

# Stemm orange peel grabs for handling waste, turnings, biomass, cut tyres and domestic & light industrial waste

*Stemm Equipos Industriales.S.L., based in Spain, offers optimal and profitable solutions to the problems of the handling of waste thanks to its grapples, buckets and grabs. As specialists in the integrated manufacture of this equipment, from its design stage to its manufacture and assembly, the company develops solutions according to the specific needs of the client, adapting them to each specific case and guaranteeing maximum quality. Currently the company is also specialisation in the renovation services known as Plan Renove for the transformation of old equipment, making it operational and thus increasing the company's portfolio of solutions for companies owning grapples, buckets and grabs.*

Mr Martin Amesti, Technical Manager at Stemm

## Equipment

The ample product range of Stemm Equipos Industriales, S.L. includes, amongst others, the following equipment:

### Orange peel grabs

Orange peel grabs for handling of structural scrap, mixed scrap, scrap pellets, packets, cast iron, stones, rocks, fragmented shavings, crushed chips, biomass, chips, cut-up tyres, industrial waste, urban waste and Municipal Solid Waste (MSW). The models available are the following:

- PH-0.9: Electrohydraulic grab for handling of waste and USW, light shavings, crushed biomass, chips, cut-up tyres, and is designed and calculated to work with materials and products of up to a density of 0.9 t/m<sup>3</sup>.
- PH-2: Electrohydraulic grab for average scrap irons, fragmented

rock and small packets. It is designed and calculated to work with materials and products of up to 2 t/m<sup>3</sup>.

- PHR-2: Electrohydraulic grab of rectangular section for handling of medium-sized scrap iron, mixed, average industrial waste, small scrap iron packets, etc., adapted for materials and products of up to 2 t/m<sup>3</sup> density.
- PH-3.5: Electrohydraulic grab apt for handling of heavy, structural scrap iron, cast iron, etc., suitable for materials and products with a maximum density of 3.5 t/m<sup>3</sup>.
- PHNA-3.5: Hydraulic grab designed for mounting on excavators for handling scrap irons, cast iron, rocks, packets, pellets, industrial waste, etc., apt for materials and products with a maximum density of 3.5 t/m<sup>3</sup>
- PHA-1: Amphibious electrohydraulic grab for handling of wood, floating branches, mud and waste.
- PMC-0.9: 4-rope mechanical grab for handling of waste, USW, light shavings, normally in waste treatment plants and ports.
- PMC-2: 4-rope mechanical grab for average scrap irons, fragmented scrap, small packets ... in harbour cranes.
- PMC-3.5: 4-rope mechanical grab for handling of heavy, structural scrap iron, cast iron, etc. with harbour cranes.

Stemm grabs are designed to slot in perfectly with penetration and drag operations, robustly compacting the dragged material and retaining it inside the grab.



The **design of the drag and the degree of turn of the claws** are important, as are the cylinders having the necessary force to compact the material.

It is highly important to emphasise that the **weight of the grab itself**, which has to have a minimum, required and suitable value, on landing on top of the waste, may penetrate the material, almost to the point of touching the underside of the body itself.

This crucial factor, together with the previously mentioned ones, makes each load operation spectacularly greater (differences of 25%) compared to the old grabs, which are normally too light.

A grab that is too light has to be unhooked because, when it hits the waste at the pit bottom, it "floats" and does not clutch the material well; this impedes dragging the required material into the interior of the grab.





Although at first sight it might appear that a light grab provides advantages, when considering the capacity of the crane, this is mistaken, as the performances are inferior to the grabs developed by Stemm.

The really important concept to consider is the hourly/daily capacity of handling of the waste and this has clearly been demonstrated.

The grab manufacturer always indicates the loads carried by the grab in each operation (minimum-average-maximum) and should advise on the minimum capacity (t) of the travelling crane.

**Stemm grabs are the most rapid** in their closing and opening movements, which considerably facilitates the manoeuvres and operations in the plant and makes them more agile, increasing the cycles/hour and therefore the production, using the same crane.

When dealing with new projects, the Stemm grab allows the use of lighter and faster travelling cranes, enabling the most optimum choice of cranes according to F.E.M. classification.

The correct combination and juxtaposition of the grab and travelling crane is indispensable to assure a good investment. Also notable is that the **Stemm hydraulic circuits are of variable speed**, in which the speed of closing is automatically adjusted, based on the density of the product, on its granulometry and degree of humidity – in short, on the state of compaction of the material and on the different densities in the various zones of the gravel pits, etc.

