

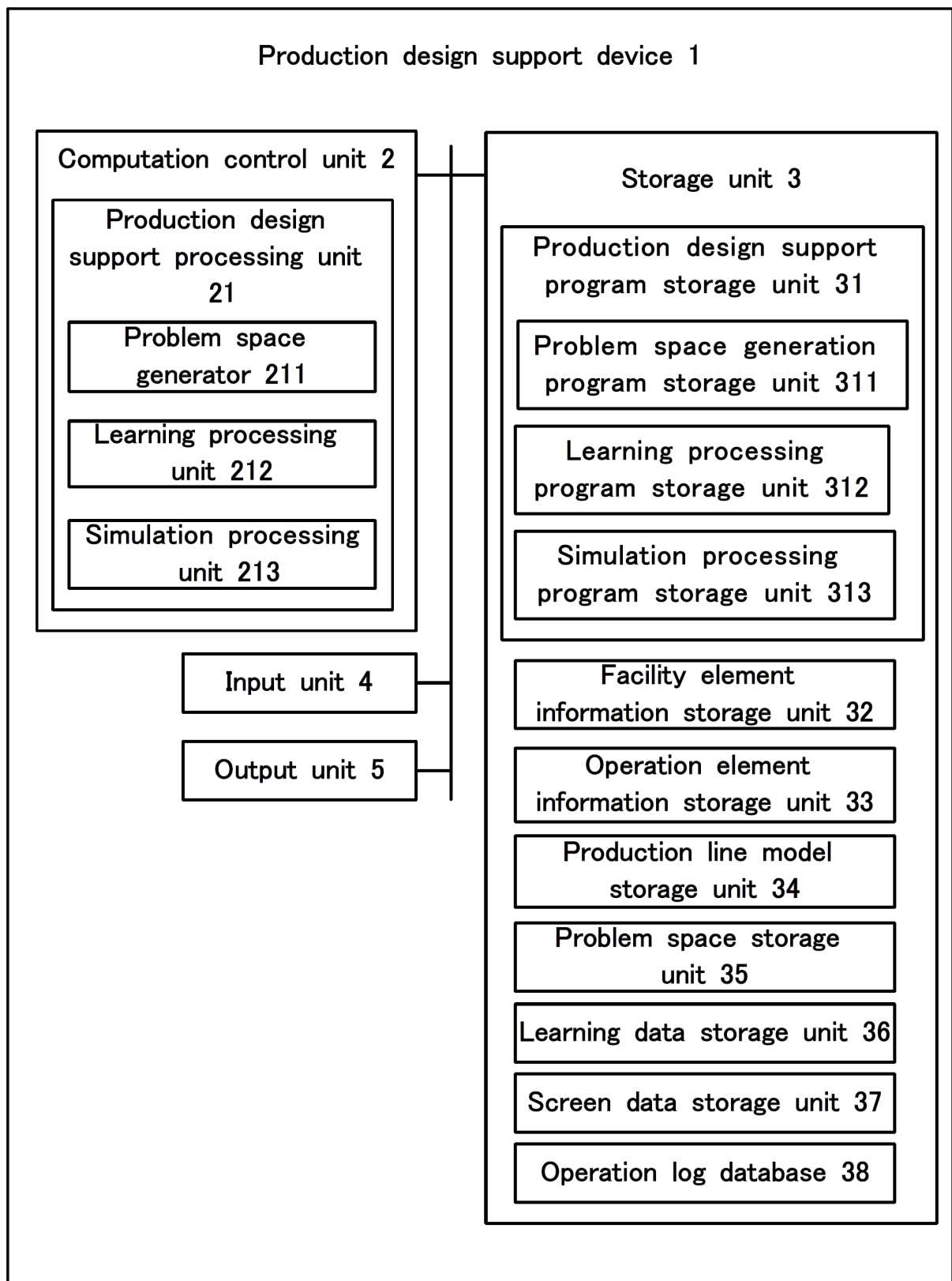


Fig. 1

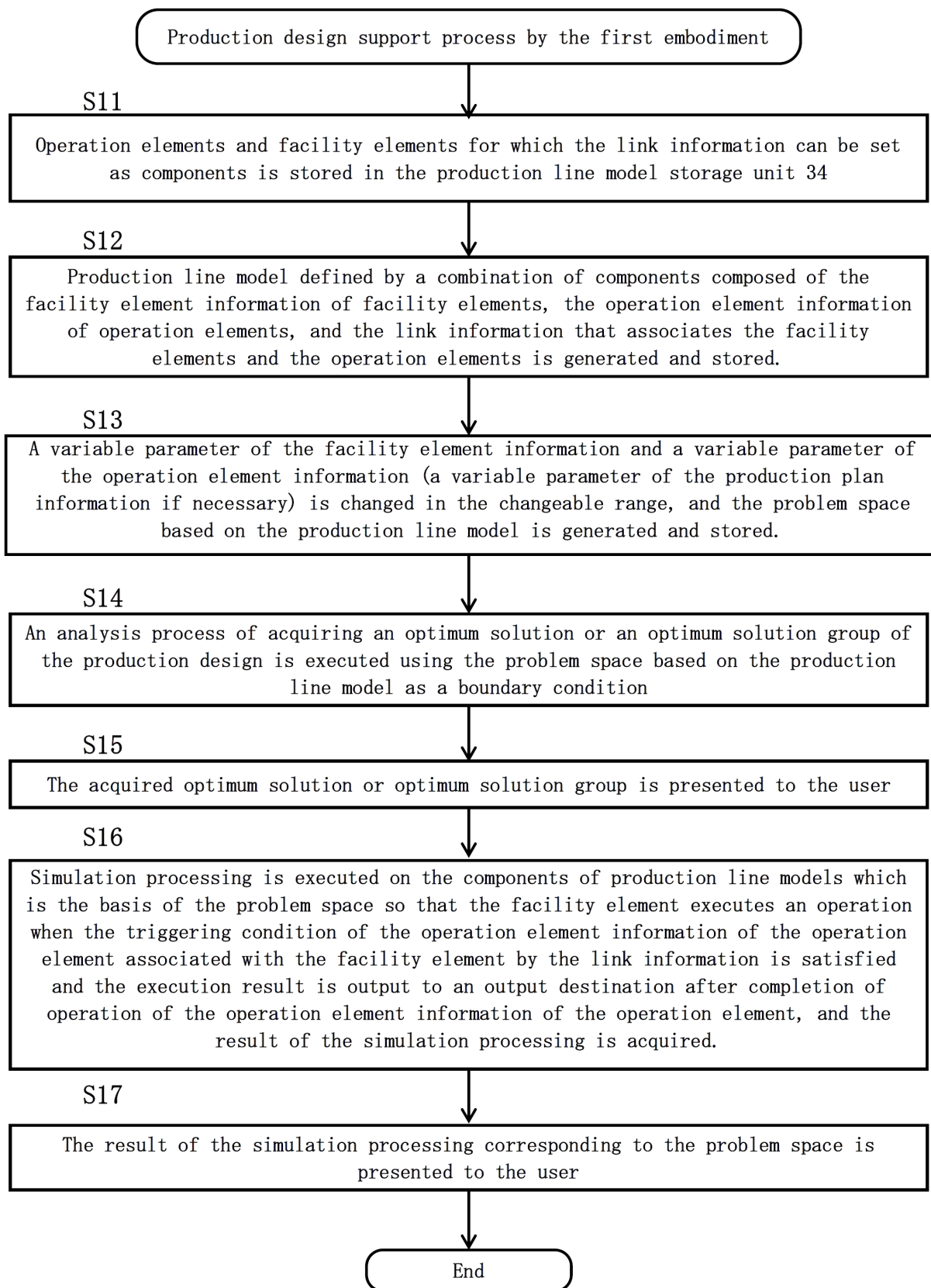


Fig. 2

