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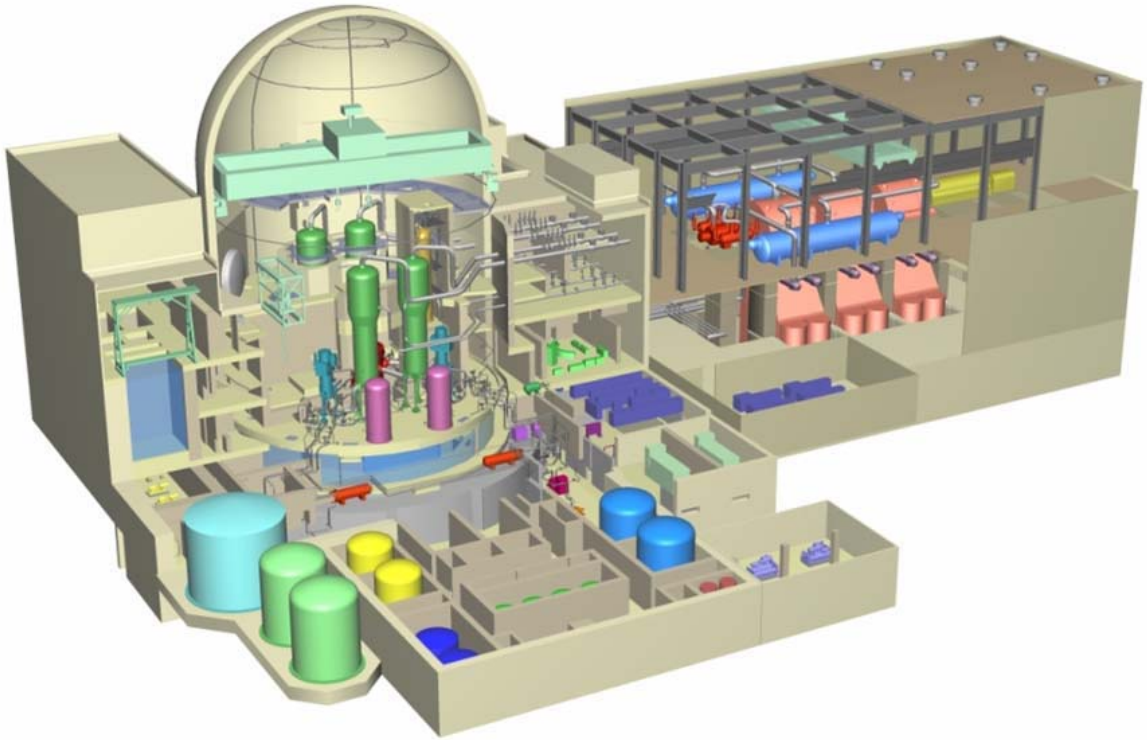
US-APWR

Steam Turbine Overview



June 29, 2007

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2. Feature and Design Technology
3. Verification of Mitsubishi Design
4. Conclusion

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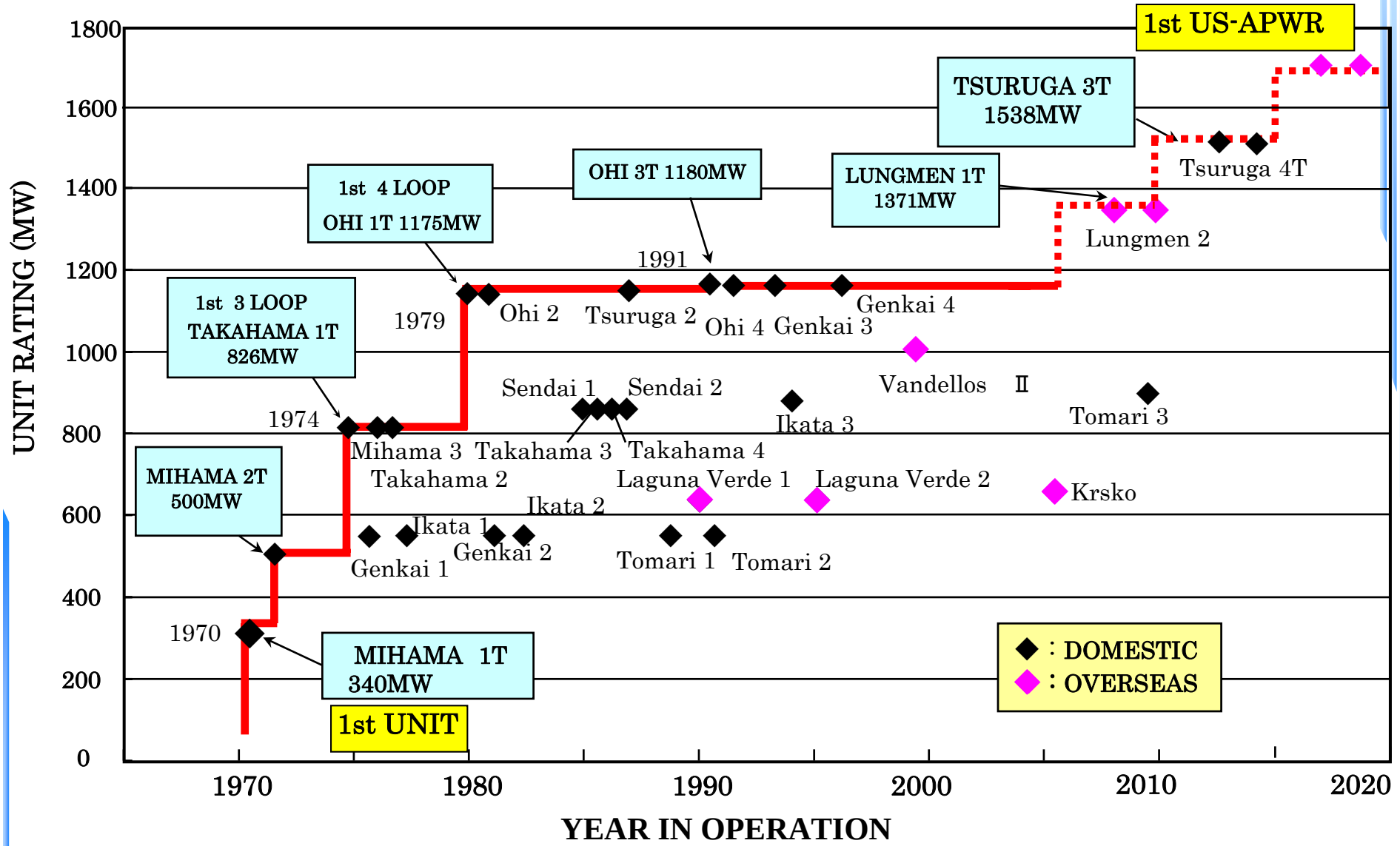
1. Introduction to Mitsubishi Turbine

