

Instruction

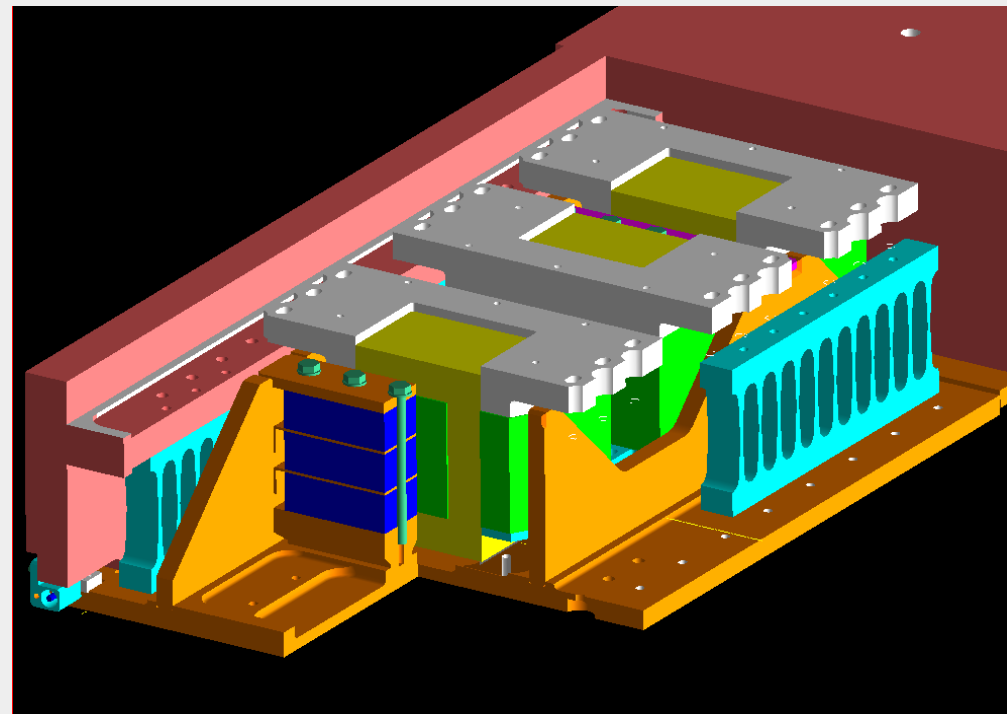
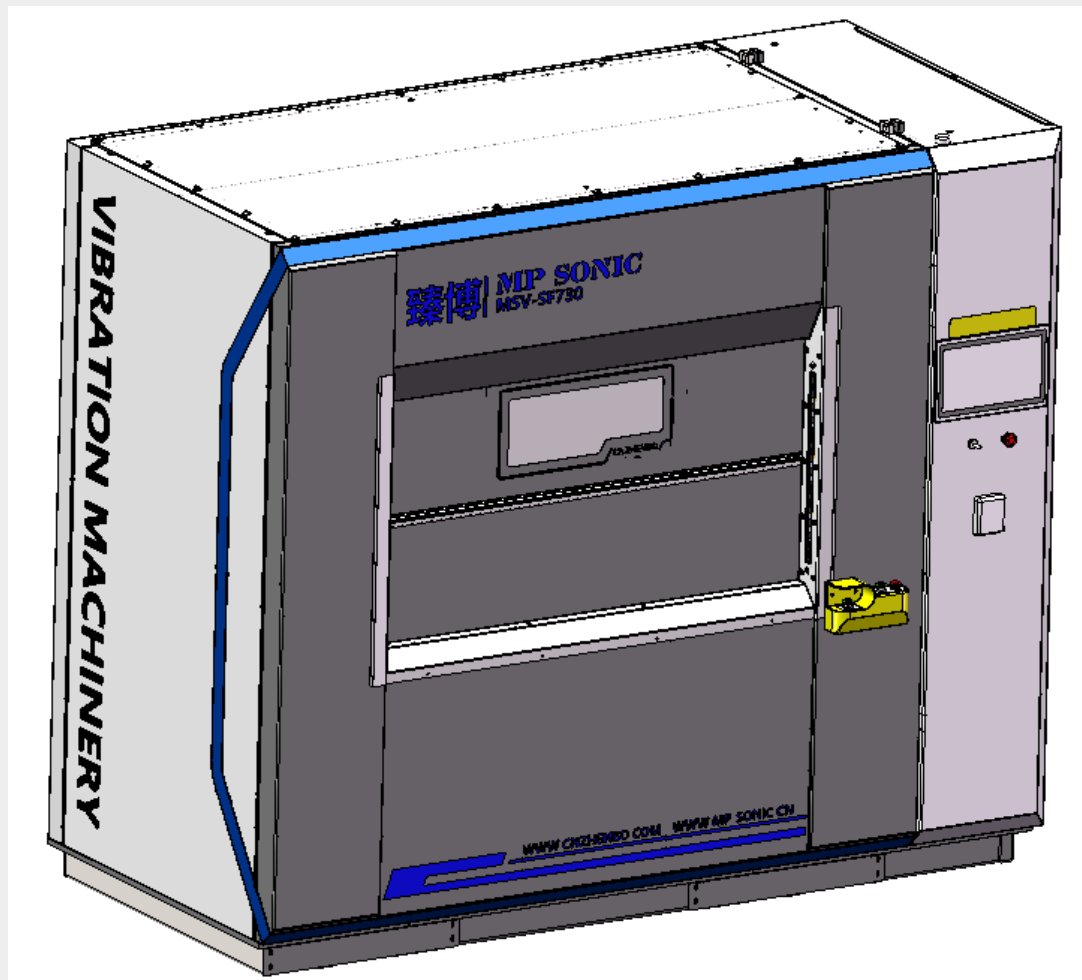
Jointing Design for Vibration Welding