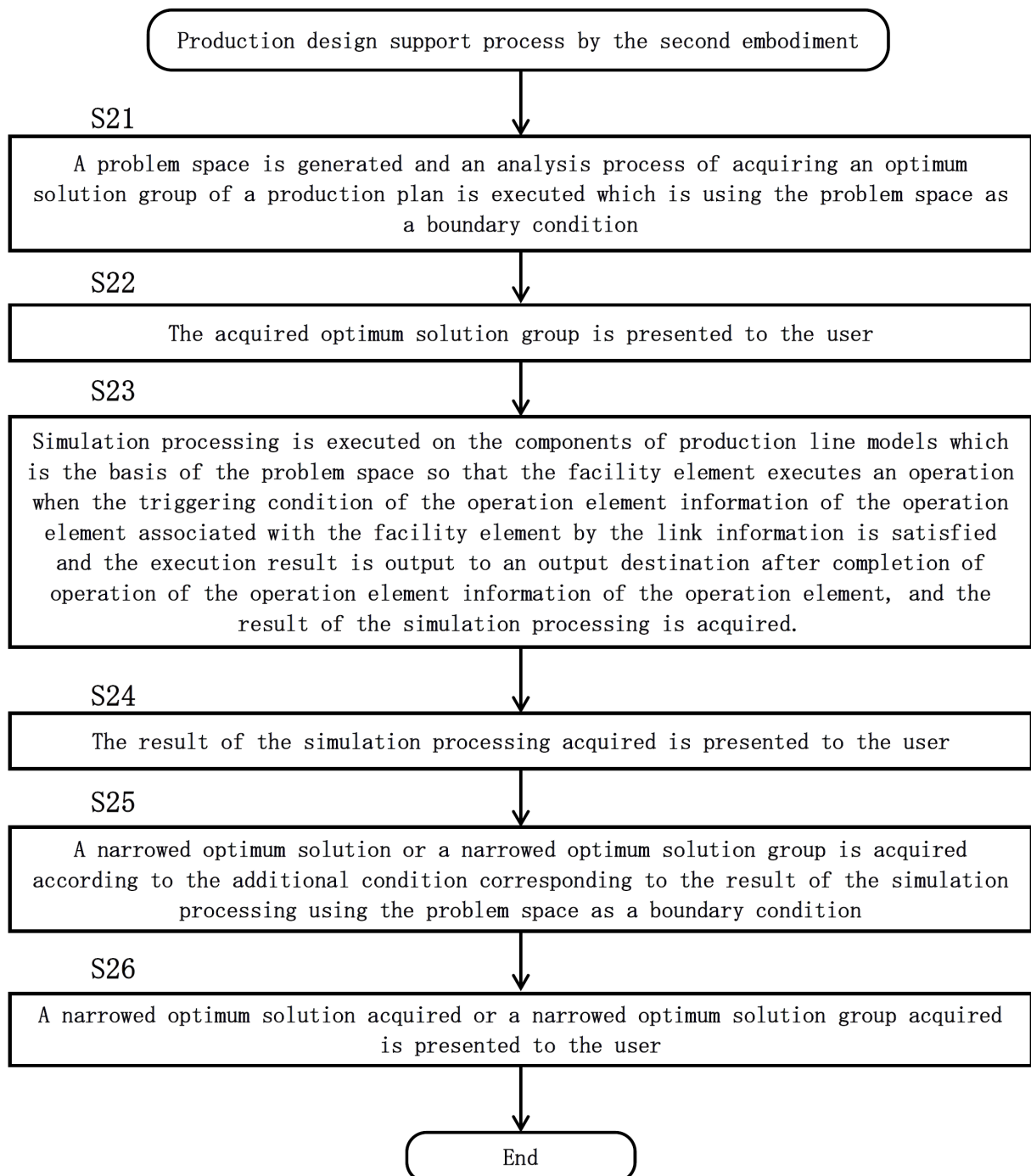


Fig. 3

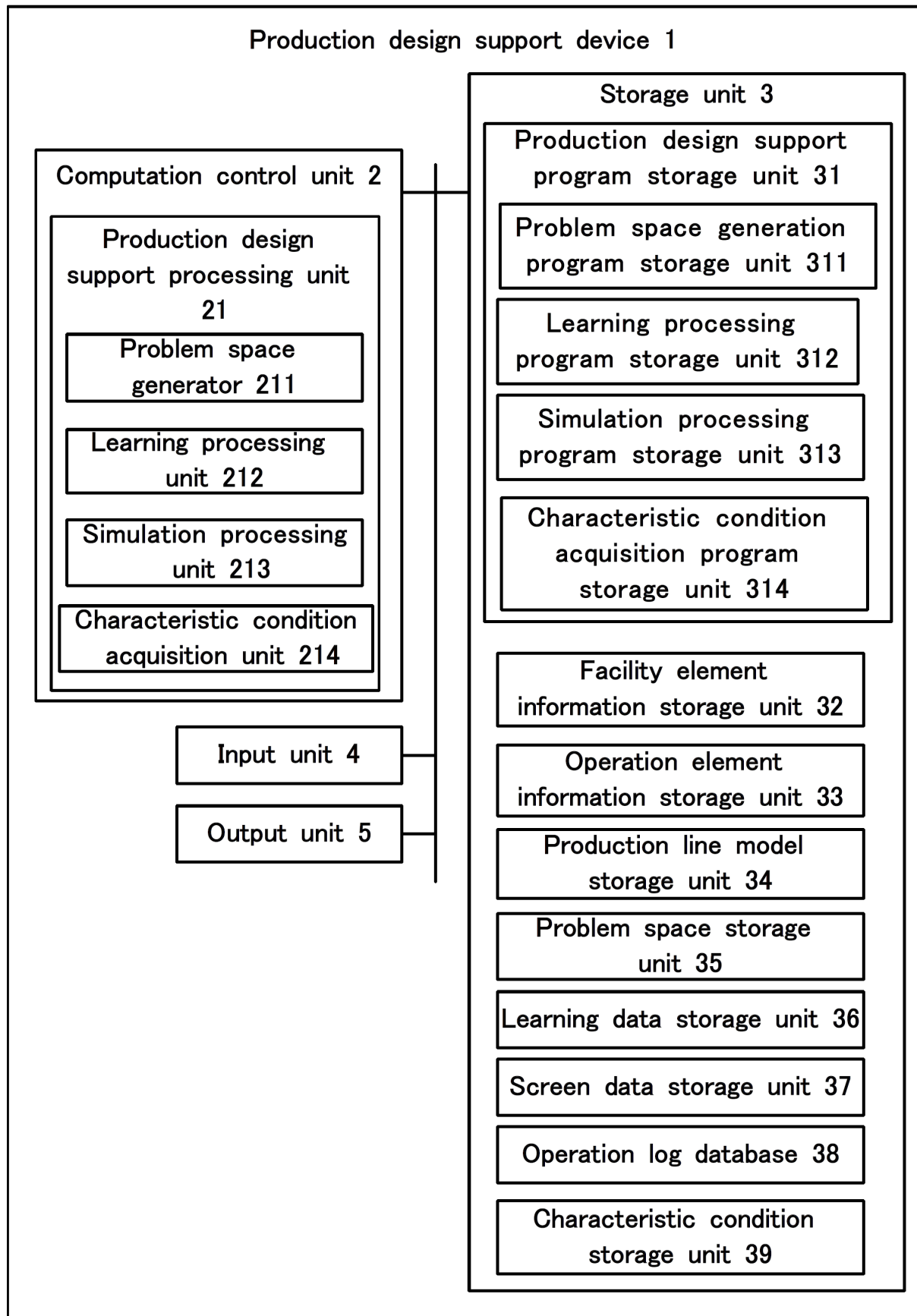


Fig. 4

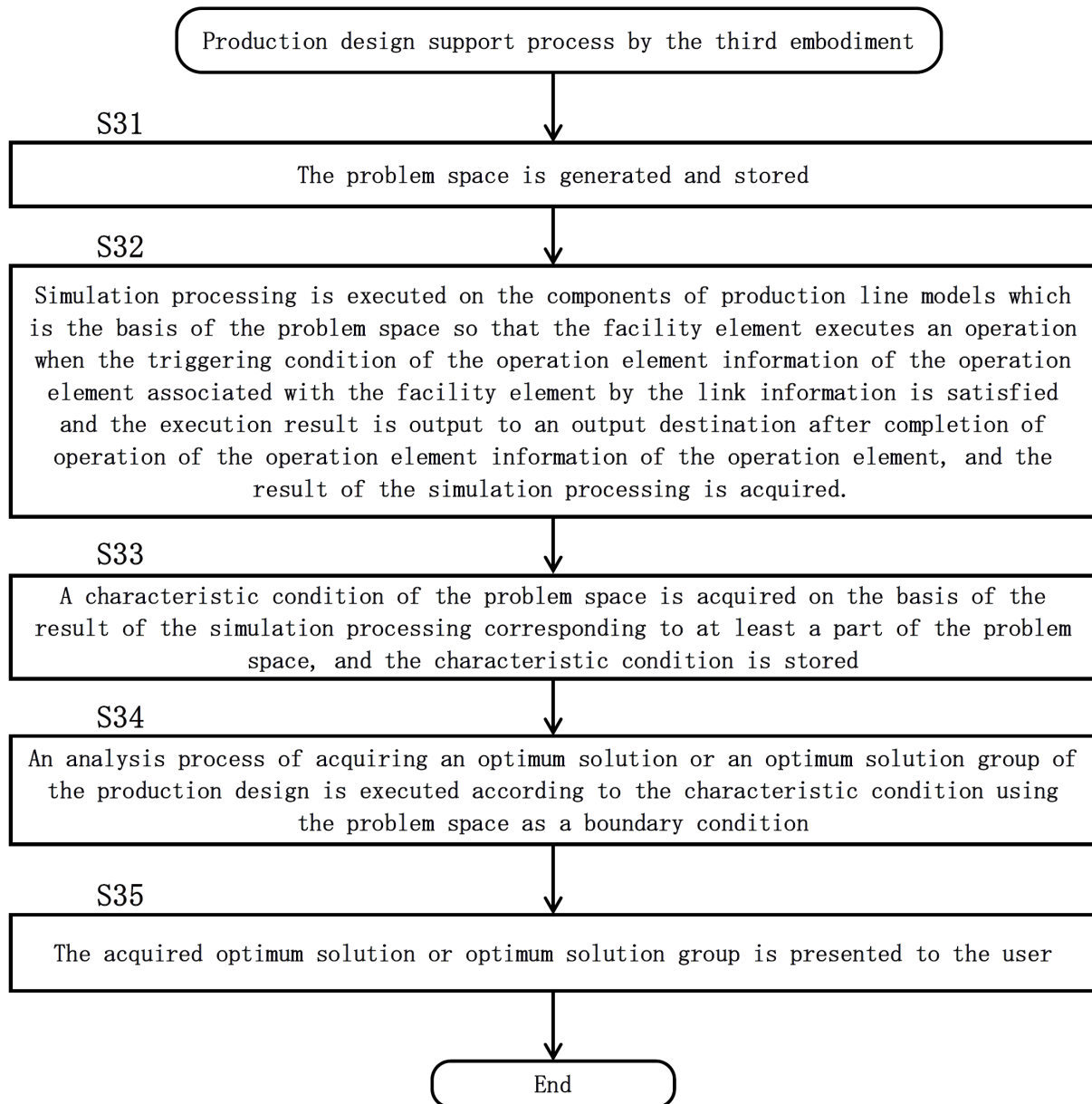
