

MING YANG VIBRATOR CO., LTD

Vibrating Hammer Maintenance Manual

台灣明暘振動機操作保養手冊



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Table of Content 目錄

1. Introduction 序言	3
2. Product Description 產品簡介	3
3. Basic Characteristics 產品特性	4
4. Parameters 產品參數	5
5. Components 元件介紹	8
6. Instructions 使用說明	11
7. Troubleshooting 簡易故障排除	16
8. Easy Troubleshooting 常見故障排除	18
9. Maintenance 保養與點檢項目	19
10. How to change parts 零件更換方法	24
11. Attachment 附件	27



1. Introduction 序言

In the heavy machinery industry, high-frequency vibrator hammer particularly relies on manual operation. It is very easy to learn to operate the hammer, even for beginners. However, the efficiency, operating technics and the maintenance status of the equipment will differ due to the experience of the operators. The hammer is composed of two main parts - the clamping head on the vibro driver attached to the crane with suspension yoke and elastomer blocks in-between. The vibro driver is assembled by a pair of eccentric gears and a block driven by hydraulic motor pump. The shock rubber pad eliminate the horizontal vibrating forces allowing the vibration to stack up on the vertical direction. The faster the hydraulic motor pump rotates, the higher the vibrate frequency is. In short, the vibration liquefies the soil of the target area in order to place the pile in to the ground.

In order to maintain a reasonable lifespan of the machine, you should choose a correct combination of the machine. Always use suitable equipment for the tasks for preventing damage to the machine. Apart from selecting the suitable machine combination and proper operation by skilled workers, another crucial factor to allow maximum life-span of the machine is by proper maintenance. This manual is to help our honored clients to understand our machines in order to do troubleshooting in short time quick troubleshooting and perform maintenance in the right way.

振動機在重型工業內，屬於完全依靠人力操作的設備。操作振動機的原理簡單，新手駕駛也能快速學會。操作速度、操作技巧以及保養方式會依駕駛經驗度而有所不同。振動機的結構為吊架和主機以減震塊懸掛，主機有一對偏心齒輪及偏心塊，由液壓馬達帶動，使偏心塊離心力橫向抵銷力度，水平疊放減震塊產生振幅，液壓馬達轉速越快頻率越高，振幅越快便能產生高頻，能藉由高頻液化土壤進行打樁作業。

選擇符合需求的振動機，除了評估使用的地質為何外，振動機的尺寸也是不可或缺的一個要素。本使用手冊供使用者了解產品結構、保養方式、故障排除。



明暘機械股份有限公司
明暘企業社

2. Product Description 產品簡介

Vibrating Hammer: Frequently used in all kinds of constructions such as highways, freeways, bridges, docks and all other buildings that requires metal piles. Applying high frequency vibration to liquefy soil allows the piles to be driven in easily. The advantages of a hydraulic hammer include lesser noise, higher efficiency, no pollution and no damage to the pile.

高頻液壓振動機：高速鐵路、公路軟地基處理、橋樑、碼頭工程、深基坑支護、普通建築物的基礎工程等方面有廣泛的應用，利用高頻率的震動，使樁體能輕鬆的打入土層，具有噪音小、效率高、無污染、不損傷樁柱等優點。

3. Basic Characteristics 產品特性

Hydraulic vibro hammer relies on high frequency vibration to quickly liquefy soil in order to place piles into the ground. Vibrating hammer is connected by a suspension to the vibro motor frame, and also attached to the vibro motor with shock rubber pad in-between. The vibro motor runs at a high speed working force onto the shock rubber pads, giving the hammer a strong vibration on the vertical side in order to liquefy the soil and reduce resistance for the pile to be driven into the ground.

Normal speed to place a pile is 4-7 meter/min, the fastest could reach 18 meter/min (non-viscose soil). The operation speed is much faster than any other pile drivers. Efficiency is 40% higher compared to an air hammer or diesel hammer. Except not able to operate on stone grounds, Vibrating Hammer could work on any other kind of ground and could easily penetrate pebble layers and sand layers.

Multifunction: Apart from pile driving, vibro motor pump could also be used in special functions such as creating thin walls to prevent leaking, underground soil compressing, soil compressing...etc.

高頻振動機是一種可持續的高頻率對土壤加速液化，振動機它由吊架連接主機框架，用減震膠塊懸掛振動主機，在液壓馬達高速旋轉帶動同向偏心塊產生激振



力，偏心塊橫向運動時相互抵消離心力，豎向時偏心塊相互疊加讓減震膠塊上拖動拉扯產生高頻振幅達到土壤加速液化。

振動打拔樁速度一般為4-7米/分，最快達18米/分（在非淤泥質土壤中），施工速度快於其他打樁機械，比氣動錘、柴油錘的效率高出40%-100%適當地質範圍廣：除了不能入岩，高頻液壓振動機幾乎適用於任何惡劣地質條件下的施工，可輕鬆穿透卵石層、夾沙層等地質。

功能多：高頻液壓振動機除可作各類承載樁的施工外，還可以建造薄壁防滲牆，深層密實處理，地面夯實處理等特殊施工。



4. Parameters 產品參數

【表 1 - 產品參數】

Brand	MING YANG									MIGHTY		
Vibro Model	#120A	#250A	#300A	#350A	#450A	#500A	#600A	450A G60ATS	M900T 650A	M600T 450A	M700T 450A	M900T 650A
Hydraulic Mortor Model (CC)	#41	#41	#90	#90	#107	#108	#110	#60 x2 Pcs	#90 x2 Pcs	#110	#60 x2 Pcs	#90 x2 Pcs
Vibration Frequency (rpm)	2800	2800	3500	3500	3000	3000	3000	3000	3500	3000	3000	3500
Vibratory Force (Ton)	30	38	45	55	65	75	85	75	95	70	75	95
Operating Pressure of Hydraulic System (Bar)	280	280	300	300	320	320	320	300	320	320	300	320
Flow of Hydraulic System (2500 rpm)(l/min)	103	103	225	225	268	270	275	300	450	275	300	450
Forces in the Clamp (Ton)	35	40	40	45	45	50	50	50	50	50	50	50
Clamp Weight (Kg)	500	545	575	575	575	670	670	670	670	670	670	670
Damping Pads Quantity	12	12	14	20	20	22	22	20	22	20	20	22
The Whole Weight (Kg)	1350	1750	2260	2600	2700	3000	3000	2800	3200	2700	2800	3200
Piling Depth (Max Meter)	6	8	10	16	18	18 Above	18 Above	18 Above	18 Above	18	18	18 Above
Applicable Excavator Models (Ton)	10 Above	20 Above	30 Above	35 Above	40 Above	45 Above	50 Above	40 Above	50 Above	40 Above	40 Above	50 Above