History of Mitsubishi Nuclear Turbine



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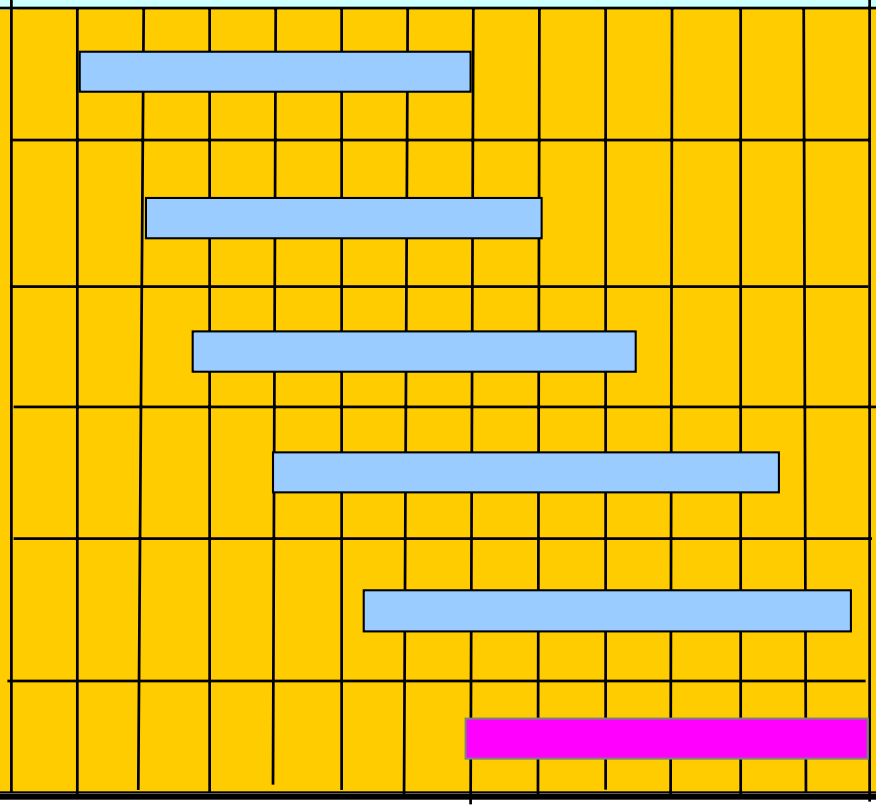
Turbine Type and Rated Output

Type	Last Stage Blades (inch)	Speed (rpm)	Rated output (MWe)	Arrangement	Number of Casing
TC4F	46	1800		G	3
	54				
	74				
TC6F	46			G	4
	54				
	74				