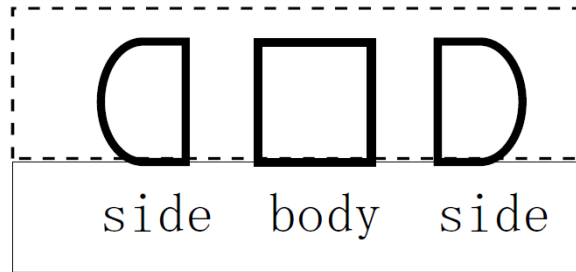
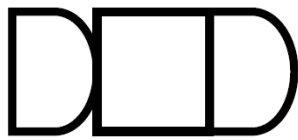


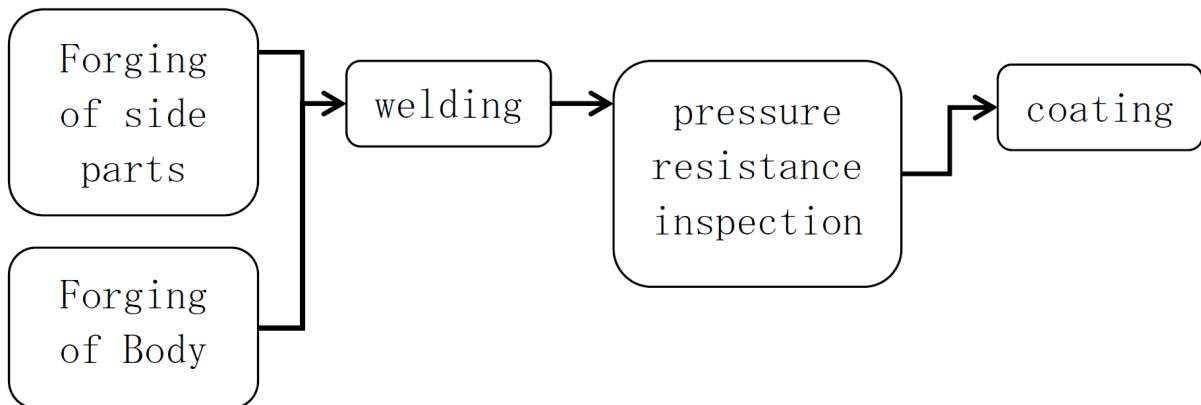
Fig. 5

○ product : high-pressure gas container



(a)

○ flow of a production process in a factory



(b)