振機型號	馬達型號	排量	最高持續速度	最高間歇速度	最大流量	扭矩	350BAR 時矩	最高/最低溫度	持續/高峰最大壓力
Vibration model	Motor model	Displacement	Maximum sustained speed	Maximum intermittent speed	Maximum flow	Torque	Moments	Maximum / minimum temperature	Sustained / peak maximum pressure
#250	41	41	5600	6200	230	0.65	227	-25/110	400/450
#300~350	90	90	4500	5000	378	1.42	497	-25/110	400/450
#450↑ above	108	108.3	4000	4400	435	1.7	595	-25/110	400/450

鑽孔機參數 Drilling Performance Parameter

鑽孔機組

型號 Model		#400-750cc	#400-600cc
適用挖機型號 Applicable excavator models		30-40 TON	30-40 TON
Pressure (壓力)	Freeze 定格	27.5Mpa (280kgf/CM ²)	27.5Mpa (280kgf/CM ²)
	Highest among 瞬間最高	31.9Mpa (325kgf/CM ²)	31.9Mpa (325kgf/CM ²)
Torque (定格扭力)		3280N.m (334kgf/m ²)	2620N.m (267kgf/m ²)
Swing speed (回轉速度)	Freeze 定格	450rpm	500rpm
	Highest 最高	520rpm	600rpm
Highest power (最高動力)		154kW (210PS)	137kW (186PS)
Weight-Pump (馬達重量)		123KG	96KG
Weight-Drilling (鑽機重量)		1390KG	1390KG
Bracket weight (十字接頭重量)		110KG	110KG
Total weight (總重量)		1500KG	1500KG



鑽嘴

Drill pipe of mouth



Cutting base

切削座
(子彈座)



鑽孔機配件
Drilling rod machine parts



鑽孔機配件
Drilling rod machine parts



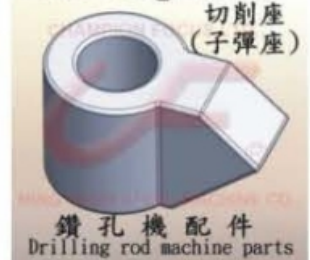
鑽孔機配件
Drilling rod machine parts



螺旋鑽桿 / Spiral drill stick



鑽孔機配件
Drilling rod machine parts



鑽孔機配件
Drilling rod machine parts

Steel sheet pile repairing machine

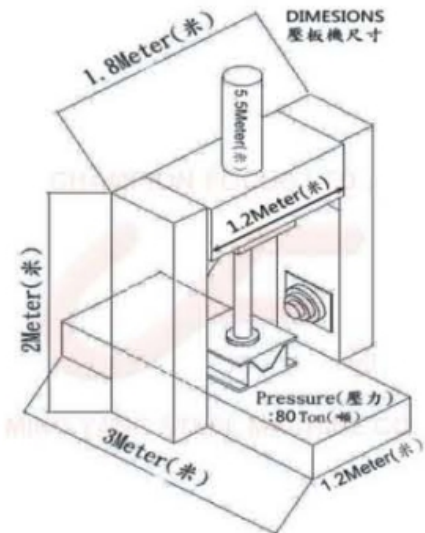
(Correction pile board of machine) (Pressing machine)

樁板矯正機(壓板機)



SPECIFICATION 壓板機數據

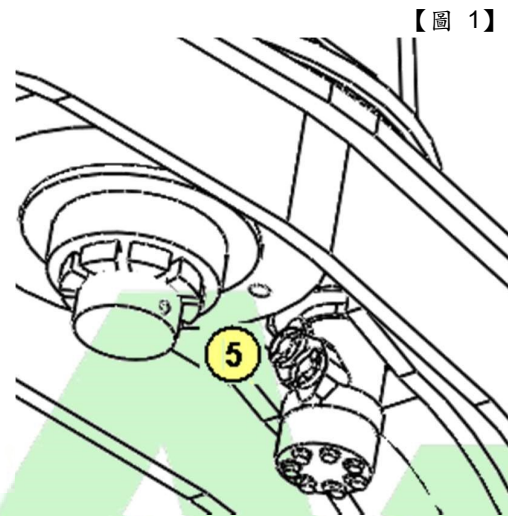
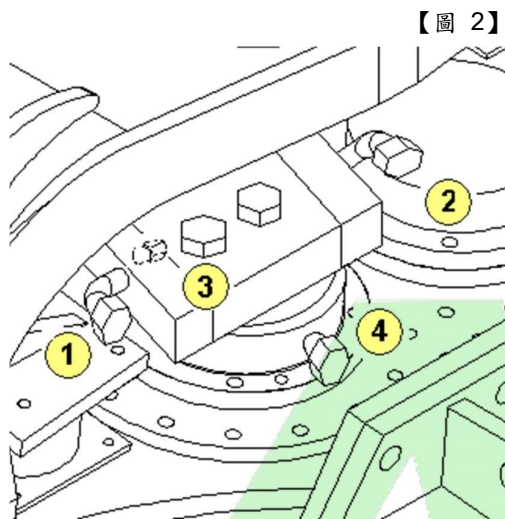
Hydraulic electric motor 液壓電氣式馬達	10HP
Pressure(Main cylinder) 主缸壓力	70~80TON
Pressure(Side cylinder) 側缸壓力	45~55TON



Working Field: Rehabilitate pile board



5. Components 元件介紹



- 5.1 Motor pump oil pipe fitting (go in oil): To provide power for motor pump and the fitting for the arm oil input.

馬達進油接頭：提供馬達旋轉的動力，與副臂上進油管連接。

- 5.2 Motor pump oil return pipe fitting (return oil): For hydraulic fluid to return to the excavator from the motor pump, and it should be attached to the arm oil return pipe.

馬達回油接頭：讓馬達液壓油回至挖機的液壓油桶，與副臂上回油管連接。

- 5.3 Brake power valve: Connected with ⑤, supplying power to the turntable when the motor pump is operating should be connected to the brakes of the turntable.

剎車動力接頭：與相連接⑤，在馬達運轉時提供油壓給轉盤達到運轉中自動轉盤的煞車動力。

- 5.4 Motor pump oil leak return joint: Protection of the motor pump. When too much oil flows into the motor pump, excess oil will leak out to protect the motor pump.