by CNZHENBO | MP Sonic



Zhejiang Zhenbo Precision Machinery Co.,Ltd

by Alex Lee



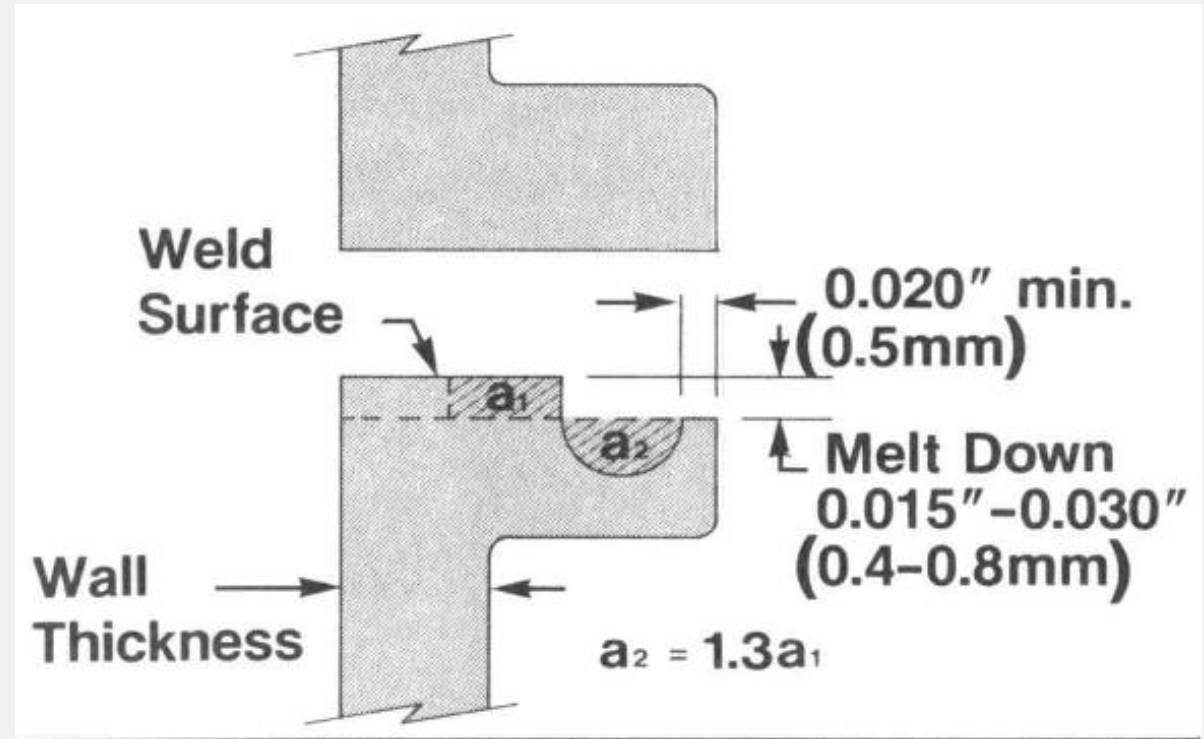
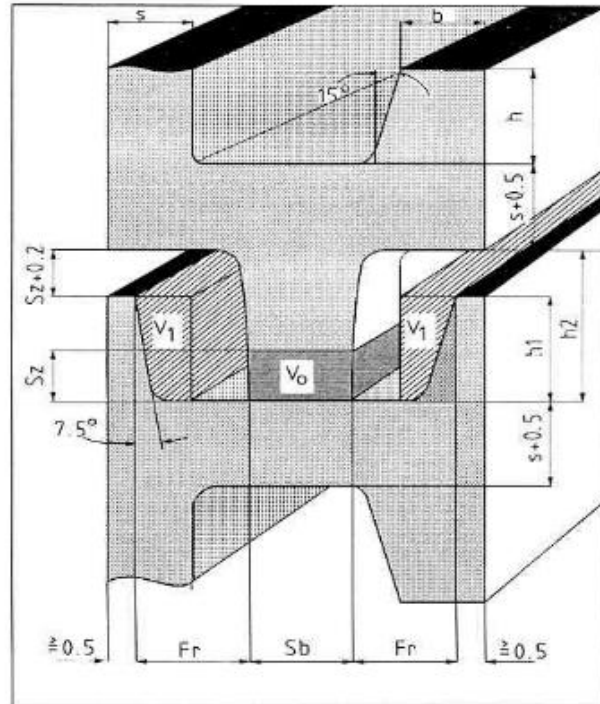


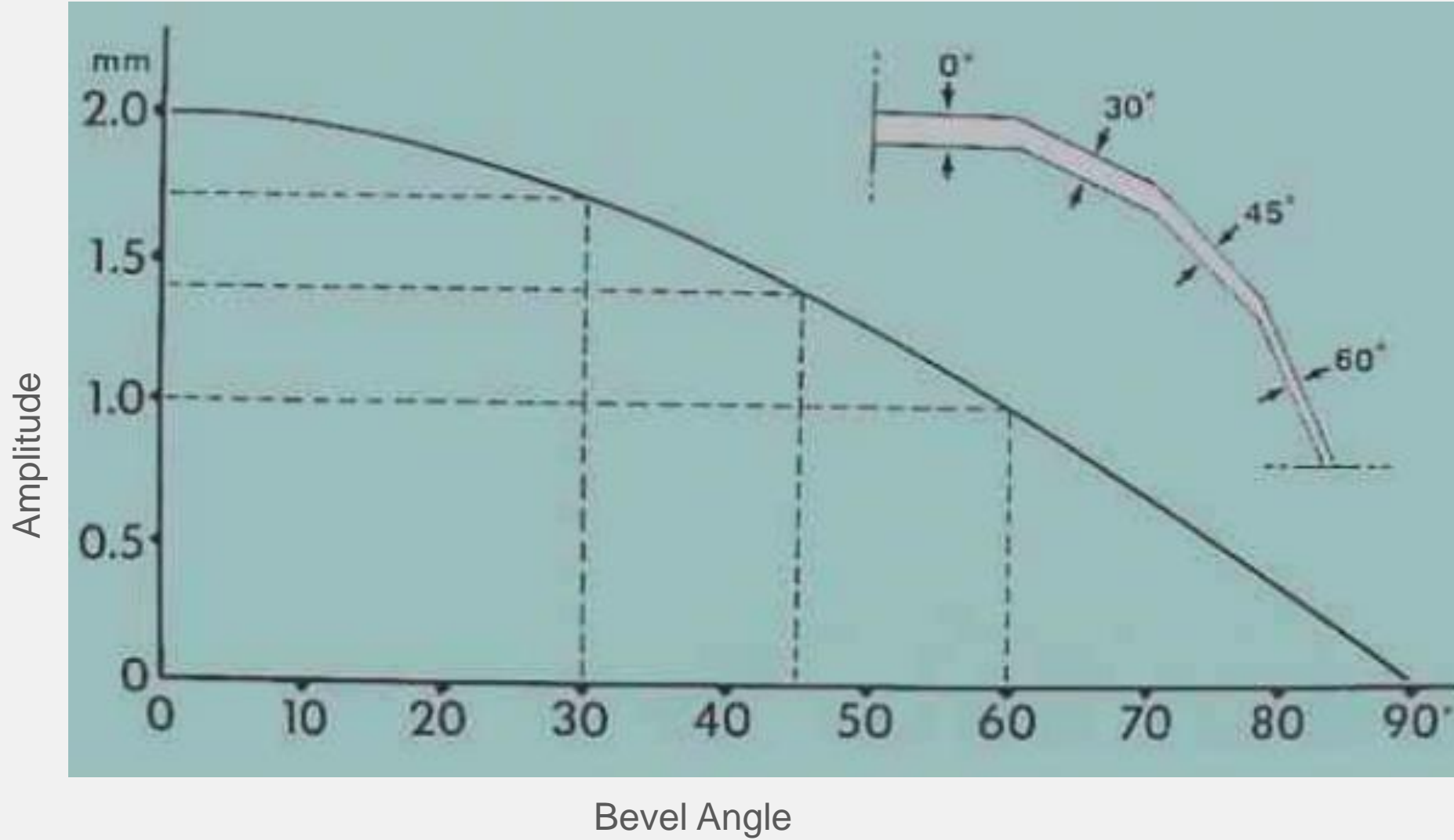
- * Measurement of welding line;
- * The parts holding design at vibration oscillation direction;
- * At least 1/2 width of joining area should be supported by vibration welding fixture;
- * At least 0.8mm space for the moving distance of oscillation (120Hz:1.8mm);
- * Reinforcement at vibration direction: $(0.8\text{mm} * 2) + \alpha(\text{above } 2\text{mm})$
 - Side: above 1mm;
 - Reinforcement for 120Hz welding : about twice of that for 240Hz welding;
- * Space for melting flow: melting volume*20~30%。
- * Design angle reinforcement to avoid shake at vibration direction;
- * Consider the deformation after molding;
- * Ensure that the surface slope at vibration direction no over than 10 degree.

