on-site or off-site)
 - Address labor challenges (high cost or low local availability)
 - Take advantage of repeatability of fabrication
 - Provide for localization of fabrication
 - Simplify logistics with several large deliveries versus many hundreds of deliveries or items handled
- Trade cost for schedule reduction since overall schedule establishes the project’s burn rate & informs the Commercial Operation Date (COD)

Implementation Issues

- Off Site fabrication facilities must be validated to ASME NQA-1 – takes time, training and attention
- Modules must withstand movement (on site transport/lift or off site transport/lift), temporary internal bracing for shipment, dedicated lifting points all backed by analyses
- Dimensional stability due to thin wall materials can be a challenge
- Fabrication personnel must have similar nuclear working environment as a new construction site (i.e. Safety Conscious Work Environment, Corrective Action Programs, and so forth)

Transport / Lift Issues

- Lift limitations of largest module plus lifting gear – drives crane selection and crane placement as well as heavy haul path design bases – heavy lift cranes require three year lead time for ordering + six months of on site assembly and massive counter weights
- Module weight limits may preclude a fully finished module
- Module fit out may be limited to overall weight on the main crane hook
- Roadways for largest modules can approach 140 foot width: example allowances for support (e.g. CV bottom head for AP1000)



Commercial Challenges

- Getting fabricator qualified through global supply chain policies and procedures – investment by both parties up front
- Multiple fabricators likely needed to address delivery and other risks – commercial commitments needed early
- Who is buying the piece parts that go in a module?
 - Do you want your fabricator buying commodity valves?
 - Project spend is accelerated to some extent.
- What is liability of fabricator to overall schedule?
- Who is holding the risk?
 - Example - Schedule overrun liability for fabricator not likely to envelop the risk that the EPC contractor has which means EPC contractor is holding more risk with an outsourced module approach

Assessing the Trade Offs Using a Project Cost / Risk Profile

Framework for Comparison of On Site versus Off Site Module Assembly

		On-Site Assembly	Cost Differences to Go From On-Site to Off-Site	Off-Site Assembly
Design Features	Parameter			
	Assembly Structures Needed			
	Laydown Areas Needed			
	Site Bldgs Needed			
Bridge Design Basis	Max Weight			
	Max Width			
Heavy Haul Road (MOLF to Site Ele)	Max Weight			
	Max Width			
Man Power for Assembly	Number of Craft and Associated Field Non Manual			
Project Risk Profile Changes	Transport			
	Weather			
	Labour			
	Productivity			
	Rail line impact			
	Quality			



Summary of Risk Profile & Cost Changes for Considering the Off-Site Option			
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QUESTIONS