tsb
Taiwan Steel Bearing

http://www.hanchun.com.tw

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Precious Bearings,
Taiwanese Exquisite Technique

精 密 軸 承 ， 台 灣 工 藝

NSF
ISO 9001:2008

軸承編號體系

d = 公稱內徑　　*d* = nominal bore diameter/5,
D = 公稱外徑　　*D* = nominal outside diameter/5, and
B = 公稱寬度　　*B* = nominal width.

標準軸承標記示例
Example for Standard Bearing

DIR 100144530/P53

DIR：雙內環四列滾柱軸承 Double Inner Ring

100：*d* = 100 x 5 = 500 mm

144：*D* = 144 x 5 = 720 mm

530：*B* = 530 mm

P53：公差等級5、徑向間隙3組 ISO 492:2002(E), 5.1.4 Tolerance class 5 and ISO 5753-1:2009, Radial internal clearance G_r: 3

非標準軸承標記示例
Example for Nonstandard Bearing

SIR/4258192

SIR：四列滾柱軸承（一個內環）Single Inner Ring

/：symbol for nonstandard type

42：*d* = 42 x 5 = 210 mm

58：*D* = 58 x 5 = 290 mm

192：*B* = 192 mm

註 (a) 滾柱組內徑 。Nominal roller inscribed circle diameter.

(b) r 的最小單一尺度。Smallest single chamfer dimension of r.

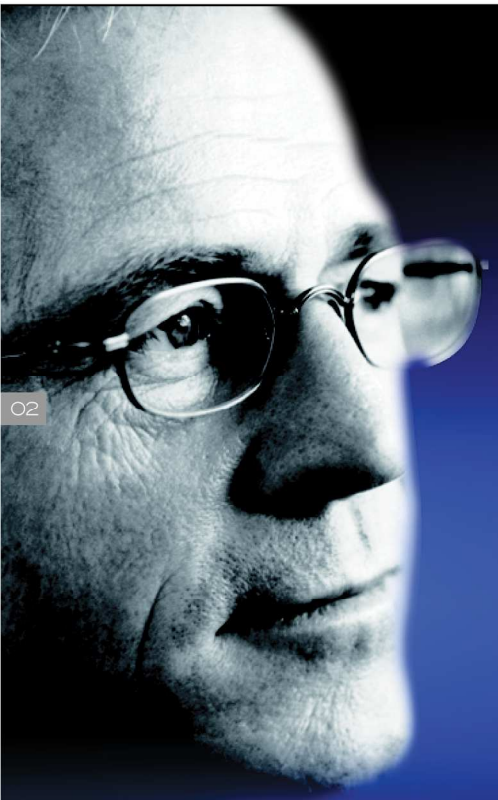
(c) r_1 的最小單一尺度。Smallest single chamfer dimension of r_1.

SIR型軸承主要尺度　　mm

代號 Identification Code	*d*	*D*	*B*	F_w (a)	r_{smin} (b)	r_{1smin} (c)
SIR 182870	90	140	70	105	1.5	1.1
SIR 3246130	160	230	130	180	1.5	1.5
SIR 3246168	160	230	168	180	2.1	2.1
SIR 3248124	160	240	124	183	2.1	2.1
SIR 3248168	160	240	168	183	2.1	2.1
SIR 3446160	170	230	160	185.5	2	2
SIR 3450170	170	250	170	192	2.1	2.1
SIR 3452120	170	260	120	195	2.1	2.1
SIR 3650156	180	250	156	200	2.1	2.1
SIR 3652124	180	260	124	202	2.1	2.1
SIR 3652168	180	260	168	202	2.1	2.1
SIR 3656180	180	280	180	207	2.1	2.1
SIR 3852168	190	260	168	212	2.1	2.1
SIR 3854168	190	270	168	212	2.1	2.1
SIR 3854170	190	270	170	212	2.1	2.1
SIR 3854200	190	270	200	212	2.1	2.1
SIR 3856200	190	280	200	214	2.1	2.1
SIR 4054170	200	270	170	222	2.1	2.1
SIR 4056188	200	280	188	222	2.1	2.1
SIR 4056200	200	280	200	222	2.1	2.1
SIR 4058192	200	290	192	226	2.1	2.1
SIR 4064216	200	320	216	233	2.1	2.1
SIR 4260210	210	300	210	234	2.1	2.1
SIR 4462192	220	310	192	246	2.1	2.1
SIR 4464210	220	320	210	248	2.1	2.1
SIR 4468200	220	340	200	250	4	4
SIR 4666206	230	330	206	260	2.1	2.1
SIR 4866220	240	330	220	264	2.1	2.1
SIR 4868192	240	340	192	265	2.1	2.1
SIR 4872220	240	360	220	272	2.1	2.1
SIR 5070220	250	350	220	278	3	3
SIR 5072220	250	360	220	282	3	3
SIR 5272200	260	360	200	288	3	3
SIR 5274220	260	370	220	292	3	3
SIR 5276220	260	380	220	290	3	3
SIR 5678220	280	390	220	312	3	3
SIR 5878190	290	390	190	316	3	3
SIR 6084218	300	420	218	332	4	4