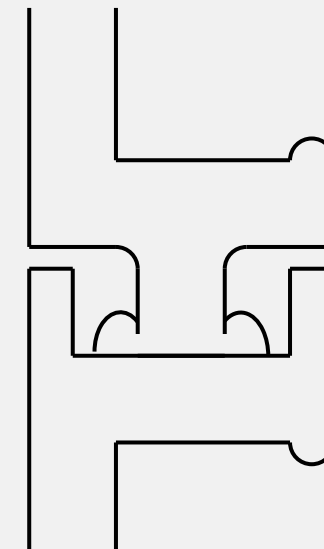
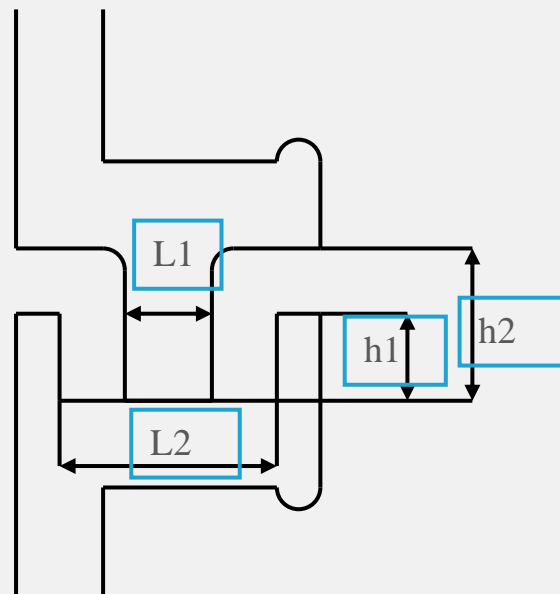
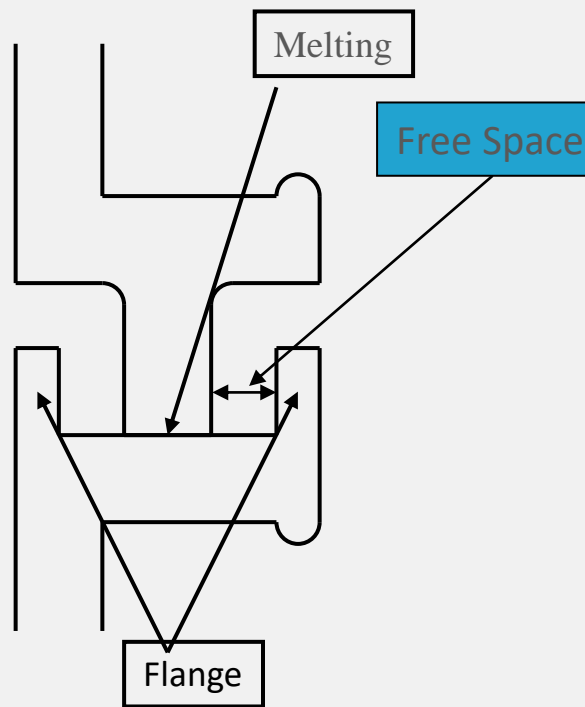
4.2.4 Exemplary design of a modified butt joint in the vibratory direction

This weld joint design is intended to cover up flash and debris by means of appropriate flash traps.