馬達溢油回油接頭：為馬達的保護裝置，當馬達進油流量過大時，多出的油量將由此處溢出，達到保護馬達的效果。

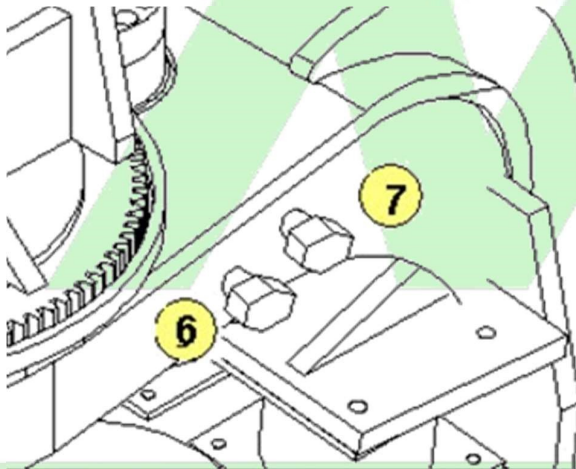
5.5 Auto turntable break joint: Using the hydraulic fluid to brake, connected to ③

自動轉盤煞車接頭：利用油壓的壓力達到煞車的效果，與③相連。

5.6 ,5.7 Auto turntable joint: Provides the rotating force to the vibro motor pump, and links with arm oil pipe.

自動轉盤接頭：提供振動機旋轉之動力，與副臂上油管相連接。

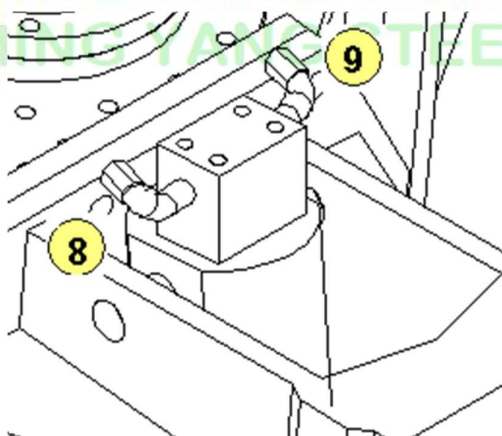
【圖 3】



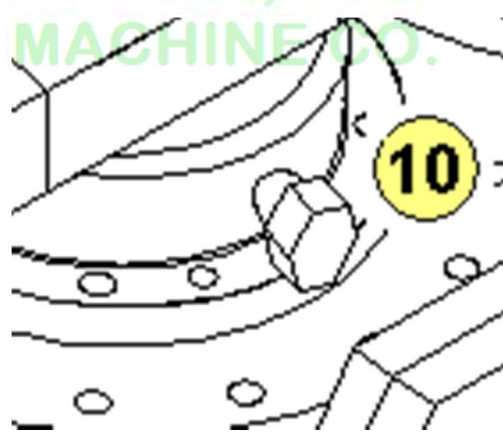
5.8 ,5.9 Clamp joint: Provides the power to clamp, and links with arm oil pipe.

夾嘴接頭：提供夾嘴開合之動力，與副臂上油管連接。

【圖 4】



【圖 5】



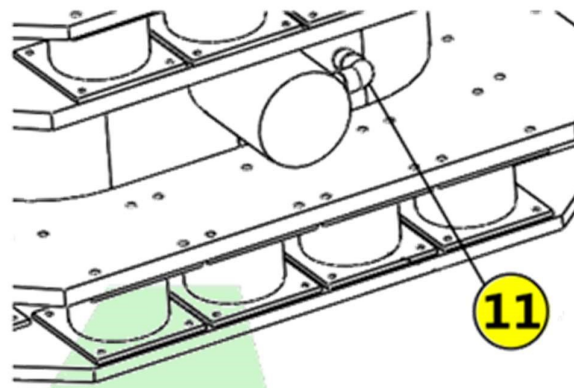
5.10 Should be opened when vibrator is operating, examining hole to check if the motor pump and motor pump oil seal is intact, if the motor pump or seal is damaged there will be oil leak at this area.

振動機使用時須旋開，為檢查裝置，檢測馬達及馬達座油封是否損壞，若損壞此處會大量漏油。

5.11 Air vent: Allowing the vibrator to suck in and remove air.

透氣孔：提供振動機震動時的
進氣與排氣。

【圖 6】

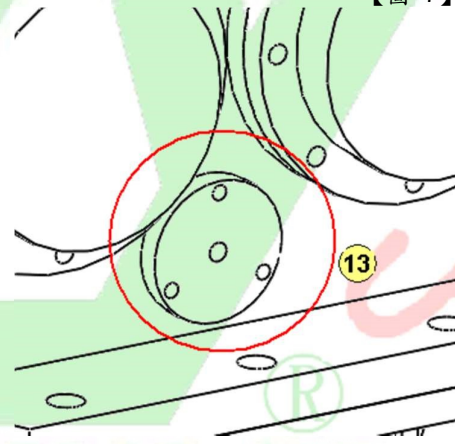
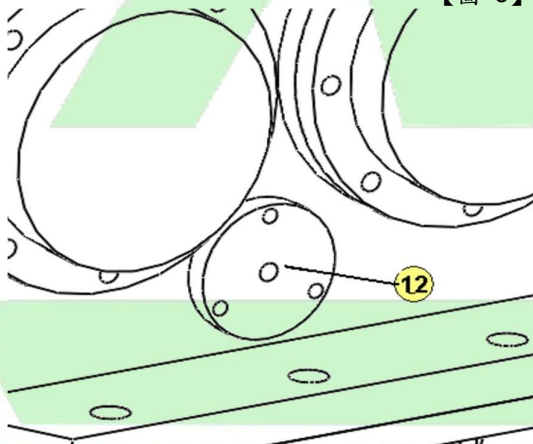


5.12 Gear oil filling port: Used to add or leak out gear oil.

齒輪油添加（洩放）油孔：用以添加與洩放齒輪油。

【圖 8】

【圖 7】



5.13 Cleaning and examine port: Remove the screws to clean the inside of the vibrator or do inspection.

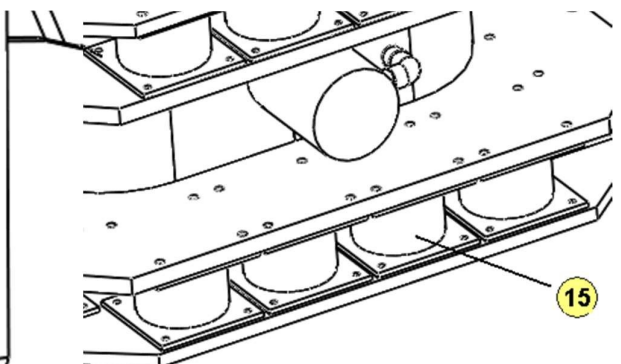
清潔檢查孔：此處將螺絲旋開可以取下，用以清潔振動機內部或是檢查振動機內部。

5.14 Outer shell bolt: To keep the shell intact; remain plugged in when not operating.

外殼固定螺絲：用
以固定外殼不晃
動，振動機不用時須
插上以策安全。

【圖 9】

【圖 10】



5.15 Shock rubber pad: Connecting outer shell and the main frame, to absorb shocks and excessory vibrations providing buffer.