This variation is obtained without needing sophisticated, expensive or noisy equipment, nor complicated pump pistons which have variable

flows and which require filtering that is too demanding and, moreover, in these types of environments, is impossible to obtain (the result being a shortening of the life of the pump pistons)

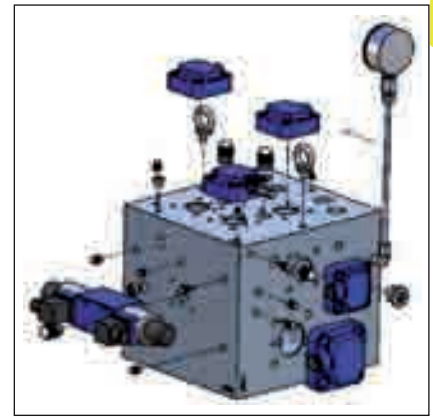
This system of **variable speed based on integrated logical circuits**, has been developed by Stemm's own engineers on site and in close collaboration with the engineers and specialist technicians from the prestigious Roquet firm, world leader in the manufacture of cylinders, pumps and oleo-hydraulic components.

In addition, Stemm equipment owns a resettable hydraulic system, when each closing or opening movement is performed, in such a way that, after each manoeuvre or intermediate shutdown, all the flow of the pump goes to the tank, without drops in pressure nor overheating of the hydraulic fluid.

It is a **system with double and simultaneous safety - electric and hydraulic** - that works automatically and simultaneously but independently. It is the perfect combination of hydraulic and electrical energy.

It is a system that acts as a hydraulic pressure sensor and with an external activation device that avoids undesired overheating in the circuit, especially when the equipment is put under high demands and frequency of cycles.

The Stemm System is made up of a manifold Block with logical cartridges; a novel system that is used in other areas and sectors such as large



**Figure 1. Manifold Block where all the components of the hydraulic circuit are concentrated**

hydraulic extrusion presses, in floodgates, launching pads and, above all, in the armaments industry. These blocks have the great advantage of never having leaks, nor drops in pressure nor overheating in the circuit; things that at the moment happen frequently with grabs of different manufacturers.

**The cartridge system is not affected by impurities in the oil**, which is why the circuit has a long life of its own without needing to change the filters constantly. The system allows a single manifold block to be incorporated with all the hydraulic circuit, which is easily dismantled and replaceable, making it possible to have a cartridge available as a spare part for repairs and rapid maintenance.

This fact enormously simplifies the maintenance of the grabs and it is practically unnecessary to have specialised personnel to this end. All the blocks are delivered trial-tested over 10 days in processes of 8 hours and to a frequency of 40 cycles/hour at our Test Beds.

The Stemm hydraulic circuits are well tried and tested but new products are continuously being developed; the circuit is always flexible and to this end nitrogen storage cells with nitrogen bladders are installed and which allow smooth manoeuvres without brusque changes to take place. But the most important detail is that all the hydraulic groups have a **decompression system** installed that avoids the water hammer effect so detrimental for the hydraulic installations and the structure itself.

Diagnosis points have been installed that allow pressure readings at diverse points of the circuit to be taken, which facilitates the diagnoses, verifications

for watertightness and other maintenance operations.

Moreover, all the equipment has **optical pressure indicators** strategically located on the grabs or the cylinders, so that at any moment the pressure at which the grab is working is known without the need for inserting a pressure gauge, a welcome situation when pressure data is needed to be known and the grab is working in the middle of the waste pit or in the scrapyard.

The only connection inside the hydraulic unit is a non-weld steel tube that unites the pump with the block. At both ends of this tube there are two straight fittings of the type known as "zero leak". Therefore, since the rest of all the components are in the manifold block and with this type of connection, it is possible to be guaranteed that **there is no possibility of leakage** at any point of the circuit. All the equipment is protected with a thermostat that ensures the temperature of the **oil never surpasses 70°C**, besides an electrically-operated oil gauge to assure a minimum level of suction in the pump.

The **electric motors** that are installed are designed to work to 100% E.D. This technical data is important as often some manufacturers of grabs claim a certain power rating when in fact they are installing motors with a noticeably inferior power.

It is possible to demand from a motor that it develops greater power at certain times, working over short periods (25-40-60% ED) but could never meet the minimum power as indicated in the F.E.M.