- S = Wall thickness
- S_z = Weld allowance about 0.5 – 1.5 mm
- h = Height of the retaining lugs
- h_1 = Groove depth about 2 mm
- $h_2 = h_1 + S_z + 0.2$ mm
- b = Width of retaining lugs about 1.2 mm
- V_1 = Flash section $\frac{V_o}{2}$
- V_o = Weld section
- Fr = Flash trap = $V_1 + 20\%$







$$p = h2 - h1 - \alpha; \text{ Welding Margin (about 0.2mm)}$$

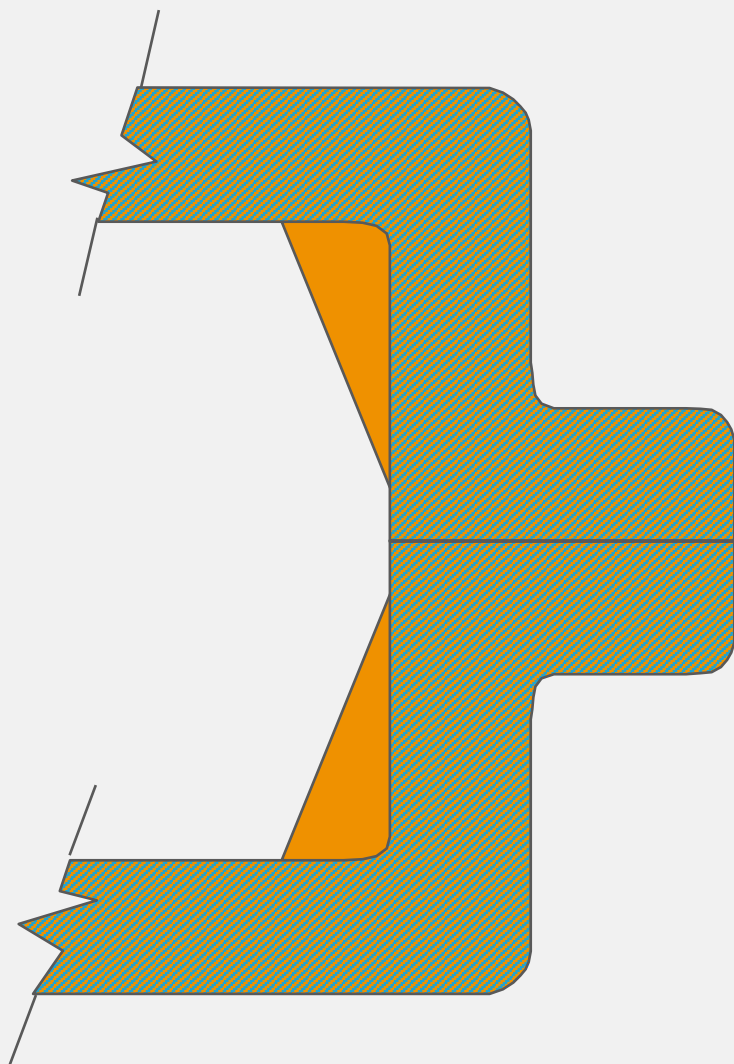
$$\text{Welding Volume } (L1 \times p) < \text{ Internal Space } ((L2 - L1) \times h1)$$