■ 若需製作其他尺寸，可依照客戶需求訂製

精 研
致 用



自1970年成立至今，早期從齒輪變速箱的生產到軋鋼設備的整廠規劃製造，漢春機械秉持「精、研、致、用」的廠訓精神，推動機械自動化的生產技術，更以服務客戶、為客戶解決問題的態度持續投入研發計劃。公司更是一直不斷地創新，從怡泰齒輪轉型漢春機械到現今創立自我品牌「tsb」，未來我們還會繼續努力，以擁有幾十年的技術經驗、嚴謹的品管製程，開創台灣製造的優良精湛工藝。
tsb的每個軸承及配件，都是在最嚴謹的品管製程下生產，從材料的取得、製程的控管、產品的量測，到產品的熱處理工藝及產品的包裝等等，我們都力求達到國際級的品質標準。

The history of company

Since its inception in 1970, from an early start with gearbox made to now capable of the Bar Mill design and manufacturing, we always hold the spirit of factory motto-"Extensive Study for Practical Purposes", even to set machinery automation into production technology. Stay, all the time, running research program for customer service and problem solved. The evolution of Company originating in Yitai Gear to Han Chun machinery to today's own brand " tsb ", would keep on using our best efforts to fully meet quality requirements, by plentiful experience as well as strict process control.

Each tsb bearing and component, shall be ensured every action, such as material procurement, machining process, follow-up measurement, heat treatment and packaging design ... etc, to be implemented under controlled conditions and product outputs which might achieve International Standard.

「立足台灣，行銷全球」

tsb生產開發的軸承都是以承受高荷載的圓柱（圓錐）滾子軸承為主，運用的領域為鋼鐵廠的棒鋼、高線線材、不鏽鋼板等型的軋機軸承，同時也廣泛運用於其他重機及綠能相關產業領域。

除了生產多種標準的軸承，tsb還可以針對客戶的需求開發設計符合客戶條件的特殊軸承，同時透過我們有效率且快速的交貨服務，能夠減少客戶對庫存的依賴進而協助客戶降低成本。

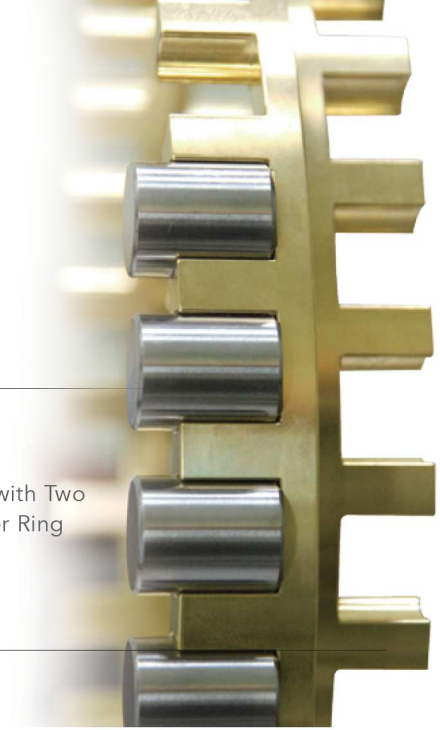
tsb秉持成為客戶最佳夥伴關係的理念，同時以「立足台灣，行銷全球」為志業，努力經營品牌提昇企業經營價值。tsb身為台灣工業界的一份子，有使命為台灣在國際競爭力上盡一份心力，經長時間地耕耘、努力至今，我們可以驕傲地說—在全球優良的軸承品牌中tab亦是其中之一。

tsb rolling bearings – four row cylindrical (tapered) roller bearings are mainly applied for Bar, Wire Rod and Hot Strip Steel Mills, also widely used in the heavy duty & green energy industry as well.

