Advanced Reactor Design

eVinci™ Microreactor

Heat Pipe Technology

Background
Westinghouse has been and continues to be one of the technical experts in nuclear and largest supplier of Generation III+ plants. Westinghouse is best positioned to realize the benefits and complexities associated with nuclear technology and those needed for advanced reactor design to move from a conceptual design, licensed, plant startup and commissioning and continued plant operation.

Description
As Westinghouse continues the development of micro-reactors based on heat pipe technology, the advancements being made continue to reinforce how versatile heat pipe-based reactor technology is when compared to competing ideas for mobile nuclear power. Heat pipe technology has been applied for the past 50-60 years with millions of operating hours in aerospace and other industries in high temperature applications, which rely on the passive and simplified component design for nuclear application development.

Benefits
Micro Reactor designs present opportunities to innovate and provide passive safety features, such as heat pipes, which are a fundamental step in advanced reactor designs that include the following:
- Simplified and reliable design without challenging reactor safety
- Eliminates significant failure modes associated with rotating or active high-pressure parts
- Enabling environmental siting flexibility on secondary side cooling enables high degree of mobility.

The benefits of heat pipe reactor designs include the following:
- Passive component (no active components)
- No single point vulnerability or failure associated with a loss of coolant
- Eliminates flow induced corrosion and vibration in nuclear reactor designs
- Low pressure application
- Realistic life testing on single prototypes
- Modular assembly allows for high-quality testing well before installation to the nuclear reactor design
- Component interface to multiple heat sinks provides reliability and flexibility in secondary side design and logistics objectives

Westinghouse continues to apply advanced manufacturing and material testing into the micro reactor design, single component and integrated system testing. Westinghouse’s high-quality controlled manufacturing processes, including fabricating in inert environments, strict cleaning and inspection processes throughout assembly, developing weld techniques for high temperature metals, and is leading material sourcing to promote success for a scalable technology based on proven science and demonstrated components. Westinghouse’s heat pipe technology has set performance records during long-term testing.

Heat Pipe Internal Model View & Operation

Westinghouse has developed and continues to advance the heat pipe into a nuclear reactor design through design and analysis tools. Westinghouse has also developed proprietary manufacturing processes for high performance heat pipes based on strict quality-controlled techniques, procedures, and tooling.