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Comparison of the “cost” between TTF-III and STF2 couplers in Toshiba

Toshiba Electron Tubes & Devices Co., Ltd.
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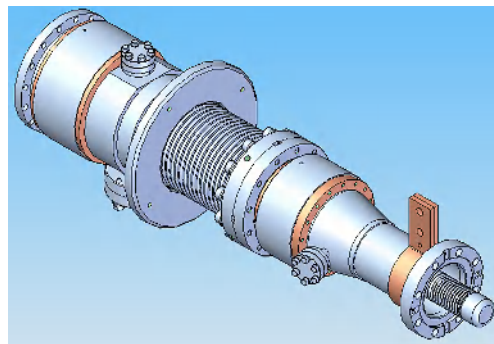
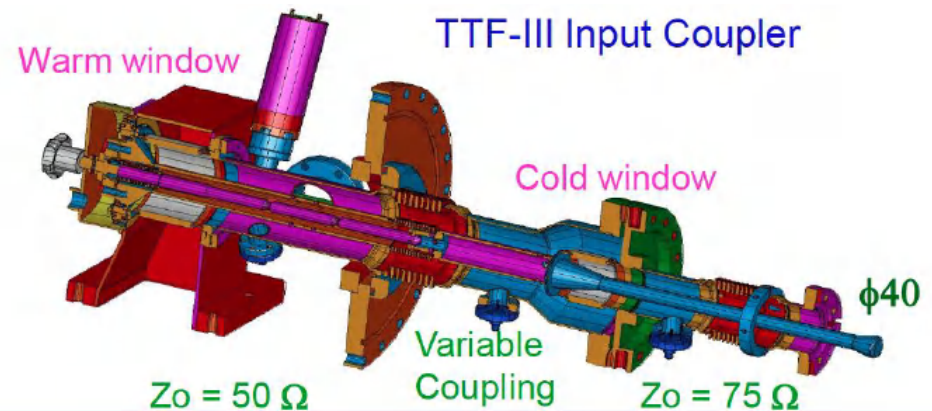
COST Comparison of TTF-III and STF2

Conditions of evaluation :

- 1) exclude waveguide, capacitor ...
- 2) all the materials purchase by vender

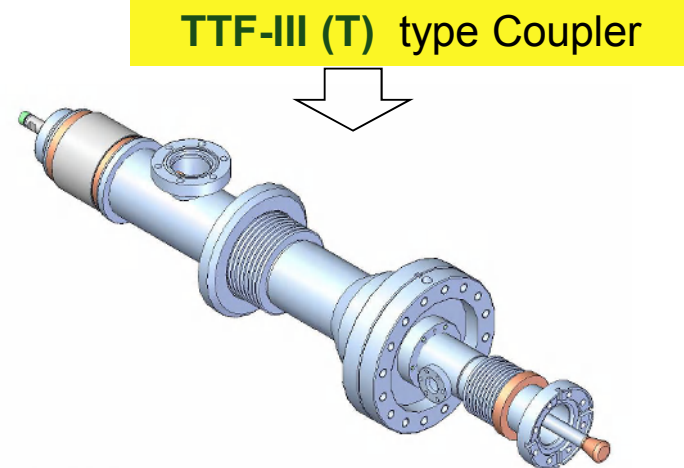
Note :

-- evaluation deeply depends on the contract numbers and also mass production designs.



Windows and Coaxial parts of STF2 type Coupler

↔
To compare



Windows and Coaxial parts of TTF-III(T) type Coupler

Comparison table: TTF-III, TTF-III(T) and STF2

	TTF-III	TTF-III (T)	STF2	Remarks
Warm Window Ceramic	Cylindrical (with V-shaped groove)	Cylindrical (with V-shaped groove)	Disk	
Cold Window Ceramic	Cylindrical (with V-shaped groove)	Cylindrical (with V-shaped groove)	Disk	
Ceramic Purity	97.6%	97.6%	95%	
Number of parts *	37	33	49	
Brazing Type	Vacuum	Vacuum	Hydrogen	
EBW points *	4	0	0	
Number of Processes	20	20	21	exclude final assembly and Inspection
Brazing *	6	11	12	
EB Welding	2	0	0	
TiG Welding	5	2	2	
TiN coating	3	3	3	
Copper Plating	3	4	4	
Vacuum Treatment	more than 4	some	0	
Materials *	* SUS316LN/316L/ 304L/304	* SUS316LN/316L/ 304L/304	* SUS316L/304L/ 304 (no 316LN)	
	Cu OFE	Cu OFE	Cu OFE	