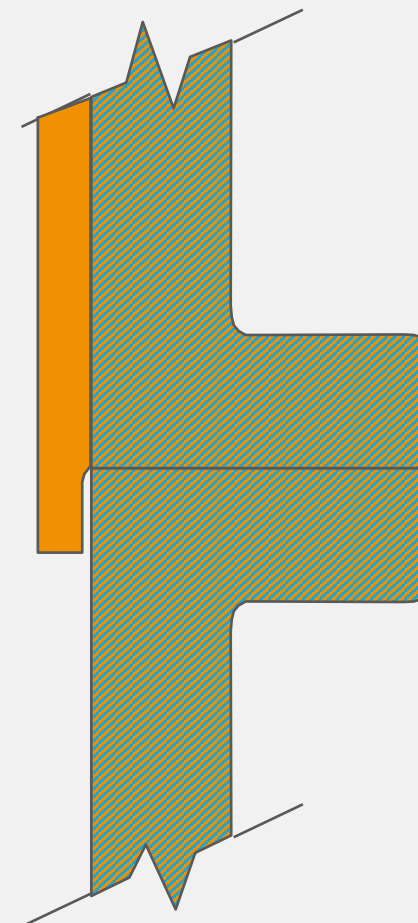
Butt Welding Design



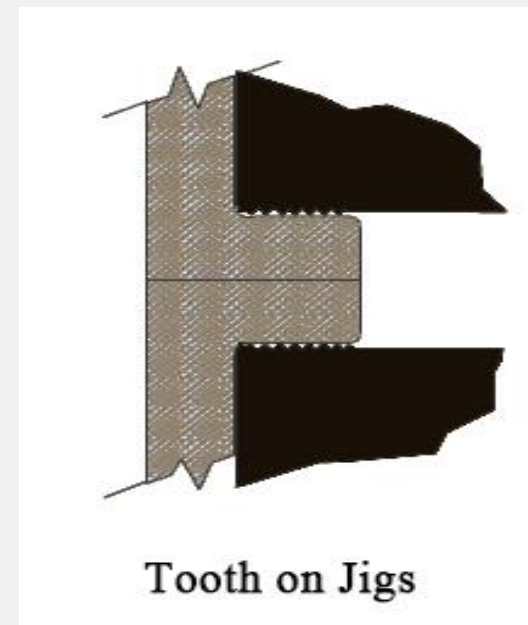
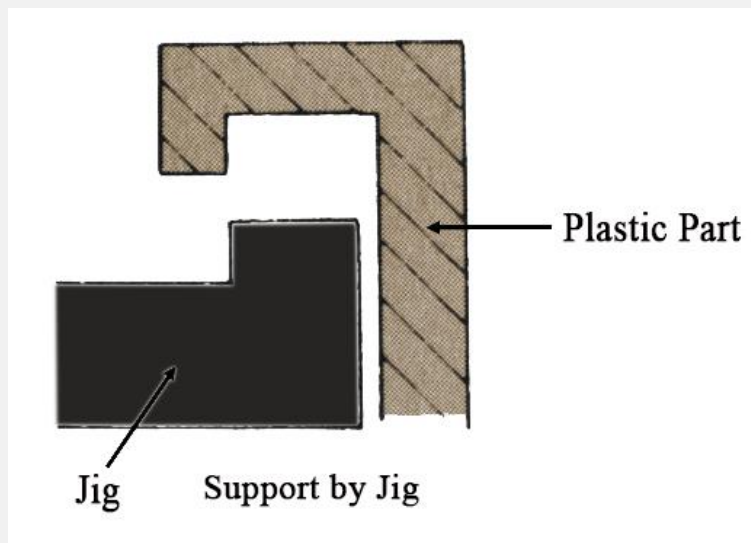
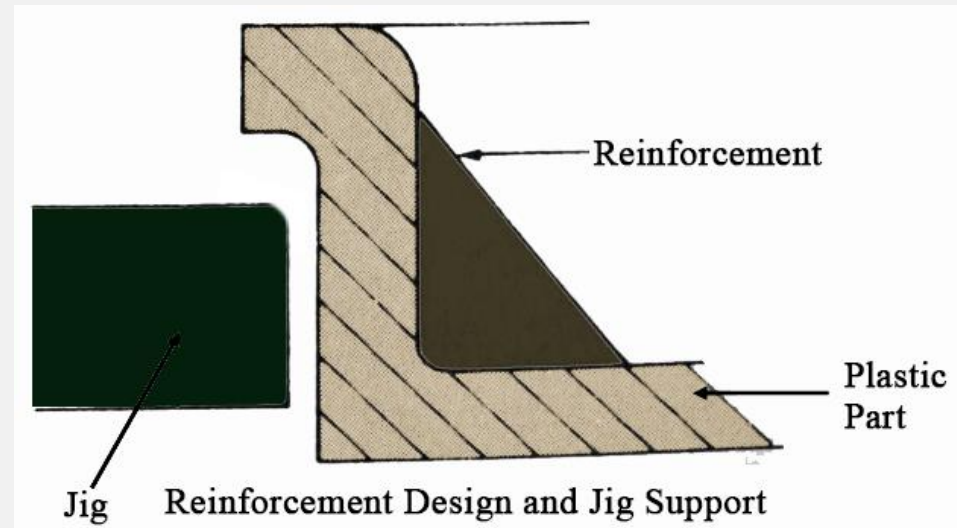
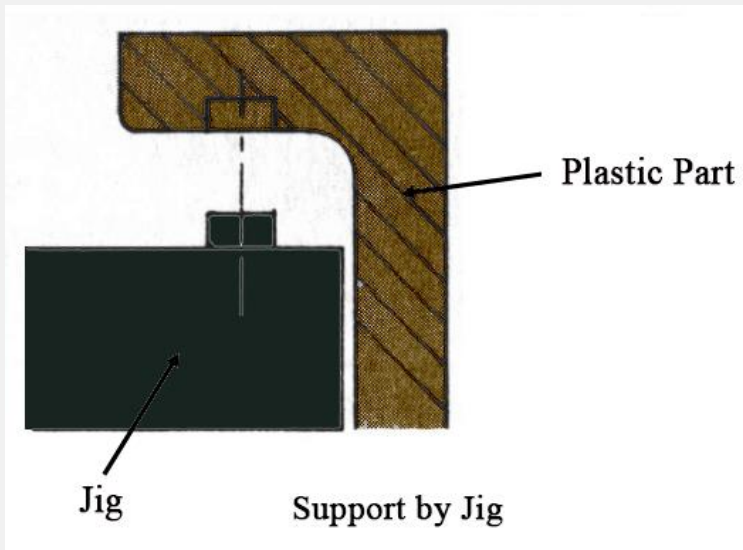
Tongue Welding Design