As an example: A motor of **18.5 kW at 100% ED**, can develop up to **29 kW at 25% ED**. Clearly, there are savings in cost of manufacture with this approach but it means too great a



Figure 2. Calculation of a claw by finite elements

demand on the installed motor and results in the frequent breakdown of the motors, with the rupture of the stator and rotor and even the flange. All our hydraulic pumps are of cast iron, silent and capable of withstanding very high pressures guaranteed for a period of 2 years or 16,000 working hours. The oil tanks of all Stemm equipment are totally watertight through the use of a specially shaped joint at the flange. **Also the bottom of the tanks are always magnetised** in order to pick up all the metallic impurities that may settle on the surface.

All the grabs are provided with filtered hydraulic oil of ISO 68 quality, included. All the equipment has a compensating bladder installed, so that the oil is not in contact with the environment, being in a watertight receptacle where oxidation, contamination nor condensation can occur and, as a consequence, the life of the hydraulic fluid (oil), and therefore of the circuit itself, is indefinitely extended. This compensating bladder allows the grab to work inclined in any omnidirectional position, even in a totally prone position.

Optionally, especially in automatic processes, the grabs are provided with **clinometers** which send appropriate signals to the system that governs the automation.

The signal that the clinometers give replaces and/or complements the so-called "loose cable" that the manufacturers of travelling cranes use; it is moreover important to point out that it is more suitable to use this signal when, during automatic processes, the grab can slide on the slope of the waste tip or scrapyard.

All Stemm equipment is **provided with an emergency system**, in case of breakdown or electrical supply failure; in case of lack of electrical supply to the grab and the load cannot be discharged, a simple and ingenious system is provided that allows manual operation, thus enabling the unloading of the product retained in the interior in a fast and easy way.

**The axes of the pumps are always fluted** in order to give suitable support to the starting torque, being so frequent; the elastic couplings clearly being of steel of the highest quality. With respect to the electrohydraulic drives, it should be emphasised that the clear difference between Stemm equipment and all



competitors at a worldwide level is above all based on research, technological development and the multiple ongoing improvements introduced. Equipment is constructed that works 24/24 hours at a rate of up to 65 cycles/hour.

With regards to the **claws**, they are designed and calculated so that their reinforcing shells as well as the structure itself are always calculated by means of a **"Programme of Finite Elements"** (Cosmos and Ansys) in order to optimise the fatigue strength, strains, flections and, above all, twisting.

The **central reinforcing shell of Stemm claws is a double one**, with only two parallel shells, joined together in a box form and linked by intermediate stiffening elements such as profiles and anti-torsion shells, a system which confers great resistance to twisting, warping and deformation due to fatigue and multiple and combined forces to which they are subjected in the handling of the most diverse granulometries, electric home appliances, voluminous solids, etc.

In this way, the claws as a fundamental component of a grab, have an even better capability for the handling of all



Figure 3. Detail of anti-twisting reinforcements in the shells of the claws

type of waste, even any unforeseeable waste that may arrive at a plant. **The articulations of the claws are steel**, with rectified and cemented sockets and axes, having been tempered and subsequently phosphate treated. The articulations are always lubrication- and maintenance-free.

The **shape of the claws** has a special design known as EL. the shape of the claws is progressive and always carries out the necessary and appropriate turns to be able to drag the product properly to be compacted later inside the grab.

**The tip of the claw exerts a constant power of penetration** from the beginning to the end of the stroke, always guaranteeing a perfect penetration of the different types of waste. This penetration factor is complemented with the quality of the optimal drag of the material that will later be compressed and compacted inside the spherical interior of the grab.

**Each claw has a mechanical stop** so that when the opening of the grab is effected, the claw hits against its own body; thus protecting the hydraulic cylinder. Normally the grabs on the market do not have this device which avoids the cylinders having to support blows.

**The semishells are constructed in Hardox 500 steel** of high elastic limit



with anti-erosion and antiabrasion with a 500 Brinell hardness. **The penetration teeth also are constructed in steel** anti-erosion anti-abrasion **Hardox 500**, and have a very special shape that allows good penetration into the product with ideal wear and tear.

#### **Clamshell grabs**

Bivalve buckets for handling coal, clinker, minerals, cereals, sand, fertilizers, ferro-alloys, cement, limestone, clay, mud and mud (water purification plants) and all type of materials in bulk.

#### **Tongs**

Grabs for handling of plates, ingots, slabs, blooms, packets of plate, coils and strap-secured bales of paper, bales of biomass, rolls of wire, tubes, trunks, agricultural waste, rocks, waste, bundles, blocks of cement, etc.