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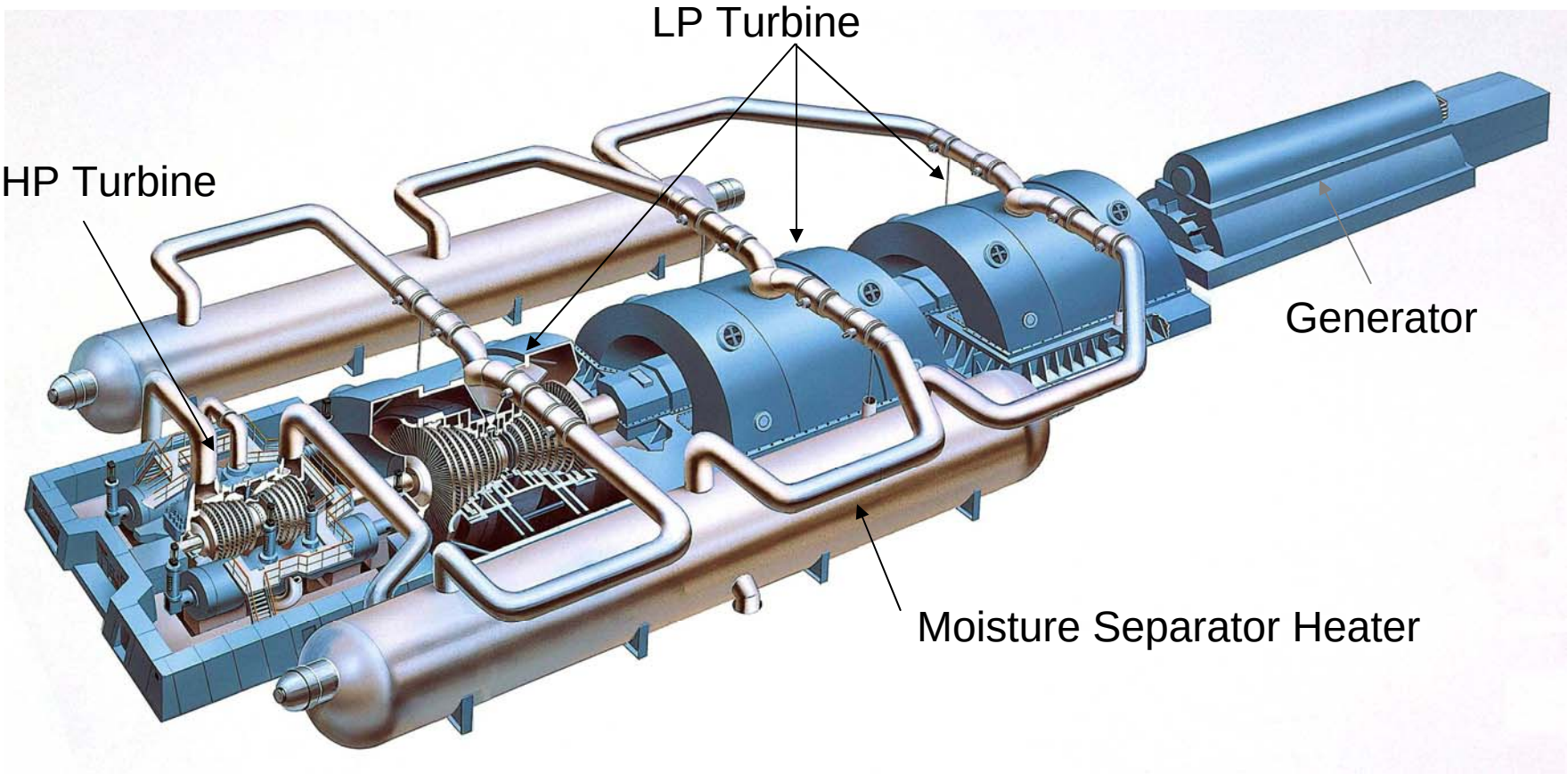
Turbine Outline(TC6F)

HIGHER EFFICIENCY

- TWO STAGE REHEAT MSR
- HIGH EFFICIENCY REACTION BLADES

HIGHER RELIABILITY

- INTEGRAL SHROUD LP END BLADE - ISB
- MONOBLOCK LP ROTOR



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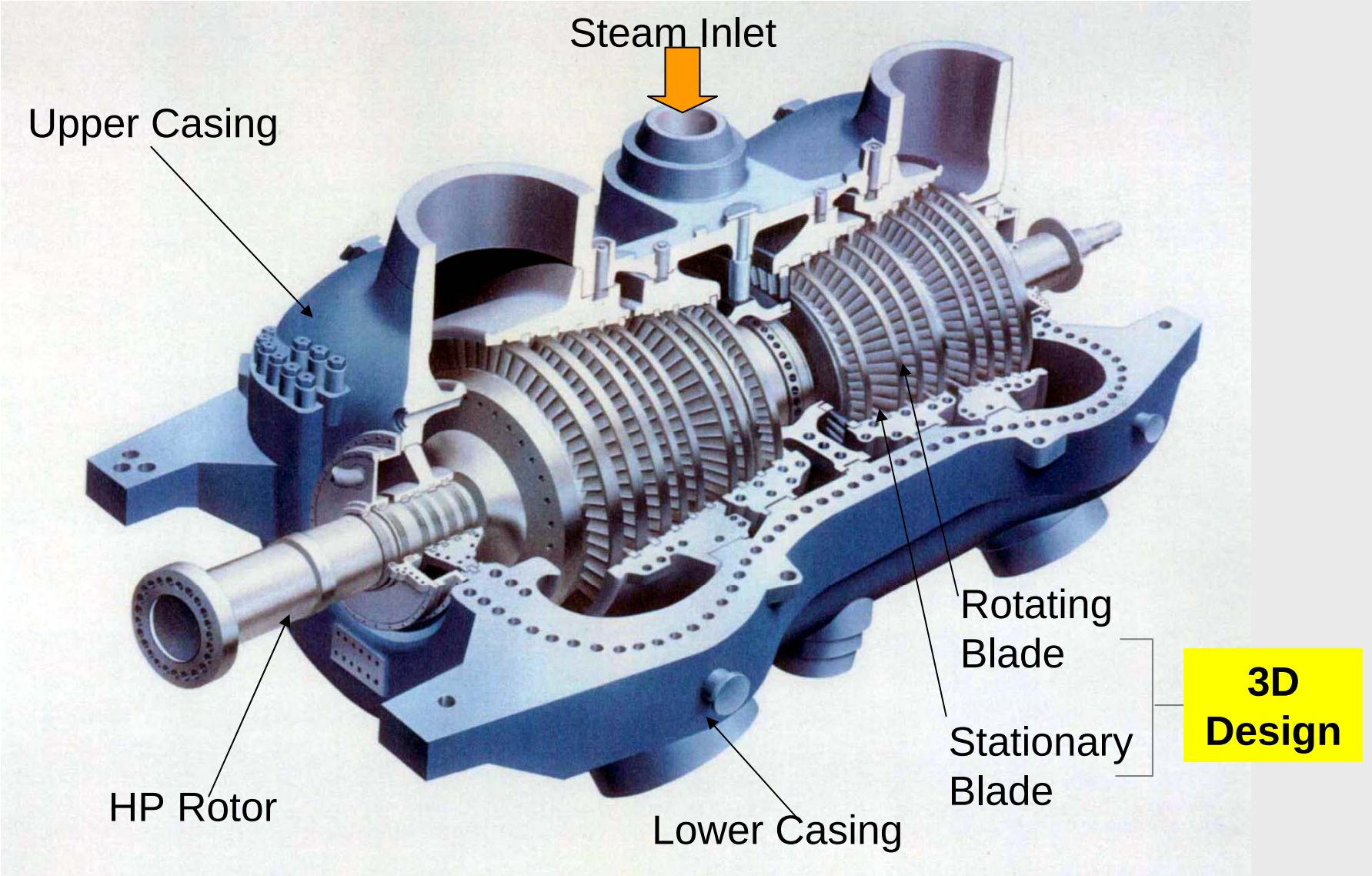
HP Turbine