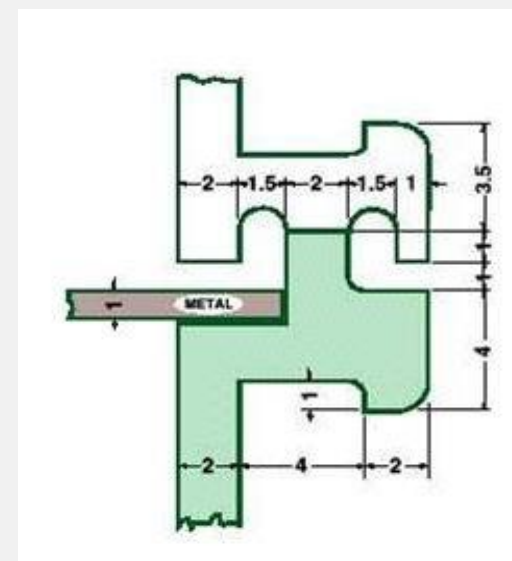
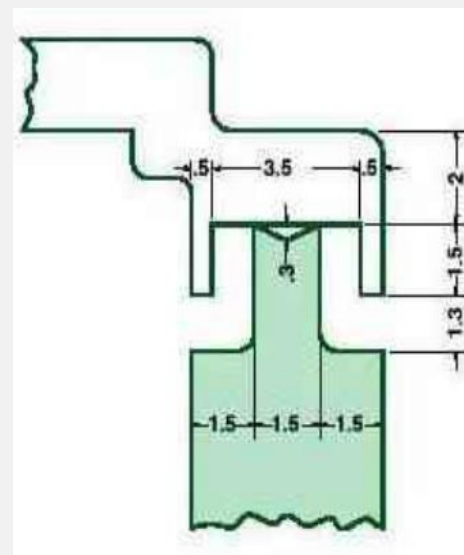
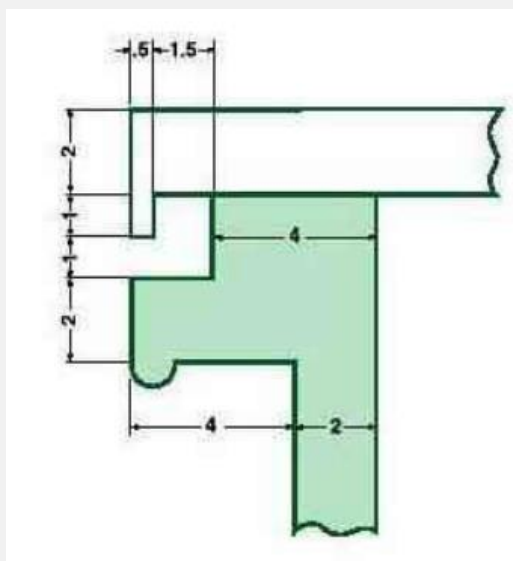
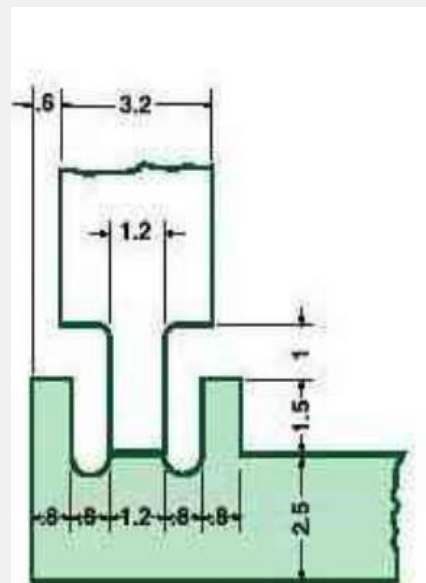
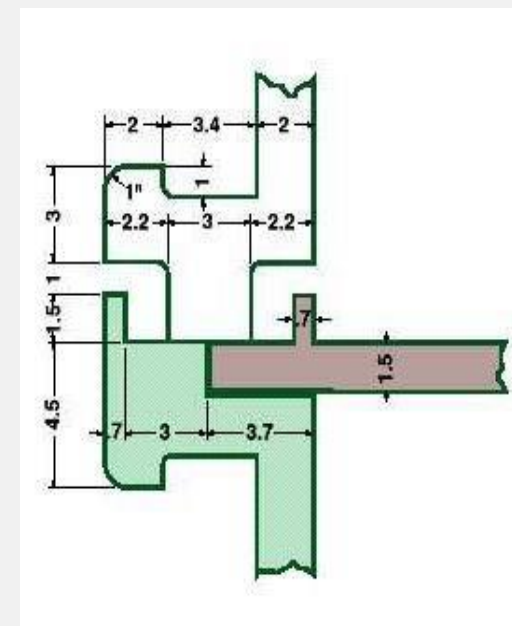
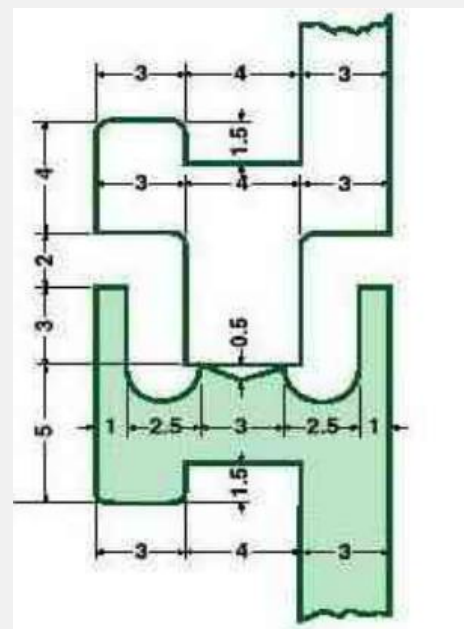
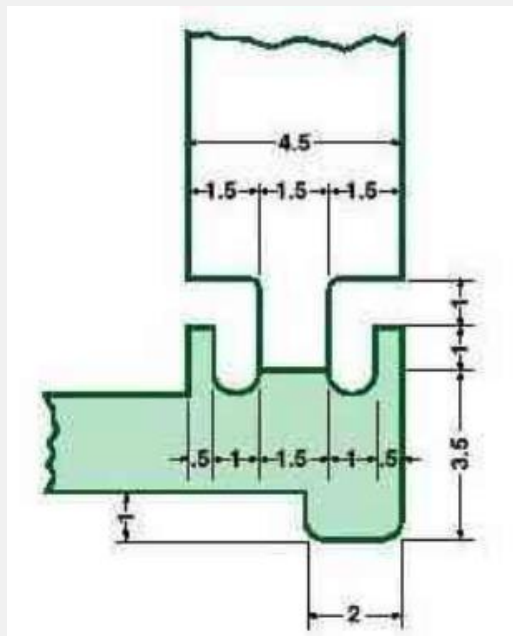
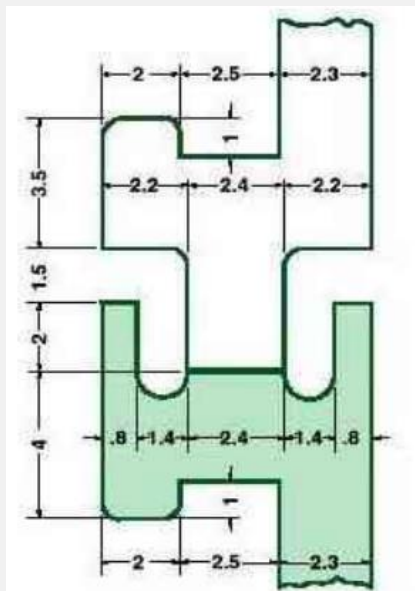