#### **Manufacturing programme**

Stemm offers the widest range of grapples, bivalve buckets and grabs on the market, with both electrohydraulic drive and rope drive. As specialists recognised and accredited by the most prestigious international bodies in the world of maintenance and handling, the manufacture of all our equipment is undertaken at our own installations, from the metalworking stage through the machining, complete assembly, cylinders and hydraulic equipment, assembly and test phases to the completion of each and every one of the manufactured items of equipment.

Stemm is a company that develops Advanced Technological Projects and its Department of Engineering has the capacity to provide answers to any specific requirements of each client, adapting to all types of Industrial Processes and in each particular case, always complying with guarantees of quality and safety.

Our R+D+i Department develops and designs - continuously, improving, modifying and evolving on previously existing experiences. All equipment is designed in 3D with Solid Edge Synchronous Technology programmes and calculated by Finite Elements (Cosmos and Ansys) programmes.

Stemm offers a totally complete Programme for Manufacture, with a single **hierarchical modular system for all the components** and parts. Basically, all the range of capacities of the different families using the same drive can power diverse capacities of grab, based on the material to be handled.

**This revolutionary system** consists of a work philosophy, from the design, manufacture, mechanisation, oxyfuel cutting machine, and so on, to the manner of undertaking stacking, in such a way that it allows the optimisation of the processes and to carry out multiple internal combinations of sets and subgroups, providing various alternative solutions for the same application, being able even to choose in each case the most optimal solution from the technical and economic point of view.



There may be more than one solution to each maintenance problem. But, above all, this Stemm modular system enables cutting down on delivery times and, moreover, lowering the price of manufacturing costs. With respect to Stemm hydraulic cylinders, they are patented with their special distribution system of oil and interconnection that enables peripheral connection between all the cylinders without having to resort to rings welded peripherally to the ferrule and that cause "burning" of the plate resulting in cracking and even the rupture of the casings.

These cylinders have a system of progressive damping, a very long guide for the piston rods in nodular GGG-40-50 cast iron where double guide joints are installed (main and secondary) to avoid any possibility of leakage from the piston rod, that so frequently is seen to "exude".

In addition, the front guides have installed **excluder type, double-lipped antidirt scrapers** that prevent the entry into the cylinders of minute particles that are deposited in the piston rods. These particles are especially abrasive in Waste Management Plants and iron and steel scrapyards.

All the joints are of top Busak Shamban quality. All the cylinders are provided with two Minimex pressure connections that enable in-situ readings to be taken; all are tested to 400 bars on the test bank and a certificate of guarantee, quality and testing for each cylinder issued.

The hydraulic cylinders never hit against the stop at the end and are thus protected from impacts. This manner of construction avoids having to absorb the kinetic energy of all the weight of the claw (a claw that left straggling, in the end receives all the force of the pump operating at great speed and therefore, if it had to support the force of cylinders hitting against the stop at the end, it would end up destroying the cylinder, above all if it does not have the required damping.

All the hydraulic cylinders are mounted and protected inside two parallel shells and covered with a protective plate which forms a fixed defence. But in addition and to avoid particle deposition (particularly very abrasive and minute particles) on the surface of the piston rod, an additional sliding protection is fitted.



Figure 4. Existing old grab (left) and grab totally renewed and transformed by Stemm (right)

### A specialised human team

Stemm offers effective, safe solutions and ones that are beneficial for any automation requirement, reform or improvement of the process of production of its clients.

The company has the **appropriate organisation** to be able to undertake any project from the initial stage of the first draft to putting the client's installations or plant into operation, taking in the design, construction, coordination and assembly stages.

In all these phases, the team of Stemm design and planning engineers provides its great technical experience in the sector of transport, lifting, maintenance and handling of goods and materials, both with single loads in bulk.

**A qualified team of engineers**, in close collaboration with the Sales Department, undertakes the initial study of the specific needs of the client, recommending the application of a standard solution or devising a technical solution that incorporates the most suitable elements and equipment for each case.

That is to say, Stemm develops a specific machine, made to measure in accordance with the requirements of each client. And before initiating any process of manufacture, a general dimensions plan in 2D (Autocad) or 3D (Solid Edge Sinchronus Technology) is delivered to the client for its definitive study and approval.

Also, the company's department of industrial design has a human capital formed by specialist professionals with an ample experience in the design and calculation of components, machinery, goods and

equipment and **complete, "ready to use" facilities.**

In the line of R+D+i, it develops and it designs continuously, improving, modifying and evolving on previous experiences. Finally, the specialist technicians at Stemm are responsible for the mechanical assembly, hydraulic units, electrical switchings, electronic circuits, etc., as well as the completion, trials and operational tests before the delivery of the equipment and in the presence of the clients themselves, that is to say, in operational conditions.