In addition to a variety of standard bearings, customized one is welcome and available in tsb. Short delivery time to lower your inventory holding costs, level price with genuine material and solid substance should be our merits, indeed.

To form a good partnership with customers is our business philosophy, footing Taiwan and global marketing is tsb mission statement, to well manage our own brand for enhancing corporate value is the goal. Being a member of the Taiwanese manufacturers, should contribute something to our country for world competition, hopefully tsb shall be proud to be one of best bearings afterwards.

01 種類 Kind

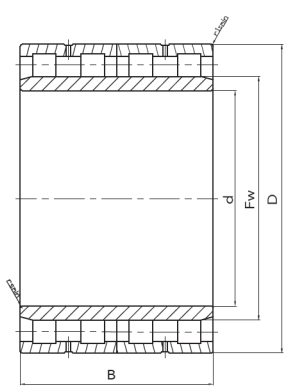


1. 單內環四列滾柱軸承 *SIR*
2. 雙內環四列滾柱軸承 *DIR*
3. 外環附活肋環的雙內環四列滾柱軸承 *DIRR*

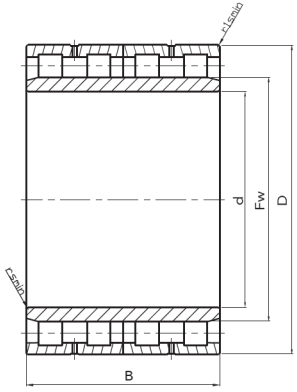
活肋環：方便安裝，具較高的定心度

1. Single Inner Ring
2. Double Inner Ring
3. Double Inner Ring with Two Loose Ribs on Outer Ring

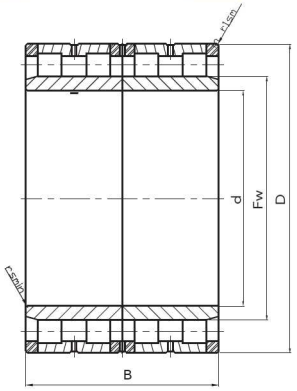
Loose Rib: Easy to install, with a high degree of centering.



SIR

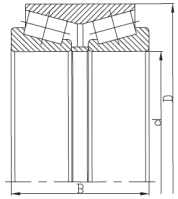


DIR

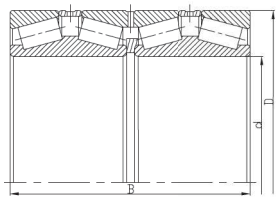


DIRR

■ 軋機用圓錐滾子軸承 (Rolling Bearings - Taper Roller Bearings for Rolling Mills)



雙列 (Double Row)



四列 (Four Row)

02 應用 Application

1. 軋輥

初/粗軋輥、中間機架軋輥、精軋輥、光亮平整輥、工作輥、中間輥、支承輥（連續工作要達到5000h）。

2. 軋機

棒線材、熱連軋、冷軋機。

3. 產業

+ 冶金

冶金設備用連座對合軸承。

■ 轉爐, 連鑄機, 傳動軸及冷軋管機

1. Mill Rolls

Blooming/Slabbing Mill Roll, Roughing Roll, Intermediate Stand Roll, Finishing Roll, Skin Pass Roll, Work Roll, Intermediate Roll, Back-up Roll (life time: 5000 h)

2. Mills

Bar & Wire Rod Mill, Hot Strip Mill, Cold Rolling Mill.