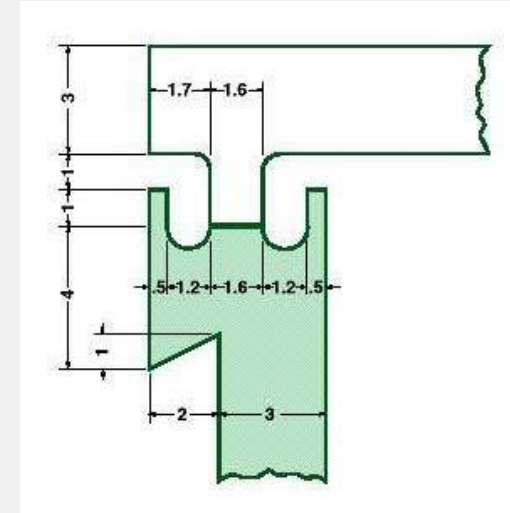
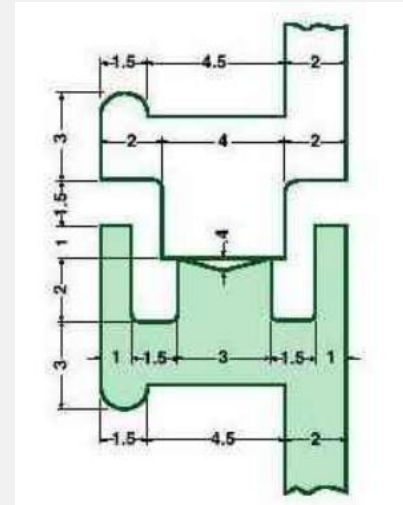
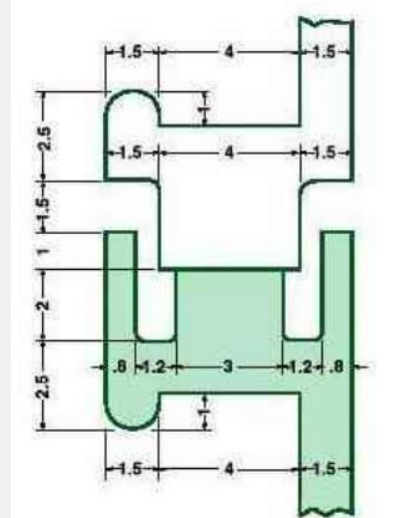
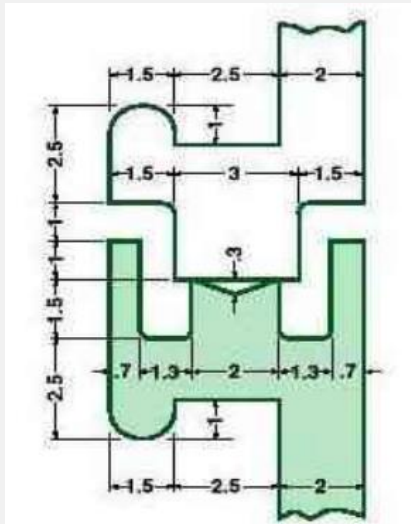
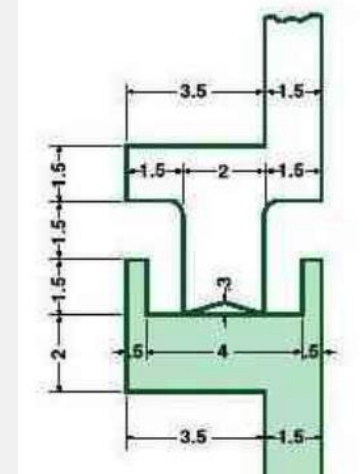
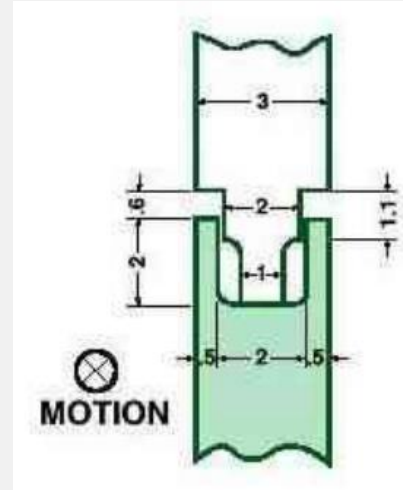
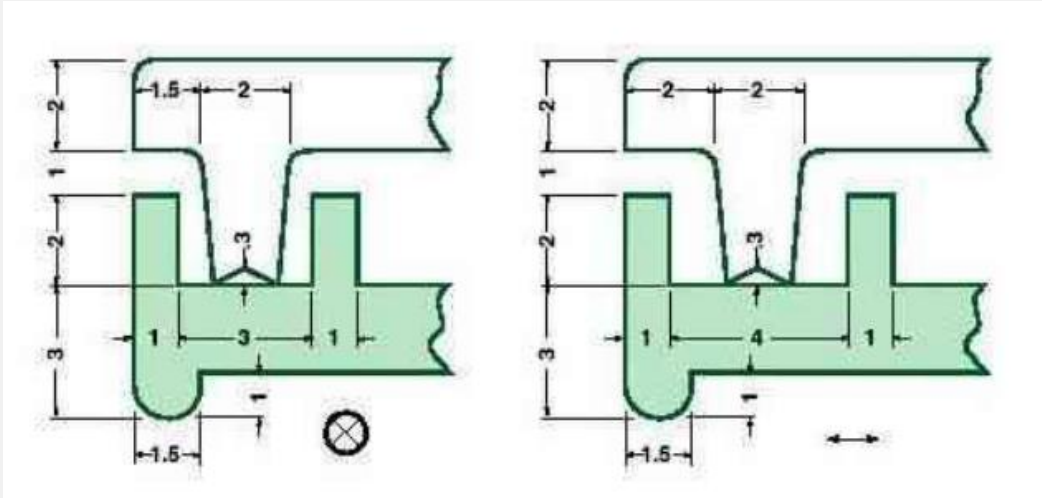
Internal Triangle Reinforcement

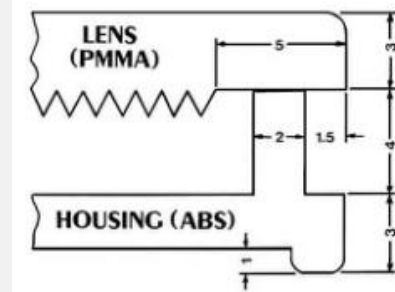
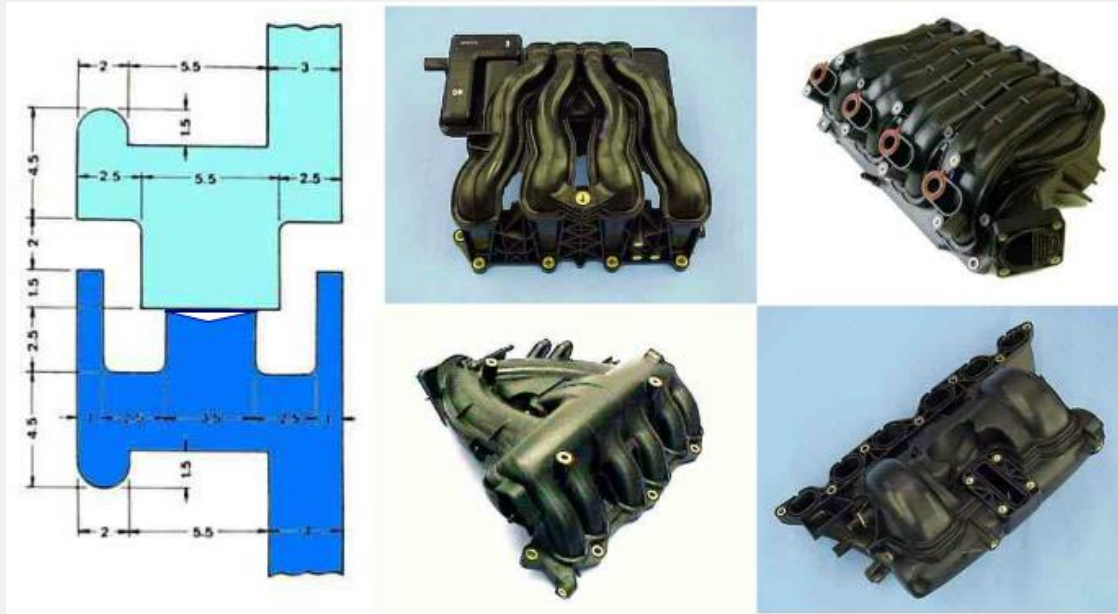