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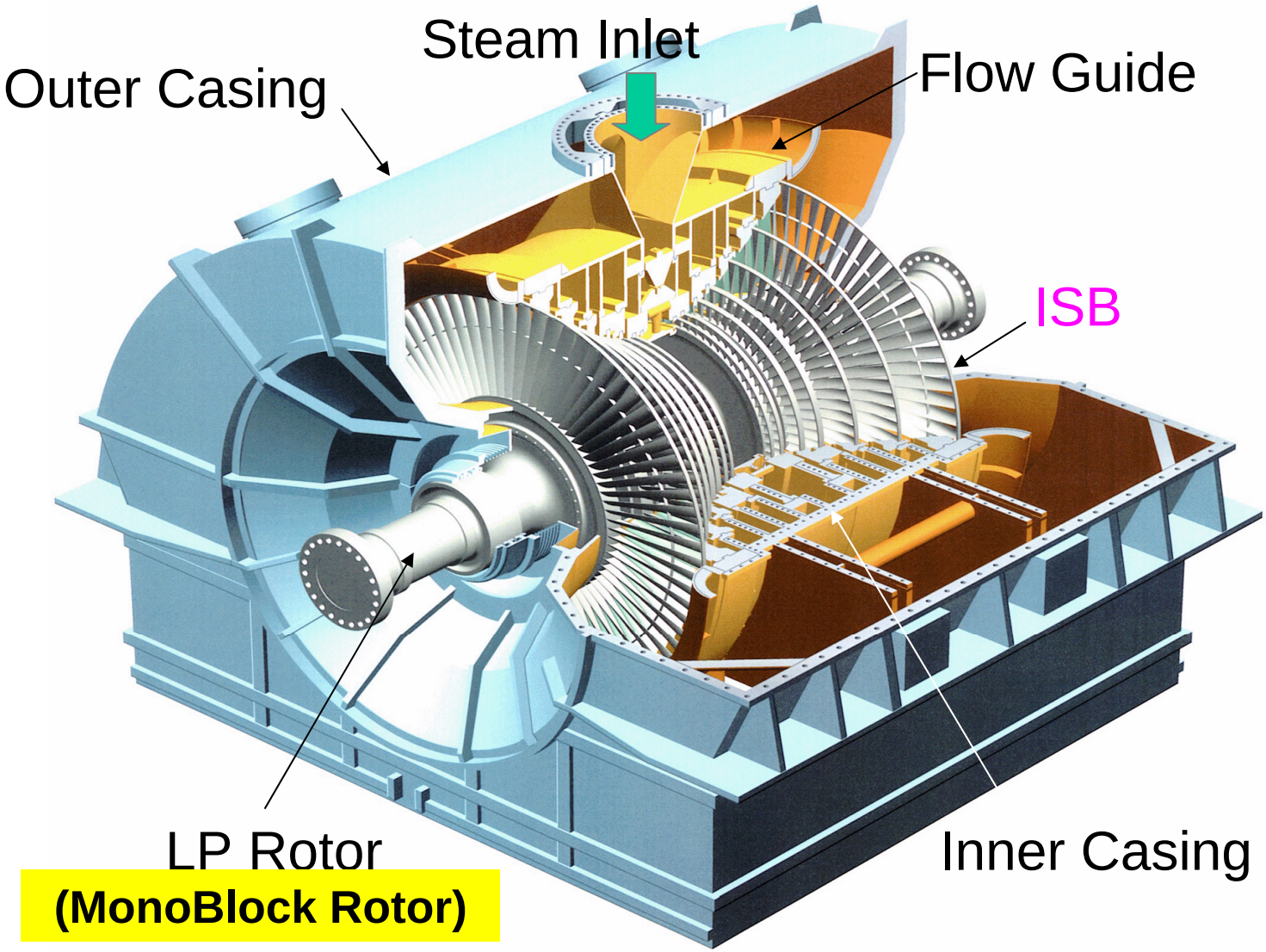
LP Turbine