3. Industries

+ Metallurgy

Split Rolling Bearing with Housing for Metallurgical Equipment

■ Converters, Continuous Casting Machines, Drive Shafts and Cold Pilger Machines

+ 機械

機床主軸用雙列滾柱軸承。

■ 臥式CNC車床

+ Machinery

Double Row Cylindrical Roll Bearings for Spindles of Machines

■ Horizontal Turing Lathes

+ 交通

鐵道車輛滾動軸承。

■ 高速列車軸承結構

+ Transportation

Rolling Bearing in the Railway Passenger Car and Wagon

■ Type in High-Speed Passenger Traffic

+ 綠能

風電發電機組齒輪箱。

■ 滿列滾柱軸承

+ Green

Gearbox of Wind Turbine Generator System

■ Multi-Row Full Complement Cylindrical Roller Bearings

03 設計 Design

① 內/外環

高碳軸承鋼鋼料，符合ISO 683-17:1999標準

② 保持器

銅及銅合金鑄件材料，合金特性：硬度優，耐磨耗性佳，鉛溶出量非常少; 用途例：滑動零件、油壓缸、套筒、齒輪、製紙用各種滾輪等。

③ 滾柱

硬度：HRC 58至65、表面粗度：Ra≦0.2μm（Rt≦1μm）

① Inner/Outer Ring

eqv ASTM A295/A 295M - 05 Standard Specification for High-Carbon Anti-Friction Bearing Steel

② Cage

JIS H 5120：2006 Copper and copper alloy castings Characteristics of Alloys: High in hardness and good in abrasion resistance. Very little lead leaching. Examples of uses: Moving parts, oil hydraulic cylinder, sleeve, gear, various types of roller for paper manufacturing, etc.

③ Cylindrical Rollers

HRC 58~65 , Ra≦0.2μm（Rt≦1μm）

04 精度 Tolerances

公差

軸承公差等級共分四級，即0、6、5和SP級，分別按表1、表2的規定；其中SP級旋轉精度為5級，尺度精度為6級。

Tolerance

tsb bearings are of four classes: namely, 0, 6, 5 and SP, respectively. Their requirements are given in Table 1 and 2. In which, SP states in running accuracy class 5 and dimensional accuracy class 6.

（表1）內環　(Table 1) Inner Ring

μm

d mm		Δ_{dmp} [a]				V_{dsp} [b]			V_{dmp} [c]			K_{ia} [d]			d_{1mpmax} [e] $-d_{2mpmin}$			Δ_{Bs} [f]		V_{Bs} [g]		
		公差等級 classes																				
超過 >	到 ≦	0, 6, 5	0	6	5	0	6	5	0	6	5	0	6	5	0	6	5	0, 6, 5		0	6	5
		上偏差 high	下偏差 low			max												上偏差 high	下偏差 low	max		
80	120	0	-20	-15	-10	20	15	9	15	11	5	25	13	6	10	8	5	0	-200	10	8	5
120	180	0	-25	-18	-13	25	18	12	19	14	7	30	18	8	13	9	7	0	-250	13	9	7
180	250	0	-30	-22	-15	30	23	14	23	17	8	40	20	10	15	11	8	0	-300	15	11	8
250	315	0	-35	-25	-18	35	25	16	26	19	9	50	25	13	18	13	9	0	-350	18	13	9
315	400	0	-40	-30	-23	40	31	21	30	23	12	60	30	15	20	15	12	0	-400	20	15	12
400	500	0	-45	-35	-27	45	35	24	34	26	14	65	35	18	23	18	14	0	-450	23	18	14
500	630	0	-50	-40	-30	50	40	27	38	30	15	70	40	20	25	20	15	0	-500	25	20	15
630	800	0	-75	-	-	-	-	-	-	-	-	80		-	38	-	-	0	-750	38	-	-

註

[a] 單一平面平均內徑偏差（對於基本圓錐孔心，Δ_{dmp}僅指內孔的理論小端）。
[b] 單一平面內徑變動量。
[c] 平均內徑變動量（僅適用于基本圓柱孔）。
[d] 成套軸承內環徑向偏差。
[e] 同一軸承內環最大平均內徑與最小平均內徑之差。
[f] 內環單一寬度偏差。
[g] 內環寬度變動量。

[a] Deviation of mean bore diameter in a single plane（for a basically tapered bore, Δ_{dmp} refers to the theoretical small end of the bore）.
[b] Variation of bore diameter in a single plane.
[c] Variation of mean bore diameter（this applies only to a basically cylindrical bore）.
[d] Radial runout of inner ring of assembled bearing.
[e] Difference between the maximum and minimum mean bore diameter of inner ring.
[f] Deviation of a single inner ring width.
[g] Variation of inner ring width.