Fig. 6

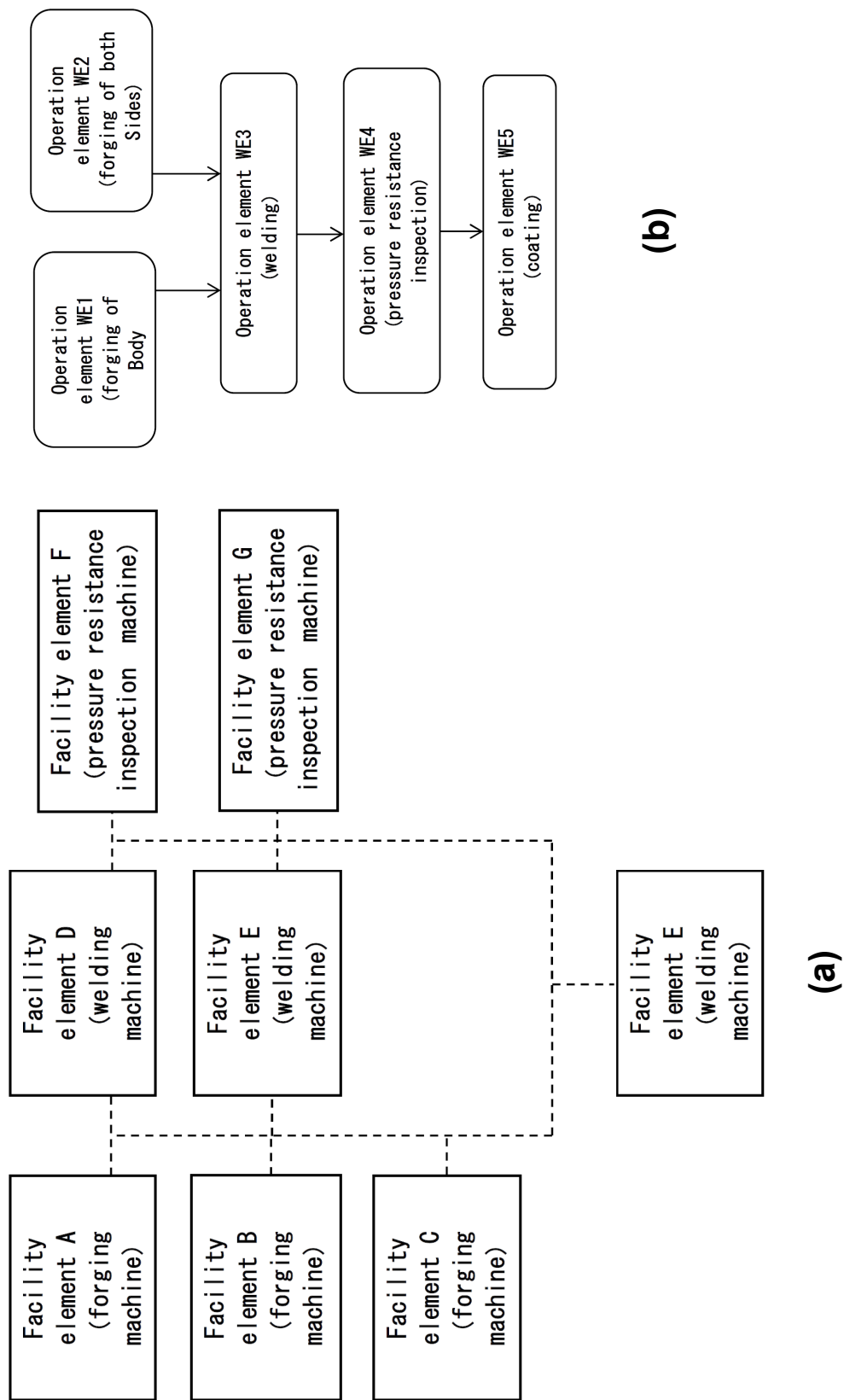


Fig. 7

Facility element	CT [min]	Position coordinate		Vertical and horizontal size to be occupied	Capacity of a part buffer (number)	Worker (number)	...
		X coordinate	Y coordinate				
Facility element A	---	Xa1-Xa2	Ya1-Ya2	Sxa, Sya	Va1-Va2	Ha1-Ha2	
Resolution		XRa	YRa		VRa	HRa	
Facility element B	---	Xb1-Xb2	Yb1-Yb2	Sxb, Syb	Vb1-Vb2	Hb1-Hb2	
Resolution		XRb	YRb		VRb	HRb	
Facility element C	---	Xc1-Xc2	Yc1-Yc2	Sxc, Syc	Vc1-Vc2	Hc1-Hc2	
Resolution		XRc	YRc		VRc	HRc	
Facility element D	---	Xd1-Xd2	Yd1-Yd2	Sxd, Syd	Vd1-Vd2	Hd1-Hd2	
Resolution		XRd	YRd		VRd	HRd	
Facility element E	---	Xe1-Xe2	Ye1-Ye2	Sxe, Sye	Ve1-Ve2	He1-He2	
Resolution		XRe	YRe		VRe	HRe	
Facility element F	---	Xf1-Xf2	Yf1-Yf2	Sxf, Syf	Vf1-Vf2	Hf1-Hf2	
Resolution		XRf	YRf		VRf	HRf	
Facility element G	---	Xg1-Xg2	Yg1-Yg2	Sxg, Syg	Vg1-Vg2	Hg1-Hg2	
Resolution		XRg	YRg		VRg	HRg	
Facility element H	---	Xh1-Xh2	Yh1-Yh2	Sxh, Syh	Vh1-Vh2	Hh1-Hh2	
Resolution		XRh	YRh		VRh	HRh	

Fig. 8

Operation element	Triggering condition	Unit price of necessary parts	Output destination	Type of output product	Number of output products	...
	Type and Required number of necessary parts					
Operation element WE1	No condition	—	Operation element WE3	Part we1	N11-N12 Resolution : NR1	
Operation element WE2	No condition	—	Operation element WE3	Part we2	N21-N22 Resolution : NR2	
Operation element WE3	Number of part we1:N31-N32, Number of part we2:2(N31-N32)	Cwe1 Cwe2	Operation element WE4	Part we3	N31-N32 Resolution : NR3	
Operation element WE4	Number of part we3:N41-N42	Cwe3	Operation element WE5	Part we4	N41-N42 Resolution : NR4	
Operation element WE5	Number of part we4:N51	Cwe4	Finished product	Finished product we5	N51 —	

Fig. 9

Operation elements and facility elements for which the link information can be set as a component	
Operation element WE1	Facility element A Facility element B Facility element C
Operation element WE2	Facility element A Facility element B Facility element C
Operation element WE3	Facility element D Facility element E
Operation element WE4	Facility element F Facility element G
Operation element WE5	Facility element H

(a)

Production line model	Component including link information		link information
Production line model PL1	Operation element WE1	Facility element A	Yes
	Operation element WE2	Facility element B	Yes
	Operation element WE3	Facility element D	Yes
	Operation element WE4	Facility element F	Yes
	Operation element WE5	Facility element H	Yes
Production line model PL2	Operation element WE1	Facility element B	Yes
	Operation element WE2	Facility element C	Yes
	Operation element WE3	Facility element D	Yes
	Operation element WE4	Facility element F	Yes
	Operation element WE5	Facility element H	Yes
Production line model PL3	Operation element WE1	Facility element A	Yes
	Operation element WE2	Facility element B	Yes
	Operation element WE2	Facility element C	Yes
	Operation element WE3	Facility element D	Yes
	Operation element WE3	Facility element E	Yes
	Operation element WE4	Facility element F	Yes
	Operation element WE4	Facility element G	Yes
	Operation element WE5	Facility element H	Yes
Production line model PL4	Operation element WE1	Facility element B	Yes
	Operation element WE2	Facility element B	Yes
	Operation element WE2	Facility element A	Yes
	Operation element WE3	Facility element D	Yes
	Operation element WE3	Facility element E	Yes
	Operation element WE4	Facility element F	Yes
	Operation element WE4	Facility element G	Yes
	Operation element WE5	Facility element H	Yes
:	:	:	:

(b)

Fig. 10

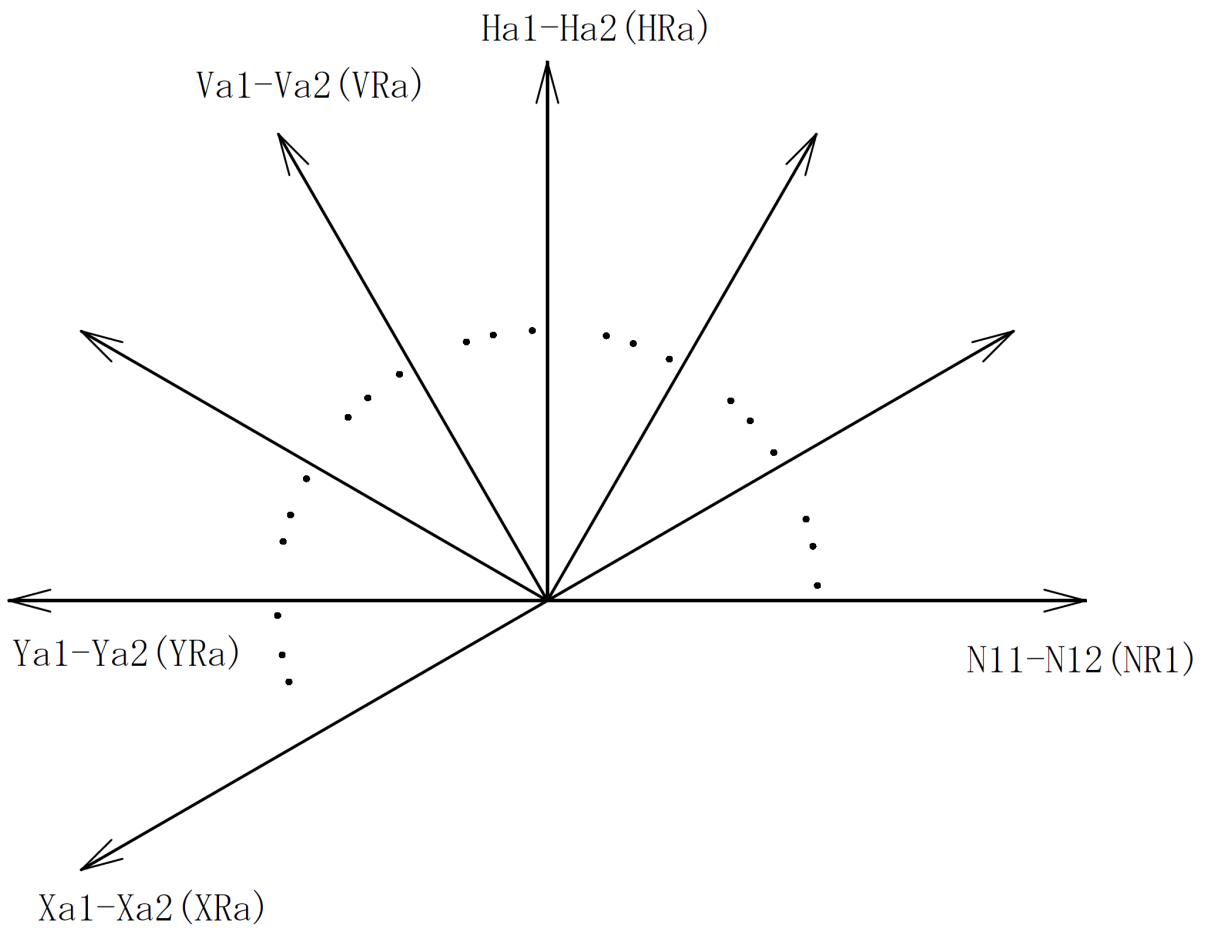
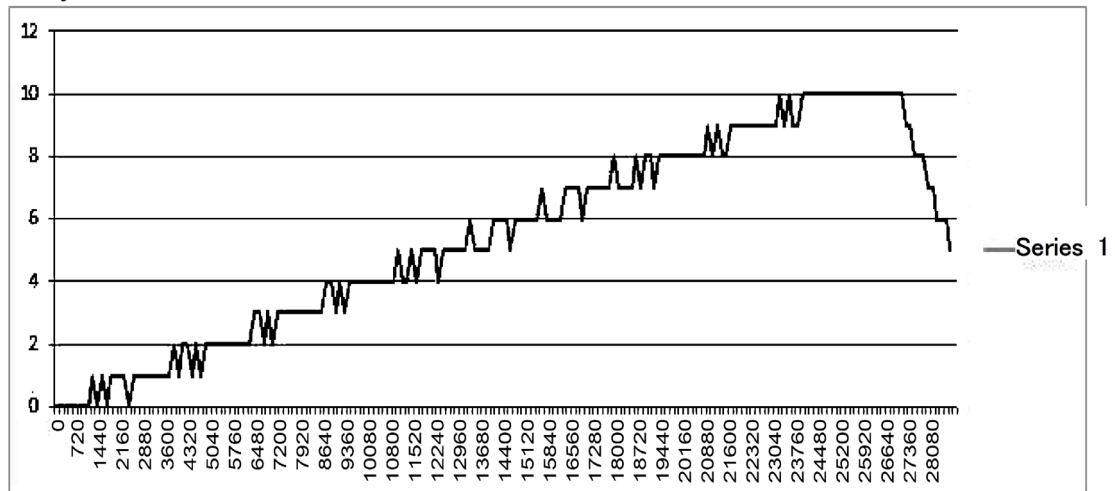