減震塊（橡膠墊）：連接外殼與主體，並提供緩衝。

6. Instructions 使用說明

6.1 Operating Instructions 操作說明

6.6.1 Foot switch pedal for vibro: Press to start vibration.

振動機腳踏開關踏板：踩下震動機啟動。

6.6.2 Clamp switch: Control open and close of the clamp.

夾嘴開關：控制夾嘴的開合。

6.6.3 Auto turntable switch: Controls the rotation of the vibro motor pump.

自動轉盤開關：控制震動機機體的旋轉。

6.6.4 Auto-pressure switch: If turn-on will open the clamp automatically and automatically shut off when vibration starts.

自動加壓開關：ON將開啟夾嘴在震動時會自動夾閉。

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【圖 11】



6.2 Precautions 操作注意事項

- 6.2.1 Before using a new hammer, please replace the hydraulic oil and filter with the specific brand designated by manufacturer in order to ensure the life-span of the vibro motor and excavator.

振動機安裝之前需要更換新的液壓油（需使用挖土機廠牌指定的特定品牌）和濾芯，以確保振動機液壓馬達和挖土機的使用壽命。

- 6.2.2 When starting operation, please start the hammer at a lower vibration frequency to allow the bearing absorb gear oil for proper function.

每次啟動振動機時，請先開低頻振動，使齒輪油帶至軸承上，可以有效地延長軸承使用壽命。

- 6.2.3 When operating, the hammer must stay vertical with ground in order to balance the force working on the hammer. When clamping the pile, both sides should apply the same force onto the pile; keeping the system balanced to prevent the clamp from breaking. If used normally, shock rubber pad should have a life-span of 2-3 years.

打、拔樁時振動機前端一定要與地面垂直，才不會造成振動機前端單邊受力，這會影響減震塊使用壽命，夾樁時活動齒兩邊牙齒要同時夾住樁，不能用單邊夾樁，這樣活動齒會受力不平均及不平衡，造成活動齒插銷斷裂。正常使用狀況下，減震塊使用年限為2-3年。請勿以不當方式操作振動機。

- 6.2.4 When working with tube piles, the hammer head must be parallel to the pile. Both jaws should clamp onto the pile at the same time. If the force is not balanced, the head will be twisted, applying improper force to the machine and breaking it.

打、拔鋼護筒夾樁時，振動機前端一定要和鋼護筒平行，讓夾座固定齒兩個牙條同時夾住護筒，單齒接觸夾樁時振動機前端會自動扭轉矯正，容易造成曲手受力不均產生斷軸狀況。

- 6.2.5 When facing hard grounds and the pile cannot be driven in, the correct method is to use the level 2 vibration to assist on breaking harder grounds. If the ground is too hard even for the use of second level vibration, operator should raise the pile up, and use the vibration along



with the downward force of the excavator and the pile to penetrate.

However, applying too much force on the sheet pile only with the weight of machine will only makes it harder to drive in, and also bend in the pile, and results in difficulties when you need to pull out the pile.

高頻振動機在打樁時遇到打樁打不下，就需要二級振動輔助衝刺，再打不下就需要拔樁衝刺打樁反覆動作，達到鋼板樁打樁順暢了再打樁，不是整機使勁的硬壓打樁，這樣會造成鋼板樁變形，鋼板樁會越來越難打樁，就算硬打樁完成工程，等到要拔樁時因鋼板樁變形，造成拔樁難拔甚至於拔不出。

- 6.2.6 Frequent use of confluence valve or a “Level 2 vibration” is strictly prohibited. The only time to use the confluence valve (level 2 vibration) is when the level 1 vibration doesn’t work. And it can only be used once in 15 seconds to break the harder ground. If it’s used below this frequency, the motor will become vacuum inside and damage the distributing plate. If the level 2 vibration is still unable to penetrate the ground, operator should raise up the pile for 1 – 1.5meters and hit the ground with the weight and vibration of the excavator. If this method doesn’t work, the operator should start finding alternative methods instead since forcing the machine will only result in damage of the hammer and excavator. The vacuum state will also result in high temperature of the motor; In this case, do not try to cool it down with water or it will cause the deformation and even the damage to bearing, motor, eccentric gear and distributing plate.

打、拔樁時嚴禁長期踩住合流及密集踩踏合流（二級振動），合流是在一級振動打不動時才使用，而且使用時不能連續密集踩踏（密集踩踏會造成馬達抽真空，造成馬達配油盤磨損，降低馬達使用壽命）間隔時間15秒，二級振動若無法成功打樁，可能原因為地質過硬，必需拔樁1米-1.5米借助挖機自身重量和振動機的振力同時打擊，若此方法仍無法成功，需另尋方案施工，若強硬操作會造成振動機以及挖土機損壞。長期踩合流會造成馬達產生高溫（高溫不能用水降溫，不然箱體會變形，並使軸承卡住），馬達沖壞油封，甚至於打壞馬達。

- 6.2.7 Using the turntable motor to fix tilted sheet pile is strictly prohibited. tilted piles should be pulled out and re-inserted; correction fixing the tilting with the turntable motor will decrease the life-span of the turntable motor. Also twist on the sheet pile will result in difficulty when trying to place the sheet pile.

嚴禁用轉盤馬達矯正打偏的鋼板樁，會造成轉盤馬達使用壽命縮短，打偏的鋼板樁需要拔出重新定位，用轉盤馬達糾正會讓鋼板樁變形扭曲，造成以後打樁難度增加；用轉盤馬達糾正鋼板樁，轉盤馬達會很快沖壞油封，當轉盤馬達停止運轉而液壓油繼續供油，會沖壞轉盤馬達高壓油封。

- 6.2.8 Do not apply machine force directly to the vibro hammer for penetrating piles - decreasing the vibration only causes damage to the bearing housings and might also leads to metal fatigue in the arms and suspensions.