（表2）外環　(Table 2) Outer Ring

μm

D mm		Δ_{Dmp} [a]				V_{Dsp} [b]			V_{Dmp} [c]			K_{ea} [d]			D_{1mpmax} [e] $-D_{2mpmin}$			Δ_{Cs} [f]		V_{Cs} [g]		
		公差等級 classes																				
超過 >	到 ≦	0, 6, 5	0	6	5	0	6	5	0	6	5	0	6	5	0	6	5	0, 6, 5		0	6	5
		上偏差 high	下偏差 low			max												上偏差 high	下偏差 low	max		
120	150	0	-18	-15	-11	19	15	10	14	11	6	40	20	11	9	8	6	0	-250	30	30	8
150	180	0	-25	-18	-13	25	18	12	19	14	7	45	23	13	13	9	7	0	-250	30	30	8
180	250	0	-30	-20	-15	31	20	13	23	15	8	50	25	15	15	10	8	0	-300	30	30	10
250	315	0	-35	-25	-18	35	25	16	26	19	9	60	30	18	18	13	9	0	-350	35	35	11
315	400	0	-40	-28	-20	40	28	18	30	21	10	70	35	20	20	14	10	0	-400	40	40	13
400	500	0	-45	-33	-23	45	34	20	34	25	12	80	40	23	23	17	12	0	-450	50	45	15
500	630	0	-50	-38	-28	50	38	25	38	29	14	100	50	25	25	19	14	0	-500	60	50	18
630	800	0	-75	-45	-35	75	45	31	55	34	18	120	60	30	38	23	18	0	-750	70	-	20

註

[a] 單一平面平均外徑偏差。
[b] 單一平面外徑變動量。
[c] 平均外徑變動量。
[d] 整組軸承外環徑向偏差。
[e] 同一軸承外環最大平均外徑與最小平均外徑之差。
[f] 外環單一寬度偏差。
[g] 外環寬度變動量。

[a] Deviation of mean outside diameter in a single plane.
[b] Variation of outside diameter in a single plane.
[c] Variation of mean outside diameter.
[d] Radial runout of outer ring of assembled bearing.
[e] Difference between the maximum and minimum mean outside diameter of outer ring.
[f] Deviation of a single outer ring width.
[g] Variation of outer ring width.

世界軸承之父、天文學家郭守敬
Father of the Rolling Bearing - Astronomer Gou, Shou-Jing

徑向間隙　Radial Clearance

μm

d mm		2組 G_r 2		0組 G_r 0		3組 G_r 3		4組 G_r 4		5組 G_r 5	
>	≦	min	max	min	max	min	max	min	max	min	max
80	100	15	50	50	85	75	110	110	140	155	190
100	120	15	55	50	90	85	125	125	165	180	220
120	140	15	60	60	105	100	145	145	190	200	245
140	160	20	70	70	120	115	165	165	215	225	275
160	180	25	75	75	125	120	170	170	220	250	300
180	200	35	90	90	145	140	195	195	250	275	330
200	225	45	105	105	165	160	220	220	280	305	365
225	250	45	110	110	175	170	235	235	300	330	395
250	280	55	125	125	195	190	260	260	330	370	440
280	315	55	130	130	205	200	275	275	350	410	485
315	355	65	145	145	225	225	305	305	385	455	535
355	400	100	190	190	280	280	370	370	460	510	600
400	450	110	210	210	310	310	410	410	510	565	665
450	500	110	220	220	330	330	440	440	550	625	735
500	560	120	240	360	360	360	480	480	600		
560	630	140	260	260	380	380	500	500	620		
630	710	145	285	285	425	425	565	565	705		
710	800	150	310	310	470	470	630	630	790		

註
(a) 單一平面平均外徑偏差。
(b) 單一平面外徑變動量。
(c) 平均外徑變動量。
(d) 整組軸承外環徑向偏差。
(e) 同一軸承外環最大平均外徑與最小平均外徑之差。
(f) 外環單一寬度偏差。
(g) 外環寬度變動量。

(a) Deviation of mean outside diameter in a single plane.
(b) Variation of outside diameter in a single plane.
(c) Variation of mean outside diameter.
(d) Radial runout of outer ring of assembled bearing.
(e) Difference between the maximum and minimum mean outside diameter of outer ring.
(f) Deviation of a single outer ring width.
(g) Variation of outer ring width.