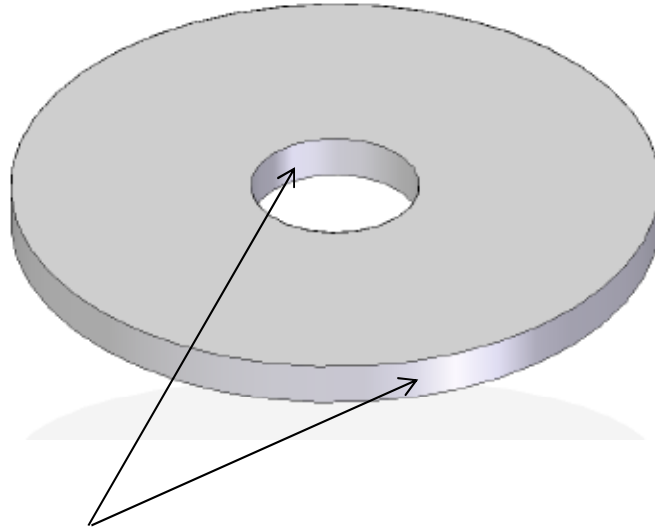
* Excluding Waveguide, Capacitor, Adjusting mechanism and Support brackets

Comparison table: TTF-III, TTF-III(T) and STF2

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Warm Window Ceramic	Cylindrical (with V-shape)	Cylindrical (with V-shape)	Disk	
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Window ceramics: Disk or Cylindrical