Fig. 11

Production line model	Changeable specification of operation element information	Changeable specification of facility element information	Inventory cost corresponding to N51 finished products
Production line model PL3	Number of output products of operation element WE1 : N1x	Position coordinate of facility element A : Xax, Yax	TC1
	Number of output products of operation element WE2 : N2x	Capacity of part buffer of facility element A : Vax	
	:	:	
Production line model PL4	Number of output products of operation element WE1 : N1y	Position coordinate of facility element A : Xay, Yay	TC2
	Number of output products of operation element WE2 : N2y	Capacity of part buffer of facility element A : Vay	
	:	:	

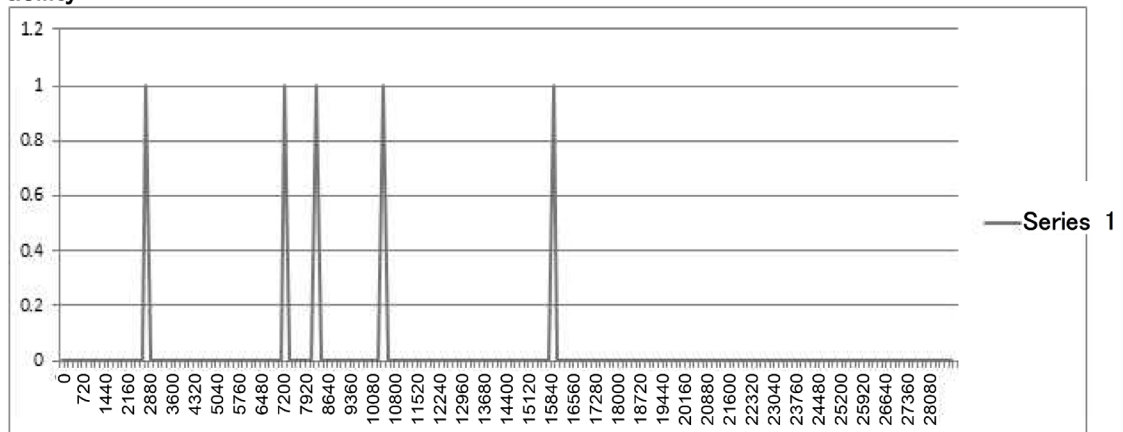
Fig. 12

Facility Buf1



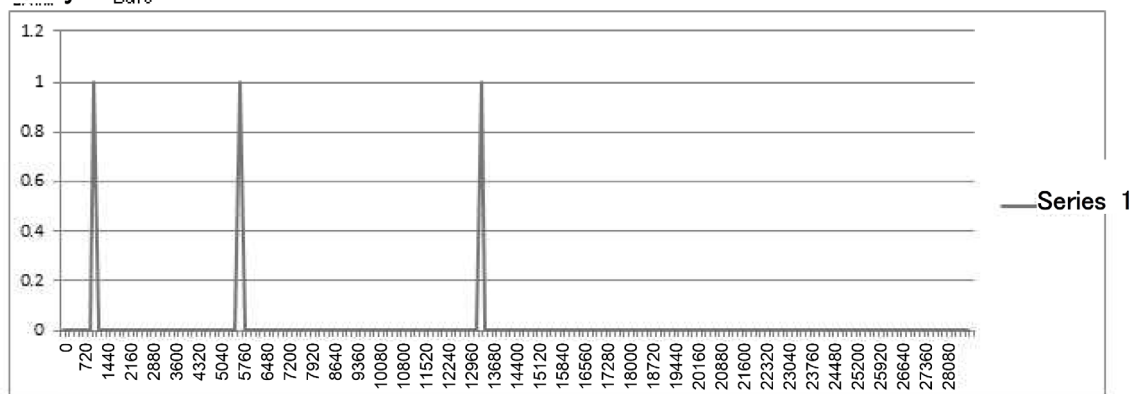
(a) Intermediate inventory after forging