05 品質 Quality

① 認證

■ 質量管理體系要求，符合ISO9001:2008標準
Quality management systems—Requirements
ISO9001:2008

① Certifications

■ 漢翔航空工業股份有限公司品質系統證書
Aerospace Industrial Development Corporation
Certificate of Approval AEF-99004

② 管制重點

熱軋（擠壓）球化退火高碳鉻軸承鋼無縫鋼管粗加工件

化學成分、氧含量、勃氏硬度、巨觀組織試驗、顯微組織試驗、碳化物不均勻性檢驗、非金屬夾雜物、脫碳層及尺度。

保持器（含試片）

外觀、化學成分、機械性質、尺度、形狀公差及應力消除退火記錄。

② Incoming Quality Control

Seamless Steel Tubes for High-Carbon Chromium Bearing Steel

Chemical Analysis, Oxygen Content, Hardness Brinell, Macrostructure Examination, Microscopic Examination, Eutectic Carbide, Non-Metallic Inclusion, Decarburization and Dimensions.

Cages (test piece included)

Appearance Inspection, Chemical Analysis, Mechanical Properties,Dimensions, Permissible Variation in Dimensions, Stress Relief Annealing Recorder.

■ 商品滾柱抽樣檢查項目（JIS B 1506 : 2005 Rolling bearings—Rollers）：

序號 Item	檢查項目 Test Items	合格質量水平 （AQL–Acceptable Quality Level）
1	ΔD_{wmp} [A]	0.65
2	V_{Dwp} [B] ; $D_{wmp} - D'_{wmp}$ [C]	0.65
3	ΔC_{ir} [D]	0.65
5	V_{LwL} [E]	0.65
6	S_{Dw} [F]	0.65
7	ΔL_{ws} [G]	1
8	工作表面外觀質量 End Surface Shape	0.65

註
A 單一徑向平面內平均直徑的偏差。
B 單一徑向平面內直徑變動量。
C 兩端平均直徑之差。
D 圓度誤差。
E 批長度變動量。
F 端面偏轉。
G 單一長度偏差。

A variation of single plane mean diameter（difference between the maximum value and the minimum value in mean diameter in plane of a roller）
B diameter variation in a single radial plane（difference between the maximum value and the minimum value of single diameter of roller in a radial plane）
C difference between mean diameter in a single plane（D_{wmp}）of both ends
D circularity deviation
E variation of gauge lot length（difference between the single length L_{ws} of the roller having the largest single length and that of the roller having the smallest single length in the gauge lot）
F end surface runout with outside surface（deviation of roller end surface from radial plane of roller）
G dimension difference of length（difference between the single length and the nominal length）

❸ 量測與監督裝置之管制

蔡司精密三次元測量儀器

Control of Measuring and Monitoring Devices

ZEISS Coordinate Measuring Machine

客戶使我們領袖群倫

業 績	Work Experience
台灣：	Taiwan:
建順煉鋼股份有限公司	Chien Shun Steel Co., Ltd.
長榮鋼鐵股份有限公司	Evergeen Steel Corporation
慶欣欣鋼鐵股份有限公司	E-Top Metal Co., Ltd.
豐興鋼鐵股份有限公司	Feng Hsin Steel Co., Ltd.
漢泰鋼鐵廠股份有限公司	Han Tai Steel & Iron Works Co., Ltd.
結進材料科技股份有限公司	Jie Jin Material Science Technolog Co., Ltd.
龍慶鋼鐵企業股份有限公司	Lung Ching Steel Enterprise Co., Ltd.
官田鋼鐵股份有限公司	Quintain Steel Co. Ltd.
志成鋼鐵股份有限公司	T S Steel Co., Ltd.
東和鋼鐵企業股份有限公司	Tung Ho Steel Enterprise Corp.
東周鋼鐵廠股份有限公司	Tung Chou Industrial Co., Ltd.
東盟開發實業股份有限公司	Tung Mung Development Co., Ltd.
威致鋼鐵工業股份有限公司	Wei Chih Steel Industrial Co., Ltd.
燁興企業股份有限公司	Yieh Hsing Enterprise Co., Ltd.
永富興科技股份有限公司	Yung Fu Shing Technology Co., Ltd.
印度尼西亞：	Indonesia: Inter World Steel Mills Indonesia, PT
馬來西亞：	Malaysia: Win-A Steel Manufacturing Sdn. Bhd. Vibrant Waves Sdn. Bhd.
泰國：	Thailand: Siam Property Steel Co., Ltd.