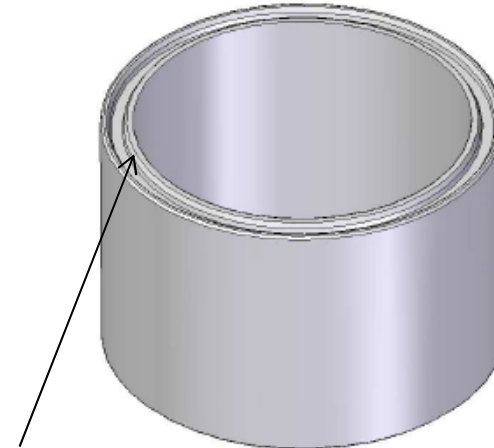
STF2 type Couplers



Metalized surface

Proven and trusted structure by developing klystrons and couplers in KEK

TTF-III type Couplers

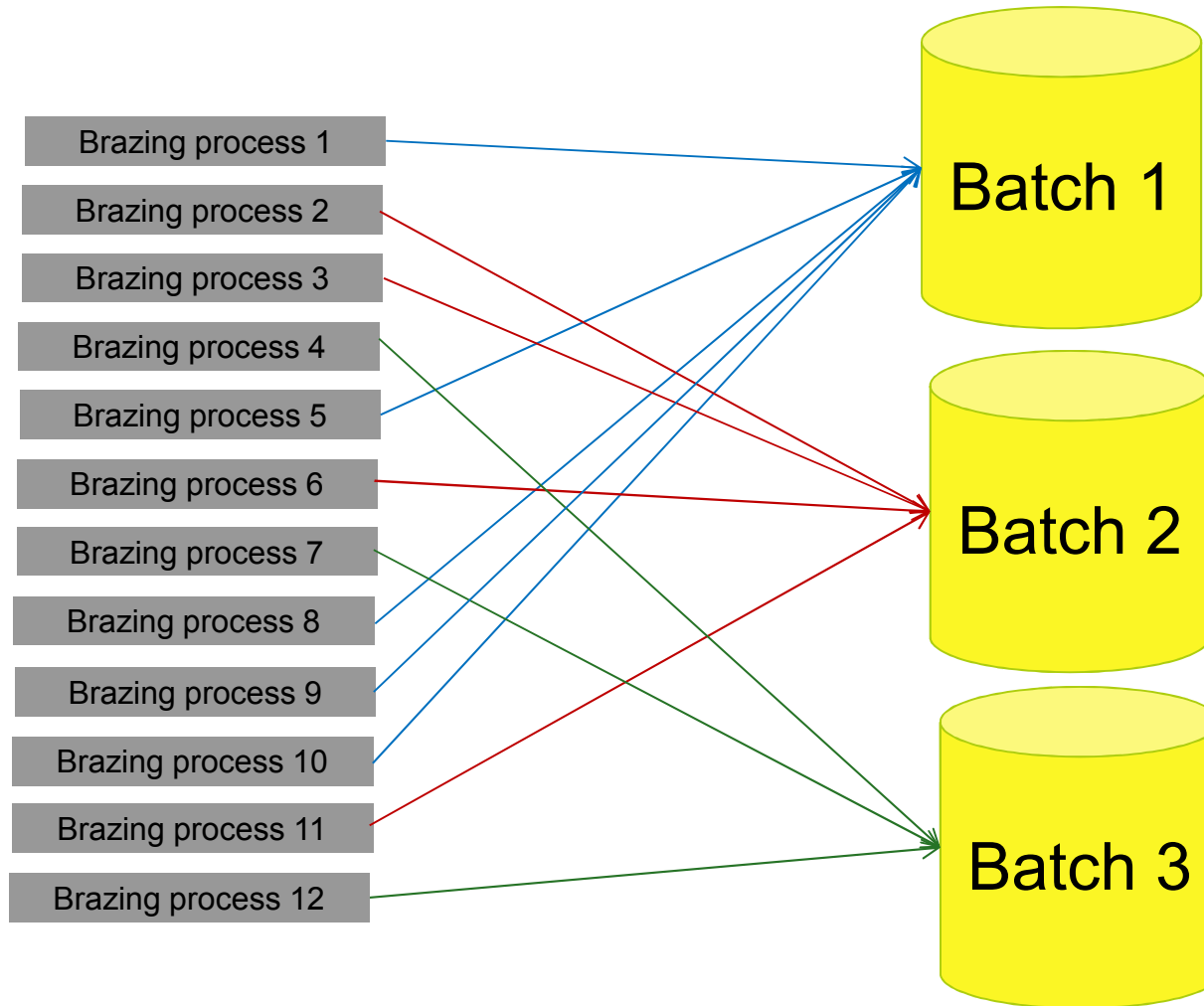


Metalized surface

Double V-shaped groove

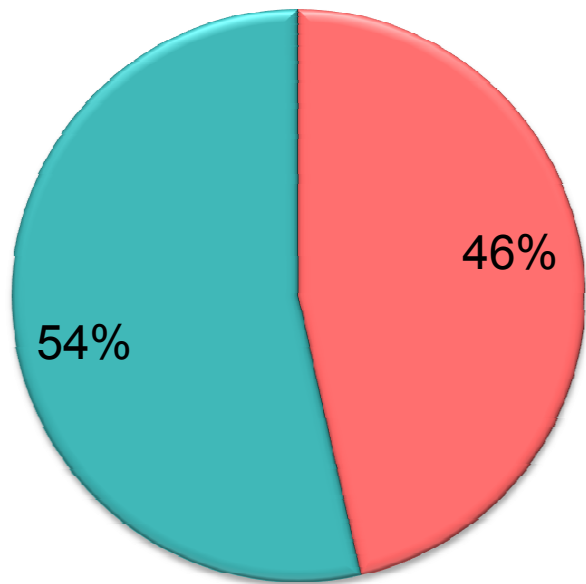
Only so many ceramics makers can supply this structure.

Brazing can batch process (image)

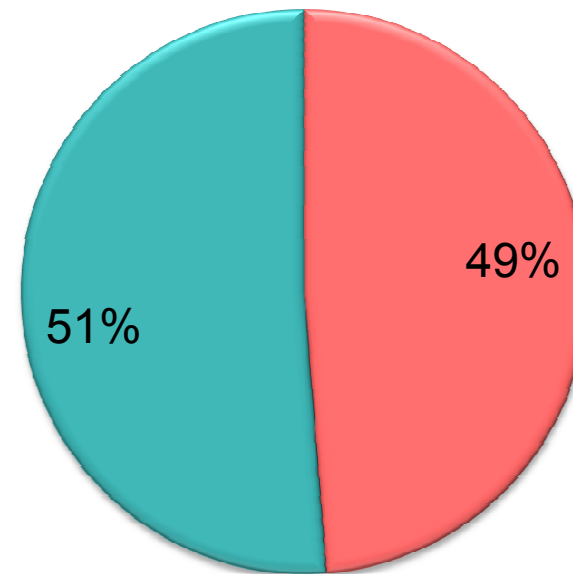


Cost Estimate of warm / cold part

TTF-III (T)