不能用整機壓樁打樁：會降低振頻損壞軸承滾子架，造成小臂，副臂，吊架金屬疲乏開裂。

- 6.2.9 Please always use suitable equipment for the job. Small hammer with high frequency should be used for sand layers, high-frequency middle size hammer should be used for soft soil, and mid-frequency big hammer should be used on hard soil or pebble layers.

由於鋼板樁打、拔樁時會遇到特殊地質，因地質的不同使用的振動機型號也很講究，砂質層就需要高頻小振動機打樁，軟乾土層用高頻中振動機，硬地質強風化層卵石層就需使用中頻大振動機。

- 6.2.10 When clamping on to the pile, high-frequency vibration should not be applied or it will make the jaw of the clamp continuously rubbing on the sheet pile, causing breaking or irreversible damage. The operator must wait for the vibration to come to nearly stopped and then clamp on to the pile to prevent wearing down the joint parts.

打、拔樁時嚴禁振動機高頻振動開夾（開夾空振），需要樁至定位後，等振頻降低後再開夾，避免鋼板樁和牙齒互磨，而嚴重磨損高強度合金鋼鑄造的牙條和尖嘴上口（活動齒和尖嘴銜接處），造成活動齒傾斜、卡齒容易斷軸或斷曲手（曲手另稱扁擔或臂力桿）。

6.2.11 Do not use the clamp to hit the sheet pile, clamps should only be used on the pile. If hitting occurs often, the metal could wear down easily and break.

夾座尖嘴嚴禁重力側撞鋼板樁，尖嘴只用來正鏟樁及勾樁，經常側撞容易造成尖嘴支撐金屬疲勞斷裂。

6.2.12 Hydraulic fluid is also an important component of the system. Please always use hydraulic fluid recommended by original manufacturer and replace it with a new batch every period of tie.

請使用挖土機原廠建議液壓油，若隨意更換液壓油，恐會影響挖土機，以及振動機前端的液壓泵，降低了液壓泵的使用壽命。

6.2.13 When operating the excavator, do not make rush and exaggerated moves, any turntable movements are causing abrasion to the bearing housings and shafts. Take slow and patient moves.

操作振動機時，請勿大動作操作大臂、小臂控不能猛拉猛壓，若有異常聲響恐為損耗吊架兩側的軸。提臂需緩慢不能急。

6.2.14 The hammer should always stand with the jaws inserted into the ground or clamped on to a pile (which is inserted in the ground) after work or when at rest, so it remains a 90 degree angle with the motor pump to prevent the iron slag inside the gear oil from flowing into the bearings causing damage to the bearings. It is always recommended to keep the bearing part standing in order for a longer life-span.

【圖 12】

工程停止休息時，振動機一定要豎立，尖嘴插在土里或夾住鋼板樁大臂壓住振動機豎立，避免軸承著地液壓油的鐵末滲透到軸承裡，降低軸承厚度，按照以上方式改進及操作可以降低很多維護成本。



7. Troubleshooting 簡易故障排除

- 7.1 Clamping fails → Examine if the clamp teeth or base hole have been worn out. Check if the oil is leaking from cylinder, and clean the oil.

夾樁脫夾→檢查齒條及軸孔磨損度，油缸閥是否損壞，若損壞需更換油，清洗油缸閥。

- 7.2 No Vibration→ Check the pedal, check electric circuits, and check if the bearings are stuck.

振動沒反應→檢查腳踏閥，檢查閥組電路，檢查軸承是否損壞。

- 7.3 Pins breaks frequently → Check if the clamp is worn or if the housing distance has increased. (Clamping while vibrating at a High frequency will cause the pin hole to wear out faster).

頻繁斷銷→檢查尖嘴內口是否磨損，檢查所有孔距是否擴大了。(高頻振動時開夾(金屬撞擊摩擦聲)孔距磨損快)。

- 7.4 Clamps not moving→ Examine the clamping valve^{C10} or oil hydraulic cylinder valve valve^{C9}. 【Picture 28、Picture 29】

夾嘴不動作→檢查強夾閥或者油壓閥(四角座)。(參考【圖 28 C9油壓缸、C10油壓閥、圖 29】)

- 7.5 Low Vibration frequency → check excavator pressure and the hydraulic fluid pressure.(Picture 28)

振動頻率不足→檢查挖機壓力及流量。

- 7.6 Motor pump breaks frequently --> Check if the hydraulic fluid is clean, excavator valve is damaged, or if “second level vibration’ is used too often. 【Table 1】

頻繁壞馬達→檢查液壓油清潔度及挖機大泵是否損傷，或者一級二級頻繁踩踏。(參考【表 1】)



- 7.7 Shaft of the hydraulic motor pump broken→ check if the bearings are worn out.
液壓馬達斷軸心→檢查軸承是否磨損過度。
- 7.8 High temperature on the vibro hammer →check if the bearing housing is worn out. 振動機前端產生高溫→檢查軸承是否磨損。
- 7.9 Abnormal sound when hammer vibrating → check if the bearings are jammed.振動機前端振動時有異常聲音→檢查軸承是否抱死。
- 7.10 Brakes not working → Check if the brakes oil seal is leaking or if the screws have slide down. 【Table 10】
剎車不靈→檢查剎車油封是否漏油或者大螺母下滑了。（參考【圖 10】）
- 7.11 Turntable not able to rotate→ Check if the turntable control valve or the turntable motor is broken. (Do not use the turntable motor to fix bended sheet piles)
轉盤旋轉不靈→檢查旋轉控制閥，或者轉盤馬達是否損壞。（不能用轉盤馬達矯正鋼板樁）
- 7.12 Turntable motor transmission gear broken → check if the turntable motor screws are loosen, and check if the turntable motor shaft is damaged.(Do not use the turntable motor to fix bended sheet piles)
轉盤馬達傳動齒磨損→檢查轉盤馬達螺絲是否鬆動，轉盤馬達固定軸承是否損壞。（不能用轉盤馬達矯正鋼板樁）
- 7.13 Broken shaft on clamp →check if the four base when driving the piles are damaged and repair immediately.
外殼（牛型鐵板）兩側斷軸銷→檢查打樁四個支撐點是否嚴重磨損需及時修補。