Internal Reinforcement









Lamp Welding Design



Joint Performance of Different Thermoplastic Material

THERMOPLASTICS 热塑性塑胶	PRPOSED WELDING METHOD 焊接方法	Ultrasonic 超声波焊接					Hot-plate 热板			Vibration 震动	Spin 旋转	Radio Freq. 高频
		Near filed welding 近距离	Far filed welding 远距离	Inserting 埋接	Staking 铆接	Spot welding 点焊	On contact 接触* Low temp. 低温	On contact 接触** High temp. 高温	Non-contact 不接触***			
Acrylic/Styrene/Acrylonitrile(ASA)	丙烯酸 - 苯乙烯 - 丙烯	2-3	2 △	2	2	2	2-3	3	3	2	2	4
Acrylonireile/Butadiene/tyrene(ABS)	丙烯腈 - 丁二烯 - 苯乙烯 (超不碎胶)	1	1 △	1-2	1	1	1-2	2	3	2	1-2	4
Cellulose Acetate(CA)	纤维	2	2-3 △	2	2-3	2	3-4	3-4	3-4	2	2	3-4
Methacrylate(Acrylic)(PMMA)	甲基丙烯酸酯 (亚加力)	1-2	1-2 △	1-2	2	2	2	1	2-3	2-3	2	3-4
PA-Blends	尼龙混合物	3	3-4 △	3-4	3-4	3-4	2	3-4	3	2	2-3	4
PC-ABS-Blends	PC/ABS 混合物	2-3	3 △	3-4	3	2-3	2	3	3	2	2	4
PC-ABT-Blends	PC/ABT 混合物	2-3	3-4 △	3-4	3-4	2-3	2	3	3	2	2	4
Polyacetal(POM)	聚甲基 (赛钢)	2	2	2-3	2-3	2-3	1-2	2	2	2	2	4
polyamide(Nylon 6)	尼龙 6	2-3	2-3	2-3	2-3	2-3	3-4	3-4	2-3	1-2	1-2	3-4
polyamide(Nylon 6/6)	尼龙 6/6	2-2	2-3	2-3	3	3	2-3	2	2-3	1-2	2	3-4
polyamide-Copolymer(Nylon 6-3-T)	尼龙 6-3-T	2	2	2	2	2	2-3	3	3	2	2	3-4
Ploybutylene terephthalate(PBT)	聚丁烯酸酯	3molded parts 注塑件	2-3	2	2-3	2-3	3-4	3	3	2	2	4
		1 foils 加薄膜										
Polycarbonate(PC)	聚碳酸酯 (防弹胶)	2	2 △	2	2	2	2-3	2-3	2	2	1-2	4
Ploybutylene(PE)	聚乙烯 (软胶)	3	4	3	3	2	1	2	3	3	2	4
Ploybutylene terephthalate(PET)	聚乙烯酸酯 (宝特胶)	3molded parts 注塑件	2-3	2-3	3	3	3-4	3	3	2	2-3	4
		1 foils 加薄膜										4
Ploybutylene oxide(PPO)	聚氧化亚苯	2	2 △	2-3	2-3	2-3	2	2	3	2	2	4
Ploybutylene sulfide(PPS)	聚硫苯	2	2	2	2	2	2	3	3	2	2	4
Ploybutylene (PP)	聚丙烯 (百折胶)	3	4	3	3	2	1	2	3	2	2	4
Ploystyrene(PS)	聚苯乙烯 (硬胶)	1	1 △	1	1	1	1	2	3	2	1-2	4
Ploysulfone(PSO)	聚佩	2	2	2-3	2-3	2	2-3	2-3	3	2	2	4
Ployvinyl chloride(PVC)	聚氯乙烯	2-3with foils 加薄膜	3 △	2-3	2-3	2-3	1-2	3	3-4	2-3	2	1
PP-EPDM-Blends	PP/EPDM 混合物	3	3-4 △	2-3	2-3	2	2	2-3	2-3	2	2	4
PPO-Blends	聚氧化亚苯混合物	3 with foils 加薄膜	3-4 △	3-4	3-4	3	2	2-3	2-3	2	2	4
Styrene/Butadiene(SB)	苯乙烯 - 丁二烯	1	1 △	2	2	1	3	3	3	2	1-2	4

List of Symbols 符号代表: 1=very good 非常好 2=good 良好 3=limited 尚可 4=not possible 不可能

- ☪ =Exhaust fan recommended 建议加排气扇
- △ =Energy director recommended 建议焊接面加焊线
- ☪ =Knurl faced horn recommended 建议焊头表面刻滚花纹
- ☪ =Shear joint recommended 建议焊接面造剪切面

* Hot plate temperature up to 290°C. Heat platens incontact with parts to be welded. 热板温度达到 290°C, 热板要与工件接触。

** Hot plate temperature above 290°C, many applications with temperature ranges above 340°C. Heat platens incontact with parts to be welded. 热板温度在 290°C以上, 热板要与工件接触, 很多次实例都要用约 340°C范围温度。

*** Temperature ranges from 400°C to 650°C. NO contact between heat platens and parts to be welded. 热板温度在 400°C -650°C, 热板与工件不用接触。

Amorphous Resin	Joining Performance	Crystalline Resin	Joining Performance
ABS	E	POM (Polyacetal)	E
ABS/PC ALLOY(Cycoloy-800)	E	Fluorine-containing resin	G-F
PMMA (Acrylic)	E	A thermoplastic polyester	E
CA,CAB,CAP	E	PE (Polyethylene)	G-F
Improved PPO(Noryl)	E	PMP (Polymethylpentene)	E
PA(Polyamide-Imide)	G	PPS(Polyphenylene sulfide)	G
PC (Polycarbonate)	E	PP (Polypropylene)	E
PS(Polystyrene)	E		
PSF/PSU (Polysulfone)	E		
SAN , NAS , ASA	G	remark: E. Excellent; G. Good; F. Fault	

Thanks

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