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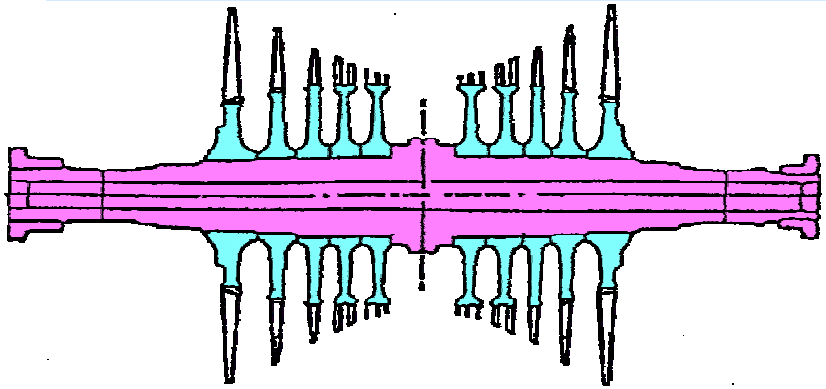
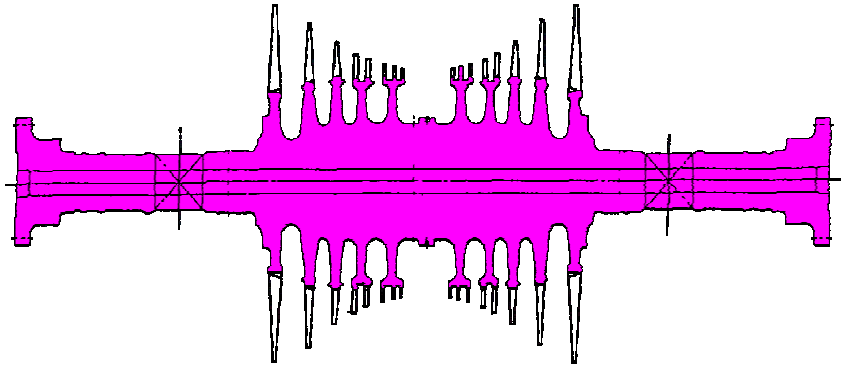
2.Feature and Design Technology

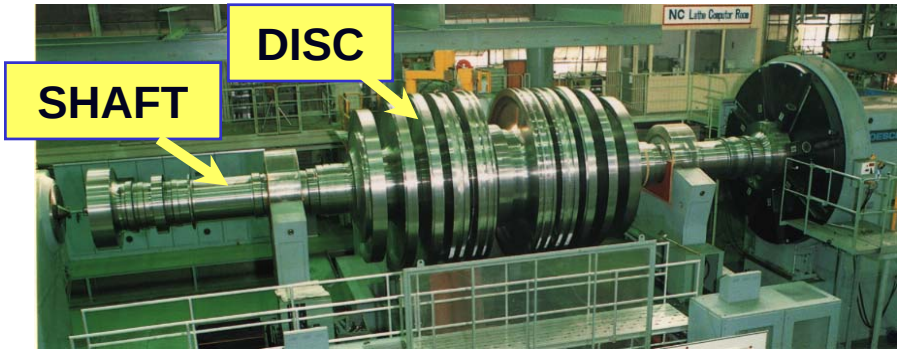
Monoblock Rotor Design



Shrunk on Rotor
(Original Design)



Monoblock Rotor



- **No Shrunk on surface and no key way**
- **Centrifugal Stress Reduction**
- **Disc Materials with Lower Yield Strength**

→

- ✦ **Reliability Improvement in a highly Corrosive Environment**
- ✦ **Longevity because of the SCC Free Design**

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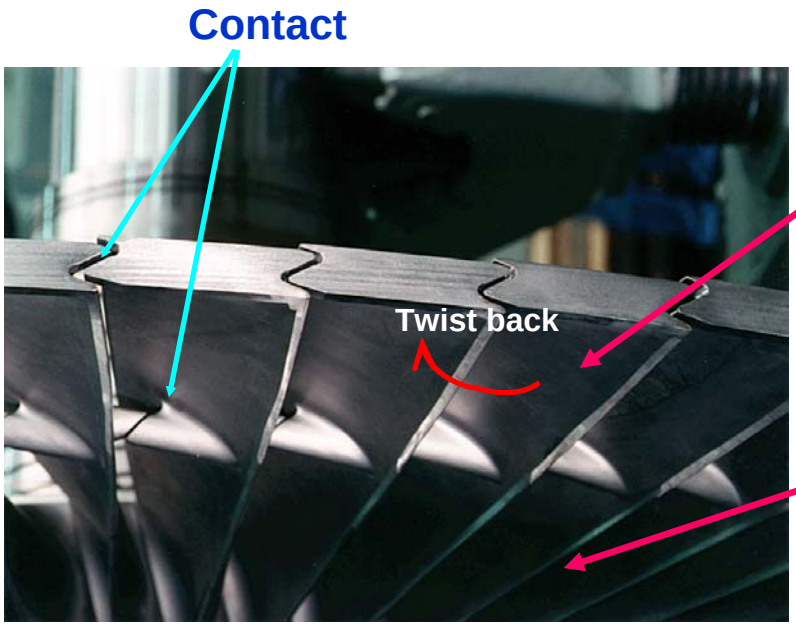
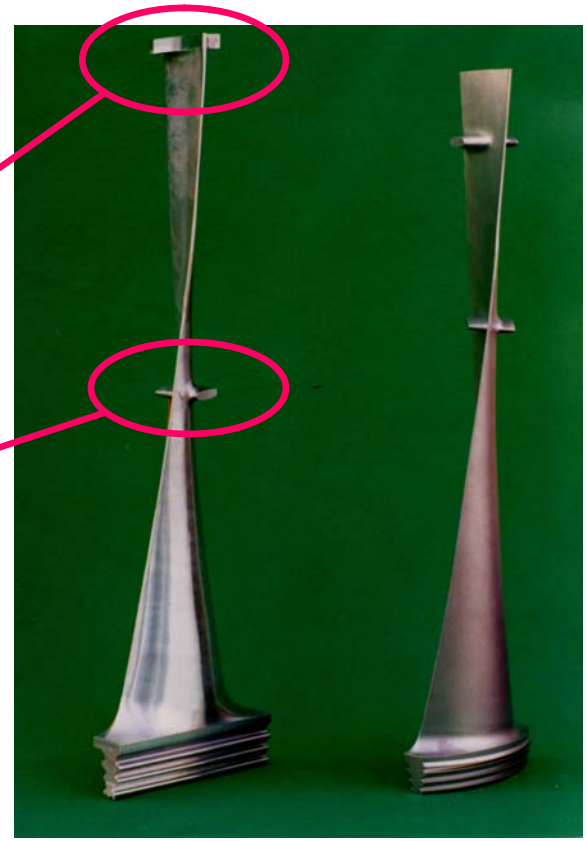
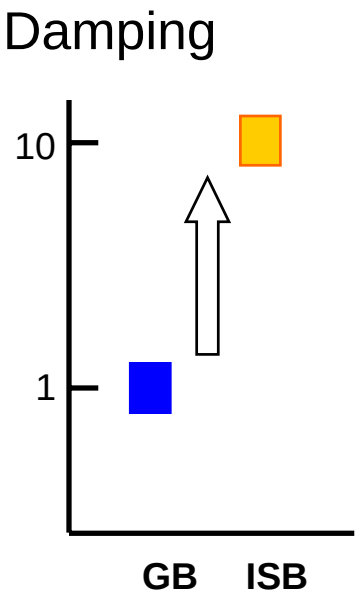
ADVANTAGES OF ISB LP END BLADES