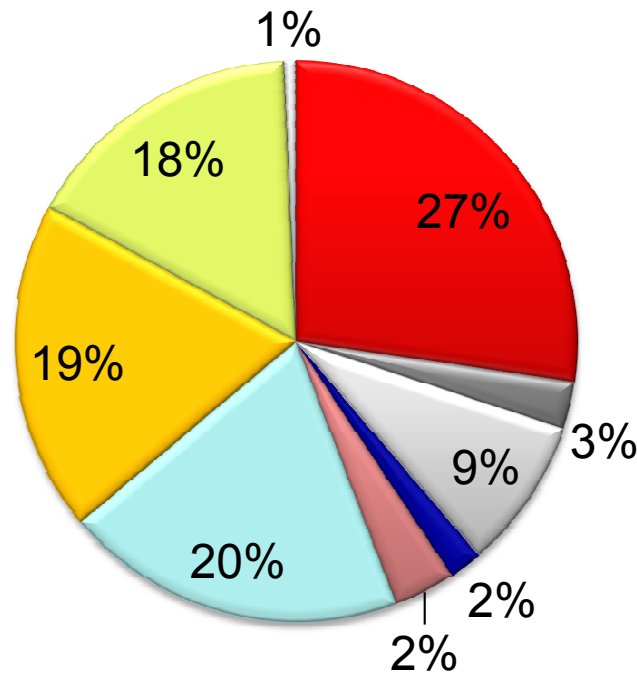
STF2 Coupler



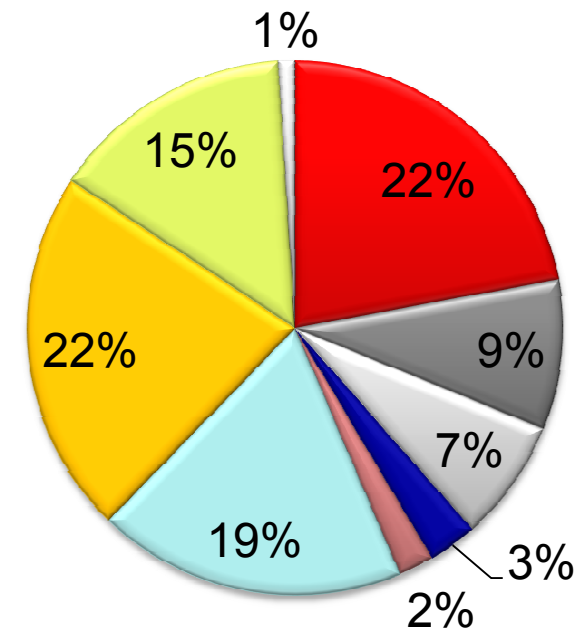
TTF-III (T) : Toshiba modifying version

Cost Estimate of TTF-III and STF2

TTF-III (T) Coupler



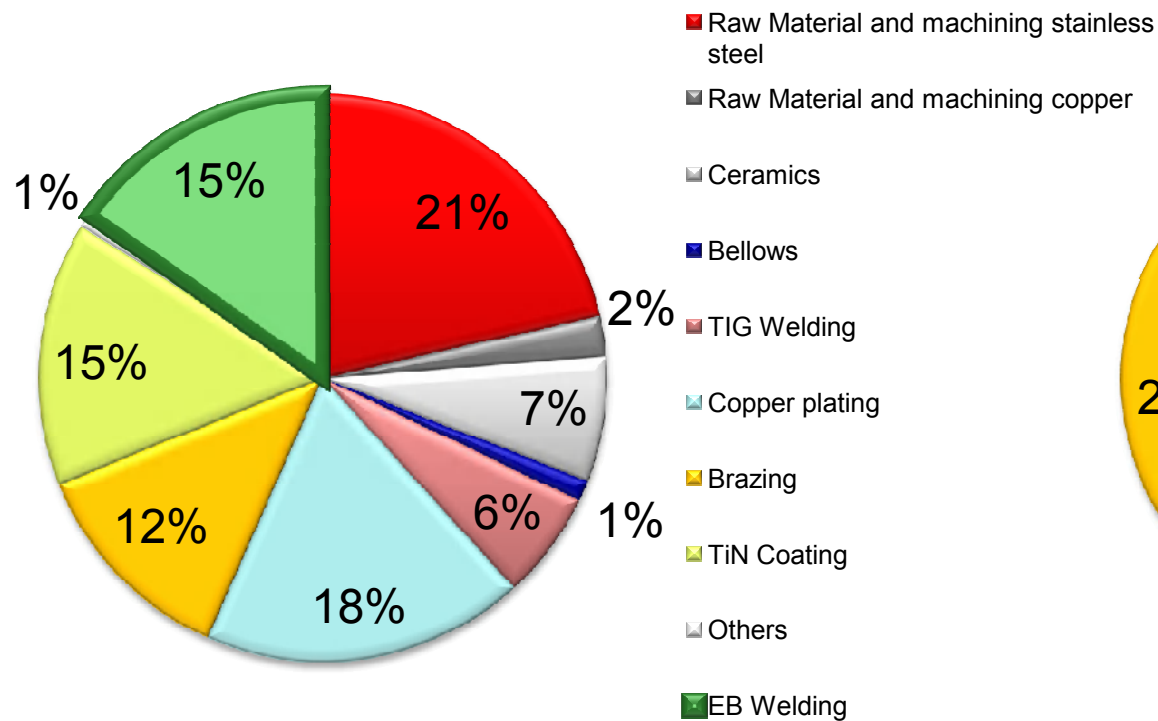
STF2 Coupler



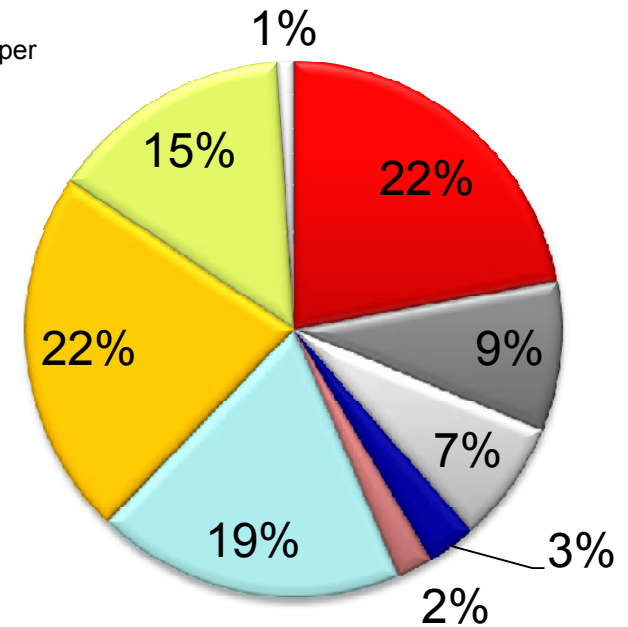
TTF-III (T) : Toshiba modifying version

Cost Estimate of TTF-III(T) and STF2

TTF-III type Coupler (estimated)



STF2 Coupler



Summary

- 1. Percentage of cold / warm cost is almost the same both TTF-III(T) and STF2.**
- 2. Raw Material cost of TTF-III / (T) is higher, because of using SUS316LN.**
- 3. TiN coating cost of TTF-III / (T) is higher, because of its cylindrical shape.**
- 4. Part numbers of STF2 are almost 150% , but brazing batch numbers are the same as TTF-III / (T).
→ it means cost performance is not larger.**
- 5. EBW is large percentage of the processing cost.**

Summary

- 6. We think that STF2 type couplers seems to have the best cost performances in this stage, and also have production easiness and consistence.**
- 7. We believe that KEK has lots of actual performances in this kinds of input couplers (hydrogen brazing) in TRISTAN / KEK-B project and also SNS project, however we need to make clear and study in data for RRR and TiN coating performances after the brazing.**

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