Facility Buf4



(b) Intermediate inventory before welding

Facility Buf6



(c) Intermediate inventory before inspection

Fig. 13

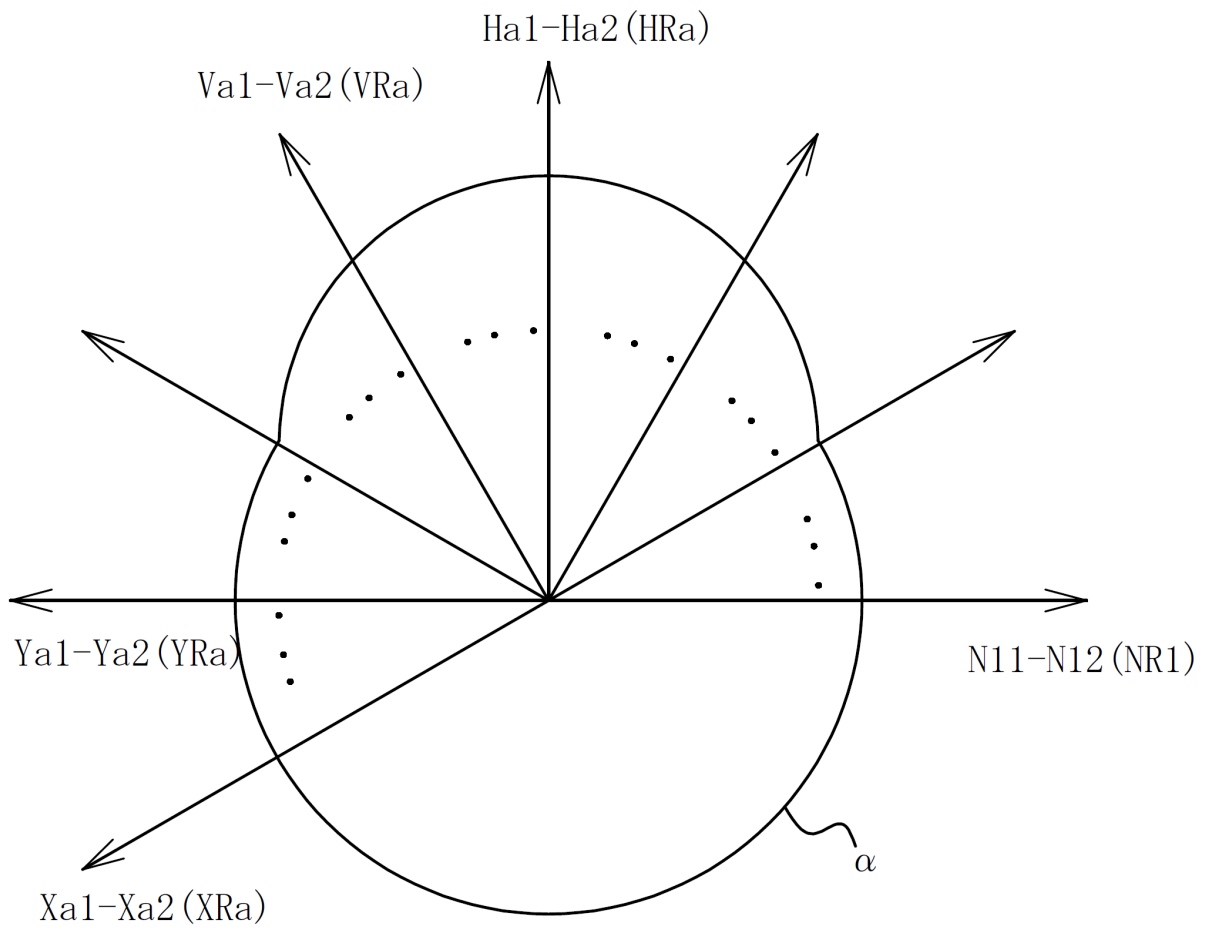


Fig. 14

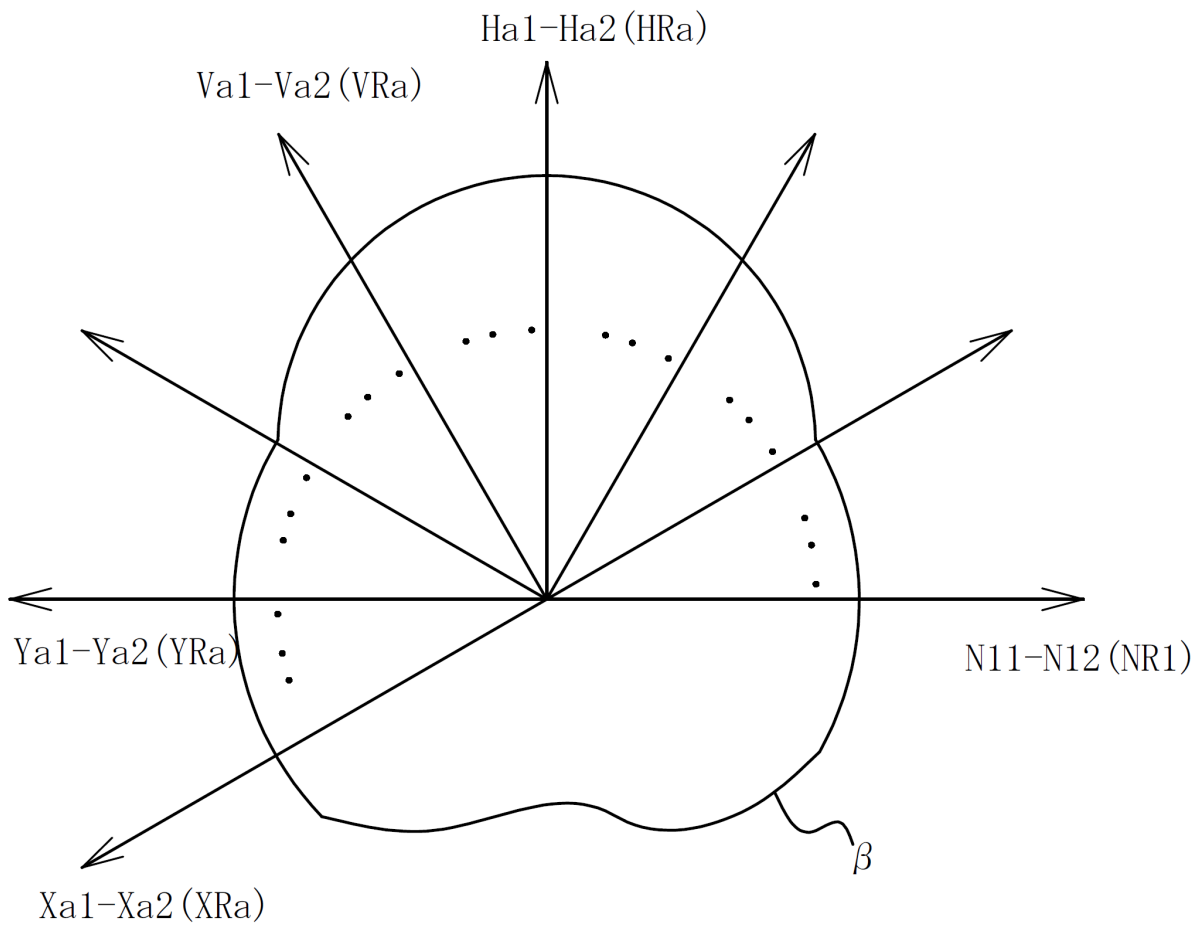


Fig. 15