ISB

Conventional Grouped Blade



Larger damping is generated by the contact at the shrouds and snubbers, which is caused by the twist-back deformation due to centrifugal force

Reduction in Vibration Stress

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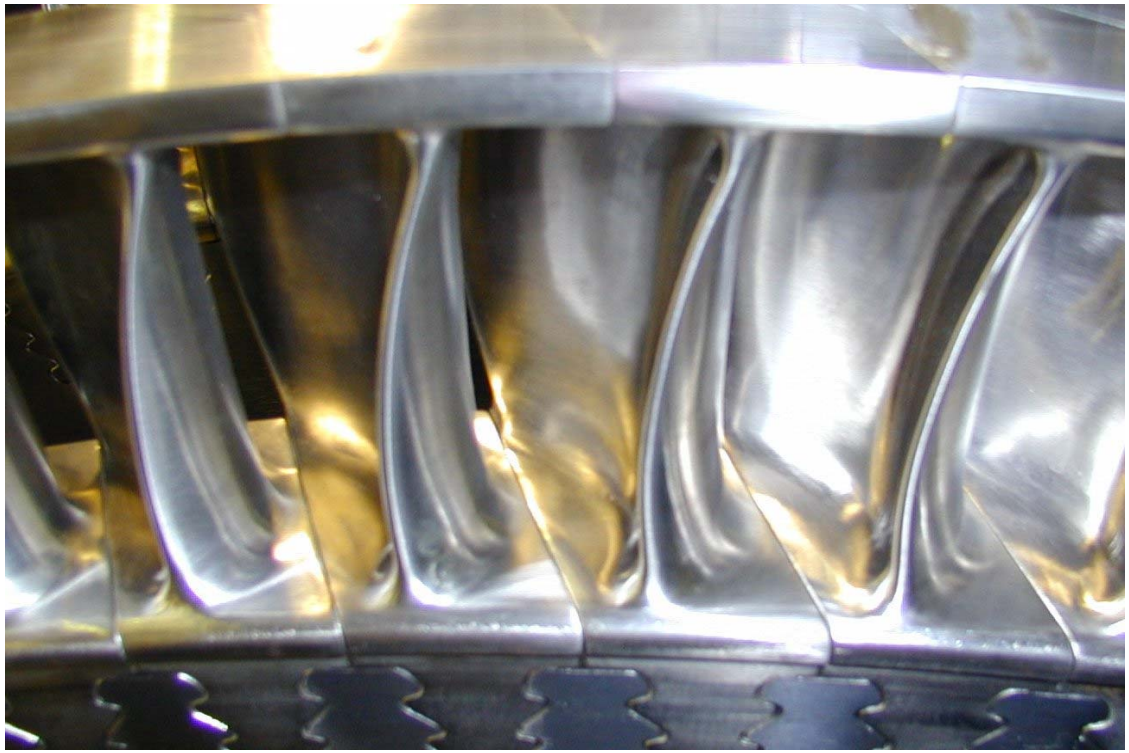
3-Dimensional Flow Design Blade