8. Easy Troubleshooting 常見故障排除

8.1 Oil leak from Air vent is because:

透氣孔有油冒出:透氣孔有油冒出的原因有:

8.1.1 Too much gear oil. 齒輪油過多。

8.1.2 Oil seal broken in the hydraulic motor pump and the hydraulic oil leaked into the vibrator. 液壓馬達油封破損，液壓油滲透進振動機內。

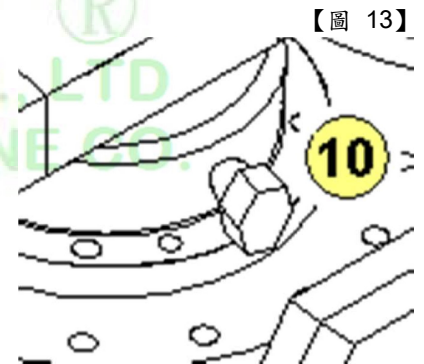
★ Solution 排除方法

- (1) Remove excess gear oil. 將過多的齒輪油排出既可。
- (2) Change the motor pump oil seal, drain out the hydraulic oil from the vibrator, and add sufficient gear oil.

更換馬達油封，將滲透進振動機的液壓油排出，加入適量齒輪油。

8.2 Oil leak on the inspection 108 motor pump base oil drain hole (10) is because: (450 or larger hammers have oil drain holes.)

108馬達座洩油孔 (10) (450型振動機以上才需要。)



8.2.1 Oil seal broken on the motor pump base, gear oil leak. 馬達座油封破損，齒輪油滲出。

8.2.2 Motor pump oil seal broken, hydraulic fluid leak. 馬達油封破損，液壓油滲出。

★ Solution 排除方法

- (1) Change oil seal of the motor pump base. 更換馬達座油封。
- (2) Change oil seal on the motor pump. 更換馬達油封。

9. Maintenance 保養與點檢項目

9.1 Daily Maintenance 每日保養/點檢項目

- 9.1.1 Before using a new hammer, please replace the hydraulic oil and filter with the specific brand designated by manufacturer in order to ensure the life-span of the vibro motor and excavator.

振動機安裝之前需要更換新的液壓油（需使用挖土機廠牌指定的特定品牌）和濾芯，以確保振動機液壓馬達和挖土機的使用壽命。

- 9.1.2 Before starting the motor, please make sure that the oil return valve is opened. It is normal for the valve to become loosen during first few times of use; operator should keep a close eye on oil spill. The motor should be drained clean every time the tube is changed.

開機之前檢查回油閥是否開啟，每台新裝的振動機剛開始使用後都會有接頭反鬆現象，應該時常注意溢油現象，每次更換馬達軟管之後都要進行馬達排空。

- 9.1.3 New hammers will need around 1 month of time to run-in. During run-in period, a lot of iron slag will occur during operation. The magnet inside the oil filling port (the magnet is installed inside of the lid), must be cleaned every day. The hammer should always be clamped on to the pile and inserted in the ground after work every day. When the hammer stays vertical, we can prevent the iron slag in the gear oil from getting into the bearing so that the bearing would have a longer life-span.

新振動機開始使用差不多有（一個月左右磨合期），磨合期間會產生很多鐵渣，需要每天清理磁鐵（加油孔蓋里面有磁鐵）鐵渣，收工時夾座頭必須豎立大臂壓住（插在土里或者夾住鋼板樁以防掉臂），避免齒輪油內殘留的鐵渣沉澱到軸承內部，若鐵渣沉澱，會磨損軸承縮短軸承使用壽命，使軸心運動不平衡，造成偏心齒輪齒損壞，最好長期豎立存放可增加軸承使用壽命。

- 9.1.4 Daily checks include the applying of lubricating oil, the examination of screw and bolts. Under continuous vibration, it is vital to make sure the bolts and screws are tight after every day work. Set screws should be

connected 2 by 2 and welded together with a steel shaft to prevent loosening.

結束每日工作後，即需添加黃油（潤滑油）、檢查所有螺絲的緊固。振動機在高頻震動之下，螺絲多少會有反鬆現象，需要緊固，以防不必要的損壞。固定齒螺絲一定要加鐵條焊接並聯，防止鬆動而掉螺絲。

9.1.5 Screws hydraulic cylinder on the fixture also need to be examined.

Loosen screws can cause damage to the oil seal, leading to clamps loosening or major accidents. 【Pictrue 28】

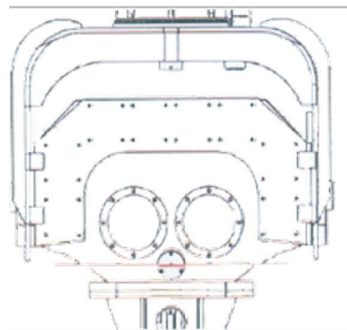
夾嘴油缸的螺絲需檢查，若油缸蓋上的螺絲鬆脫容易造成油封損壞，夾嘴油缸漏油會造成夾樁不緊，嚴重會掉樁造成重大事故。（【圖 14】C9油壓缸）

9.2 Preventive Maintenance 預防保養

9.2.1 Gear oil should be replaced after working on the first use (MOBIL 80W-90 in the winter and MOBIL 90W-140 in the summer), and afterwards gear oil should be replaced every 300 hours of working time. If the gear was working on an harder ground, the turnover of the gear should be shorten. The operators should make the judgement due to their experiences. Gear oil should be added till the oil flows a bit out of the oil release hole. Approximately to the red line indicated below (about 6~7 liter for 330 vibro motor pump).

新振動機第一次運作完畢，當天就須更換新的齒輪油（冬天用美孚 80W/90，夏天用美孚 90W/140）；之後每 300 小時更換齒輪油。

若於較硬地質操作振動機，需縮短時間（小於 150 小時），具體由司機自己掌控，確保軸承使用壽命。齒輪油添加容量約以齒輪油洩放孔會緩流出為標準，高度約如圖下中所示紅線（330 振動機約 6~7 公升）。



【圖 16】

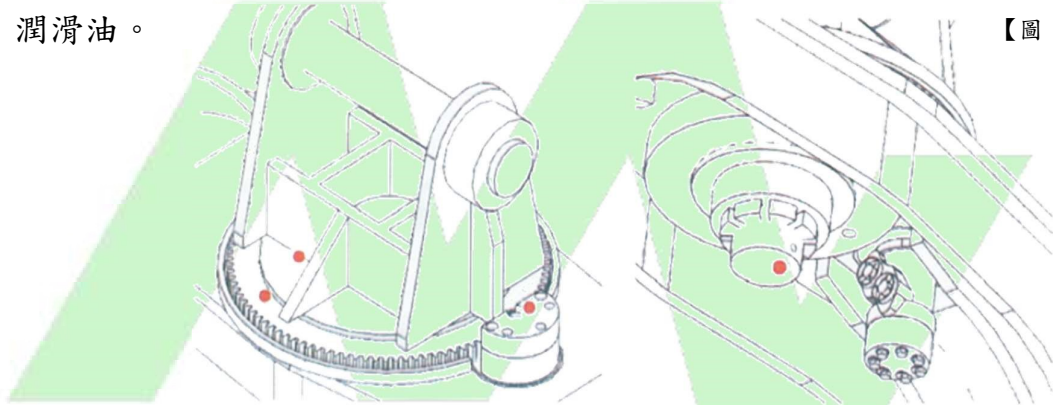


【圖 15】

9.2.2 All turning parts such as gears and metal joints should always stay lubricated in order to resist friction and extending life-span.

轉盤齒輪需添加黃油（潤滑油），以保振動機靈活性，鋼材摩擦部位也需要添加黃油（潤滑油），降低摩擦力增加轉盤馬達使用壽命。

9.2.3 Lubricating oil port in below picture. Lubricating oil should be added every 2~3 days. 下圖中表示之黃油（潤滑油）嘴須定期（約2-3天）添加潤滑油。

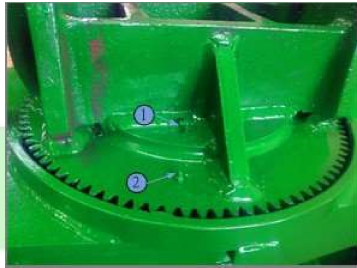


【圖 17】

【圖 18】

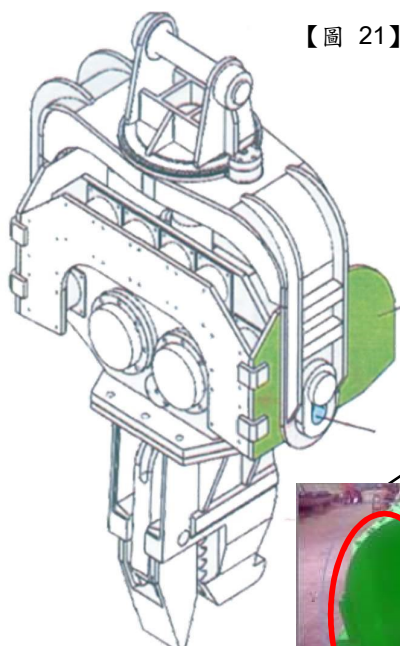
【圖 19】

【圖 20】



9.2.4 Area indicated in below picture should always stay lubricated.

下圖中表示之區域需塗抹黃油（潤滑油）保持潤滑（左右兩側皆要）。



【圖 21】

油箱外側板(兩面都要)

Outer shell of the oil tank (both sides)

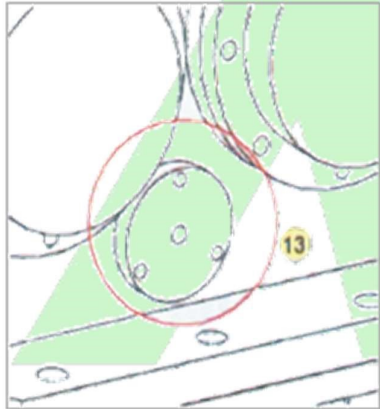
環圓環內側



9.2.5 Regularly take off ⑬ and perform maintenance. The magnet will adsorb the iron scums inside the vibrator. Make sure the gear oil is clear inside. (New hammers should be cleaned every day during the first month of use.)

定期將 ⑬ 取下清潔，板上磁鐵會吸附振動機內部之鐵屑，須定期取下清理，確保齒輪油之清潔。

【圖 22】



【圖 23】



【圖 24】



9.2.6 When the jaws are worn down (Two sides add up more than 1.5 CM), the jaws need to be repaired or replaced. An un-fixed jaw will not be able to clamp onto the pile and cause the pile to fall in severe damage.

牙條磨損嚴重（兩邊相加 1.5 公分）即需修補或更換，避免夾樁不緊掉樁，造成事故，或引發其它損壞，如斷軸或油缸行程超出而油缸蓋被頂出，造成不必要的損失，（開夾空振鋼板樁亦容易造成夾座整體開裂而報廢）。

9.2.7 Filter for the oil return should be replaced regularly. Jamming of the oil return valve could cause the oil seal to break.

回油濾芯要定時清理更換，避免雜質堵塞影響回油，造成液壓馬達沖壞油封。

9.2.8 The oil tube for the break should always be loosened and the oil should be released when changing oil seal or oil tube for the motor pump. This is to prevent the motor pump running in a vacuum state, causing the oil distributor to break.

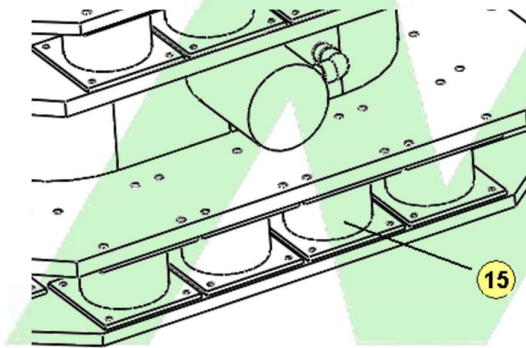
每次拆卸馬達更換油封或者更換油管，都需要鬆掉剎車油管排油，讓馬達裡的空氣排出，避免馬達真空運轉，損傷配流盤。

9.2.9 Due to high-frequency vibration, please check regularly if the bolts and screws are loosen and screw tight.

由於振動機使用時為高速震動，在使用一段時間需檢查各螺絲是否鬆動，並加以旋緊。

9.2.10 Regularly check if the shock rubber pad ¹⁵ are damaged. Change if damaged.

使用一段時間需檢查減震塊 ¹⁵ 是否有破損，有破損須更換。



【圖 25】

9.2.11 If the temperature of the hammer rises abnormally, this indicates that the bearings are worn out and should be replaced. Do not wait till the bearings stop functioning, once the bearing shaft and housing are damaged, the whole system will need to be replaced.