Stationary blade



Rotating Blade

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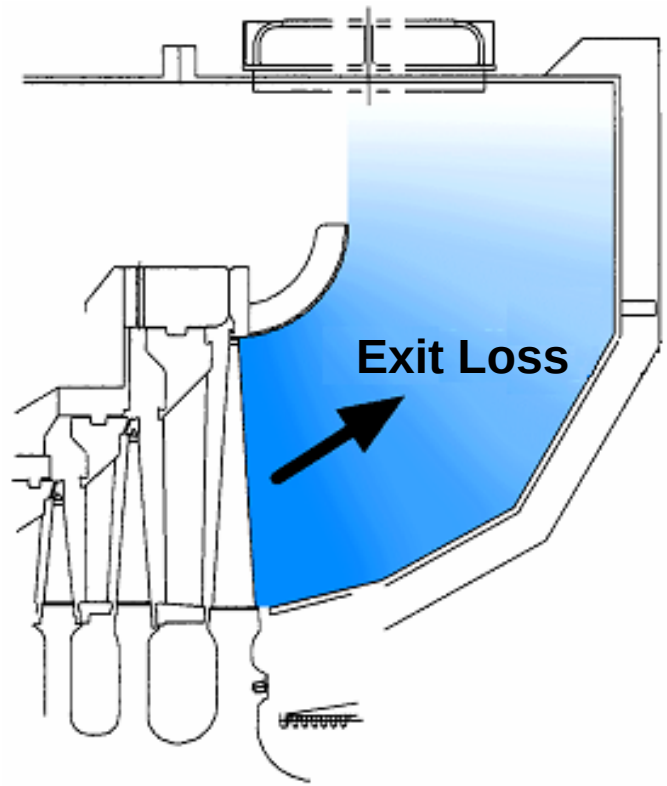
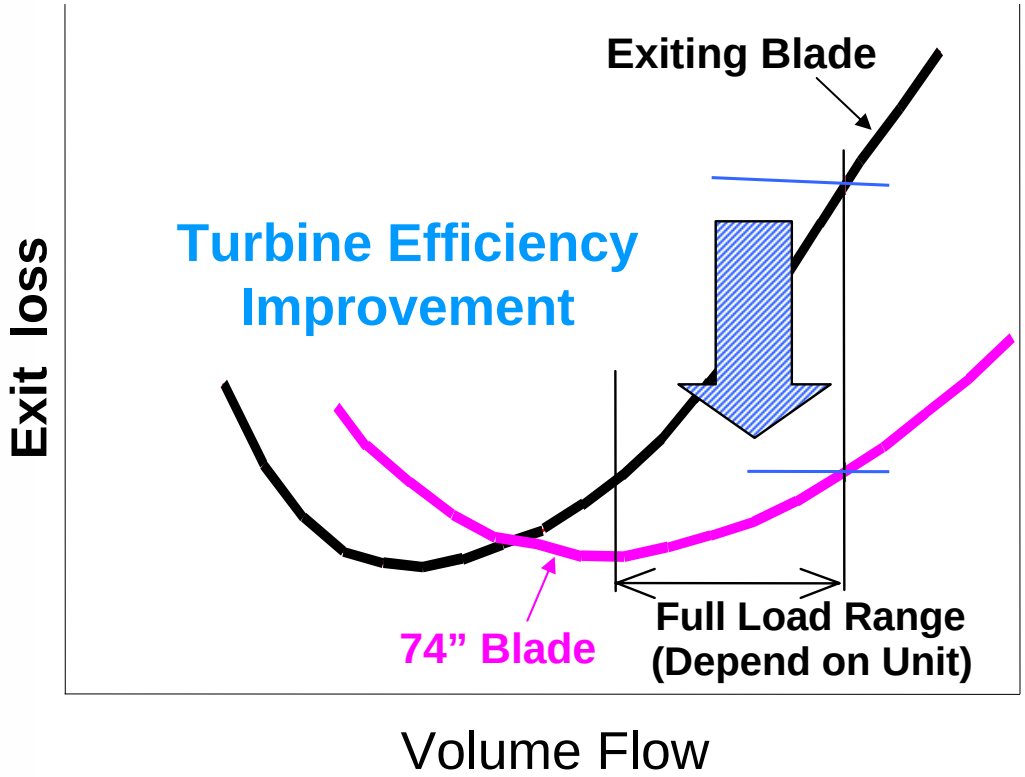
Longer Last Blade Application

- **Longer blade application significantly reduces Exit Losses**





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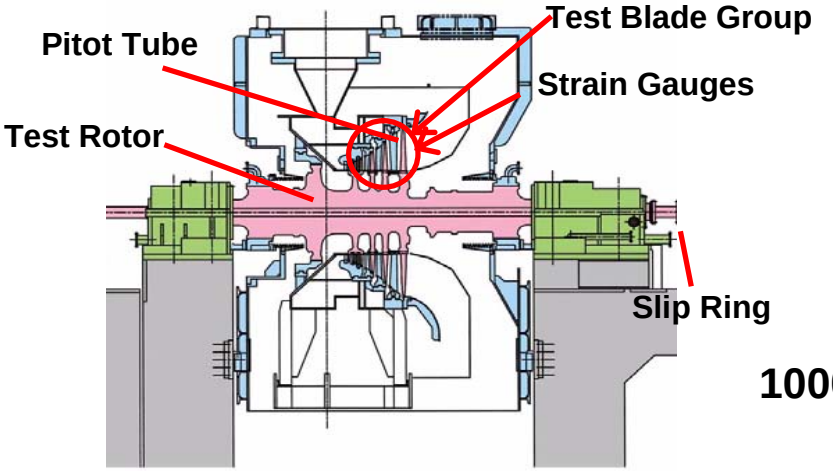
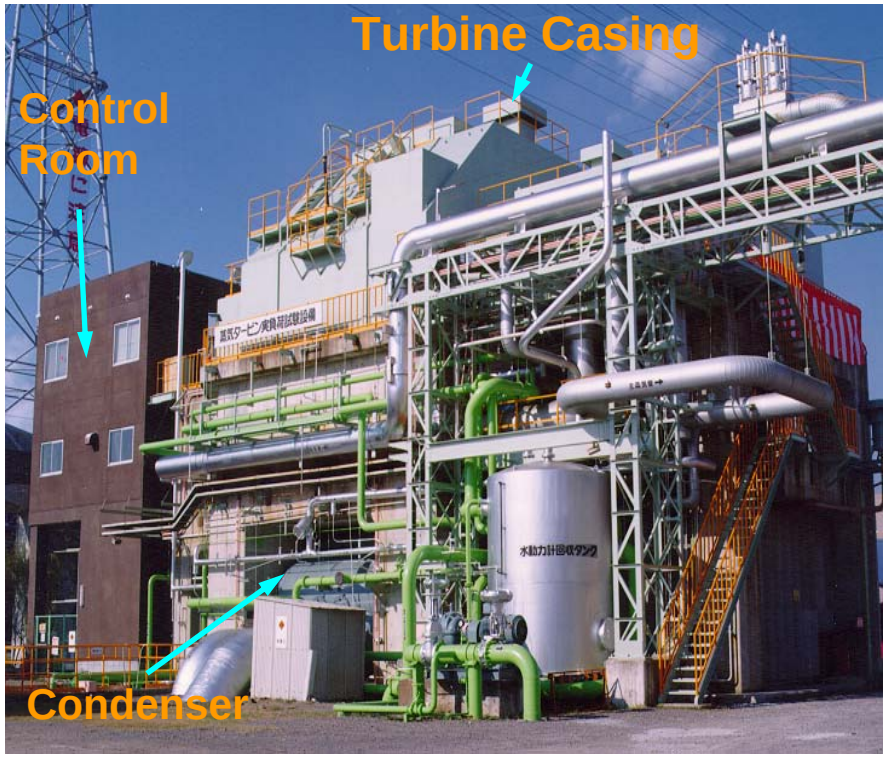
3. Verification of Mitsubishi Design