振動機前端溫度異常升溫，代表軸承已經磨損需及時更換軸承，請勿等到軸承卡住再進行更換，此狀況容易磨損軸承座和軸心，造成軸承跑內圓或外圓，若在此時更換新軸承，軸承會馬上損壞，無法使用。

10. How to change parts 零件更換方法

10.1 Changing bearings and shafts.

更換軸承步驟。

10.1.1 Remove the damaged bearing and clean the iron scum inside.

卸掉損壞的軸承，清理機箱裡的鐵雜質

10.1.2 Lubricate the new bearing before placing. When inserting, do not hit the bearing too hard, gently hit on the outer rim and let it smoothly slide into the housing. Do not hit on the inner rim or apply too much force to prevent deformation of the bearing housing. If the bearing housing deforms, it will need to be bored. If the bearing can be placed without any force, this means that the housing has already been damaged severely, and will need to be replaced.

新軸承抹上黃油（潤滑油），放進軸承座不能硬打進去，不能敲打內圈，需要輕敲外圈周圍慢慢敲進去，絕對不能敲打內圈或者硬打，硬打進去的話軸承座就變形了，軸承座就需要搪孔，也不能輕放不敲就掉進去，這是軸承座之前軸承已損壞，還不知道而繼續使用磨損過度損壞，這個軸承座就報廢。

10.1.3 Place the shaft after the bearing is inside the housing. Same as the bearing, apply gentle force and let the shaft slide into the bearing. If the shaft can be placed in without any force applied, it indicates that the shaft has already been worn out due to previous use, and will need to be replaced.

軸承放進軸承座後，再放進軸心，同放進軸承座一樣，輕敲進去，不能硬打，不敲就掉進去代表軸心因為軸承損壞繼續使用而磨損了，就需要更換軸心。

10.1.4 After replacing all 4 bearings and shafts, manually test run the motor pump with tools. If it does not run smoothly, try to loosen each bearing lids a bit till all 4 run smoothly.

軸承四個都安裝好後，用工具在馬達的軸承齒試轉，假使轉動不暢，就需要鬆一個軸承蓋再試轉，假使還卡代表不是這個軸承蓋太緊，就需要再鬆



10.2 The following picture shows how to change brake pump.

更換煞車油封步驟。

10.3 Changing the motor pump base oil seal.

馬達座油封更換步驟。

10.3.1 Remove the motor pump. 將馬達取下

10.3.2 Take out the seal. 從油封取出

10.3.3 Place the oil seal flat.

(be aware to place in the correct direction) 平整放入油封(注意油封方向)

【圖 27】



10.4 Changing the motor pump oil seal.

馬達油封更換步驟。

10.4.1 Unscrew the bolts. 將螺絲旋下

10.4.2 Take out the oil seal. 取下油封

10.4.3 Place the oil seal flat. 整放入新油封

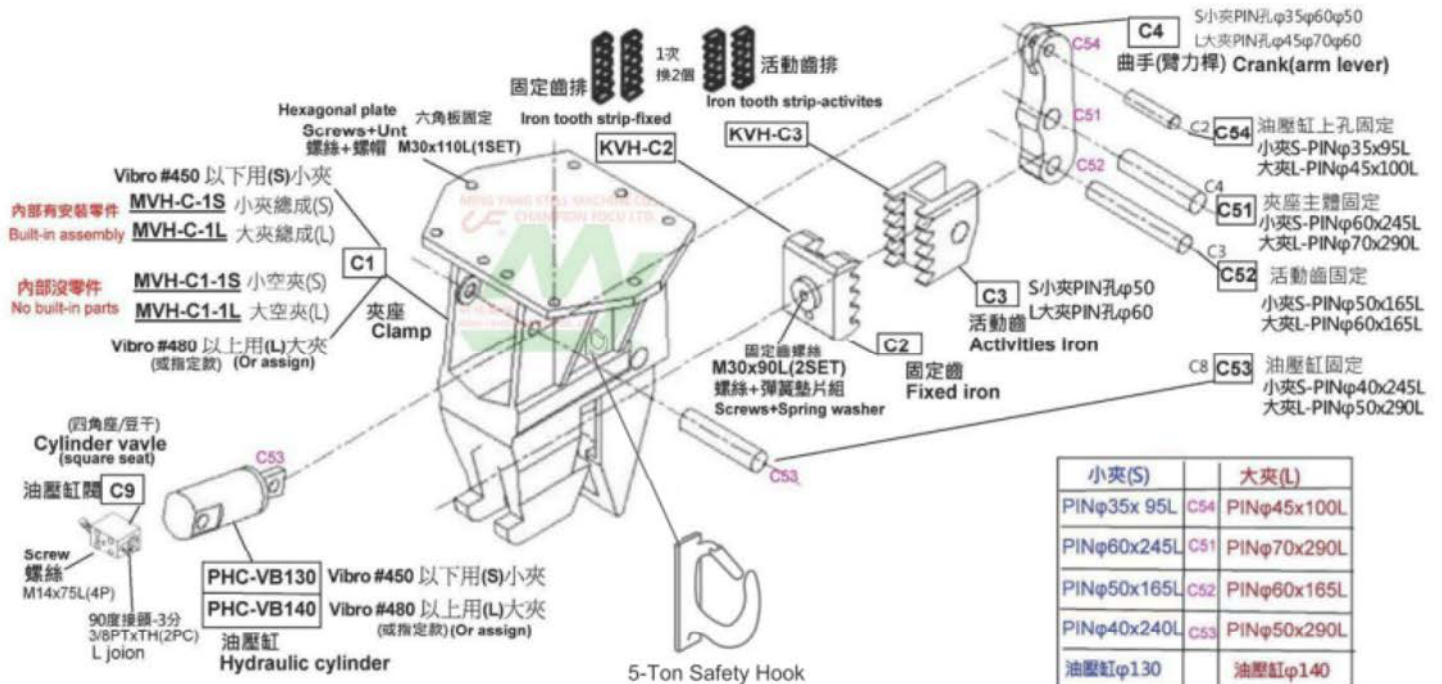
10.4.4 Screw back the screws. 整放入新油封

10.4.5 Screw tight the bolts. 注意是否旋緊螺絲

11. Attachment 附件

11.1 The following picture shows the parts of clamps.

夾座零件拆解圖。



小夾(S)	大夾(L)
PINφ35x 95L	C54 PINφ45x100L
PINφ60x245L	C51 PINφ70x290L
PINφ50x165L	C52 PINφ60x165L
PINφ40x240L	C53 PINφ50x290L
油壓缸φ130	油壓缸φ140