Mitsubishi Steam Turbine Test Facility

- **World largest class test facility verifies reliability and efficiency to prevent field trouble, through extensive test under prospective and severer operating conditions**
- **New Blade will be verified under various conditions on this facility**

Test Rotor





1000 x 10^3 lb/h steam can be supplied to test facility

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New 74” Last Blade Development Program

Items		2006	2007	2008	2009	2010	2011
①	Project Mile Stone		DC Appl. (12/15/07)		DC Appl. to NRC (12/30/08)		
②	Licensing			DC Review Process		FDA / FSER	DC Approval / COLA Approval
					COLA Review Process		
③	Design						
④	Manufacture Test Rotor Equipments						
⑤	Steam Loading Test						

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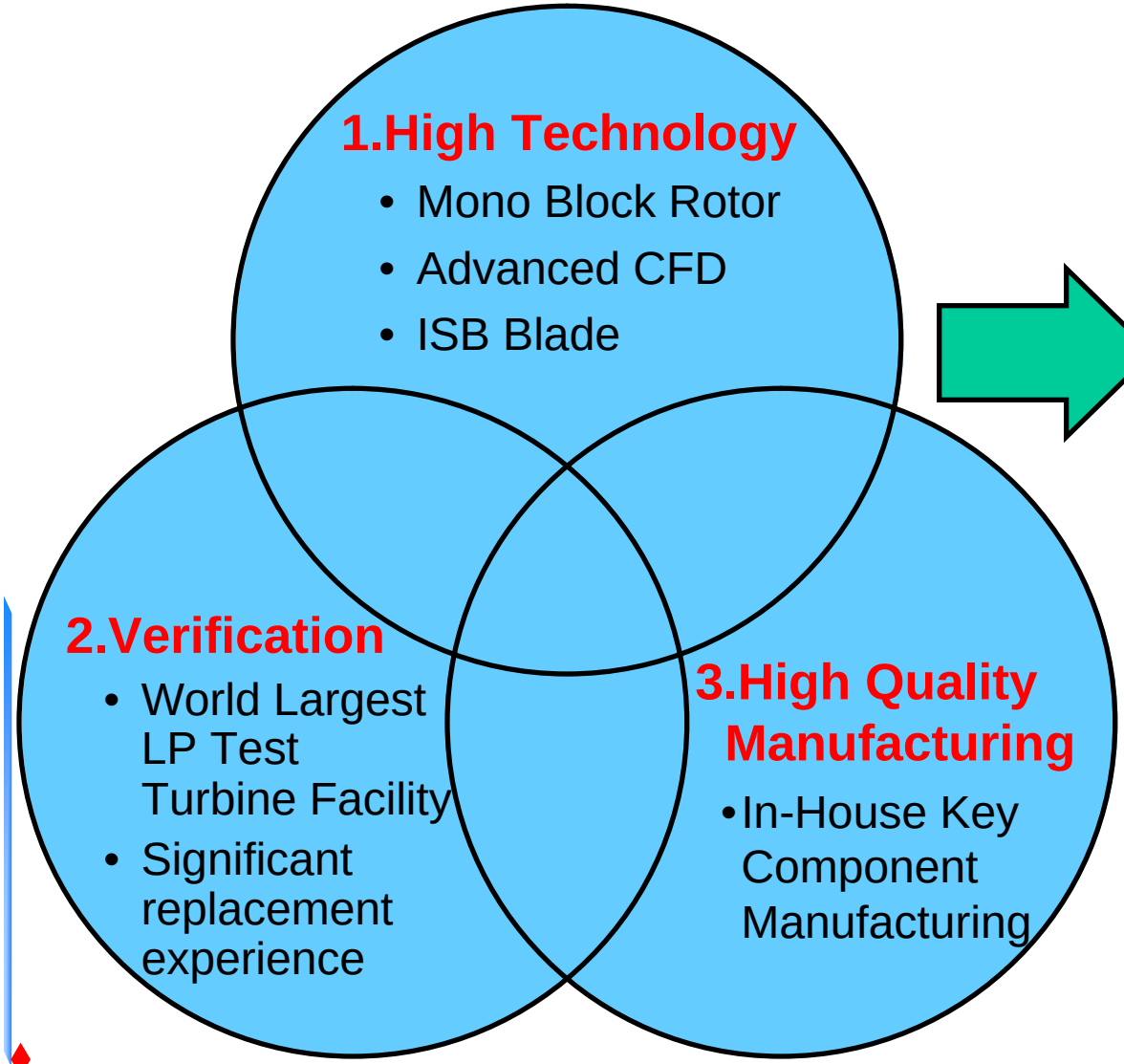
4. Conclusion



MHI can supply

- High Reliability
- High Quality
- High Efficiency

Nuclear Turbines

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