### Quality design and manufacture at competitive prices

All Stemm products are made with the maximum total quality, and proof of this is that the design and process of manufacture have the **ISO 9001:2000** certificate of quality, and therefore comply with the current UNE-EN norms in each case. Also it complies with the 98/37/CEE Directive and the EN-292 norm, regarding safety of machines.

Generally, the equipment is conceived, designed and calculated following the directives of the **FEM (Fédération Européenne de Manutention)** norms 1001 Section I: 1998 regarding rules for calculating lifting equipment, handling and maintenance. In addition, all welders and welding procedures are accredited according to the ASME Section IX. It is important also to point out that the company has been a member of the Spanish National Committee of the FEM from June of 2001, as accredited by the certificate to this effect from the AEM (Spanish Association of Maintenance).

Stemm installations are equipped with a stock of tools and machinery for metalworking, machining, assembly and testing that enable **integrated manufacture at very competitive prices**.

In addition, to ensure absolute reliability, Stemm has innovative means for verification and control. In fact, all the equipment is functionally tested under non-load conditions, simulating real work conditions for at least 48 hours uninterrupted. Next a report is written that certifies the correct operation, general dimensions, kinematics (movements, synchronisms) and the different parameters regarding times of manoeuvre, temperatures, performances, etc.

And, as additional advantages, the delivery times are reduced to only 2 or 3 weeks, all machines have a guarantee of 2 years and are proven to work to performances greater (150%) than the habitual ones.

### Manufacture but also renovation

The company has recently introduced a **new Renove department** that provides exclusive services of renovation, transformation and putting back old grapples and buckets into operational use, thus contributing optimal and economic solutions for the clients who currently may have limited budgets for new capital investments.

These services offered by Plan Renove are having a great response in many sectors, but above all in recycling, incinerating and waste treatment plants and also in iron and steel scrapyards.

The current stock of grabs, above all in France and Spain, is quite old and out of date. There exist, at many installations, grabs built by manufacturers that are no longer on the market or on the way out. This has given rise to a certain shortfall in the market that has not been adequately met to date.

Stemm is focusing on meeting this shortfall, offering constant and ongoing maintenance, both preventive and corrective, as well as putting into operational use any existing equipment of any make or brand. These old grabs too often give rise to chronic problems, mechanical as well as hydraulic.

The performances are quite deficient and subject to constant failures and shutdowns with the corresponding costs of maintenance which are prohibitively expensive and untenable.

The stock of grabs requires, thus, urgent renovation and modernisation. Old grabs, always involving repair needs that are urgent, basically have **5 kinds of problems and anomalies**:

1. - Problems with the hydraulic unit due to overheating, leaks and

breakdowns that constantly result in shutdowns. Normally changing the entire unit is required.

With respect to the hydraulic unit, the price of replacing the components one by one is too high and, in addition, the original circuits of the old grapples are obsolete and very out of date in comparison with current technologies that are adopted to modern grabs.

2. - Normally the hydraulic cylinders of the old grabs are installed without damping at the top end stop position. There are also grabs with perforated piston rods mounted in inverted vertical position. With this type of cylinder, the piston rods have long and narrow longitudinal drilled holes, in the order of 6 mm, in each cylinder, where the hydraulic oil has to circulate. In addition, in this type of construction, the 2 connections of the cylinder casing are at either end of the piston rod. These close and narrow passages give rise to overheating due to the loss of head and laminating of the fluid.

It should be pointed out that the problem increases and multiplies with the number of cylinders installed in the grab. The immediate initial operation and the only one possible is the substitution of all the hydraulic cylinders with ones fitted with damping and, in addition, with watertight seals of top quality. The design of the Stemm cylinders makes the form of construction with perforated piston rods, in our opinion, obsolete, for two important reasons because the Stemm system:

- Avoids overheating.
- Mechanically protects the ends of the piston rods where the rod ends are mounted, avoiding any possibility of failure in the piston rod itself.

The design of Stemm cylinders allows a peripheral interconnection of all the cylinders, without any loss of head and maintaining speeds of fluid less than 6 m/seg in all the ducts, by which a perfect, uniform and harmonised speed is assured throughout the whole stroke of the cylinder.

3. - Problems in the joints with premature wear, because formerly bronze bushes were fitted, and which obliged expensive repairs of boring, new bushing, etc., to be undertaken. Currently, a total substitution of the steel-steel articulation is being carried out, with sockets and axes which are,

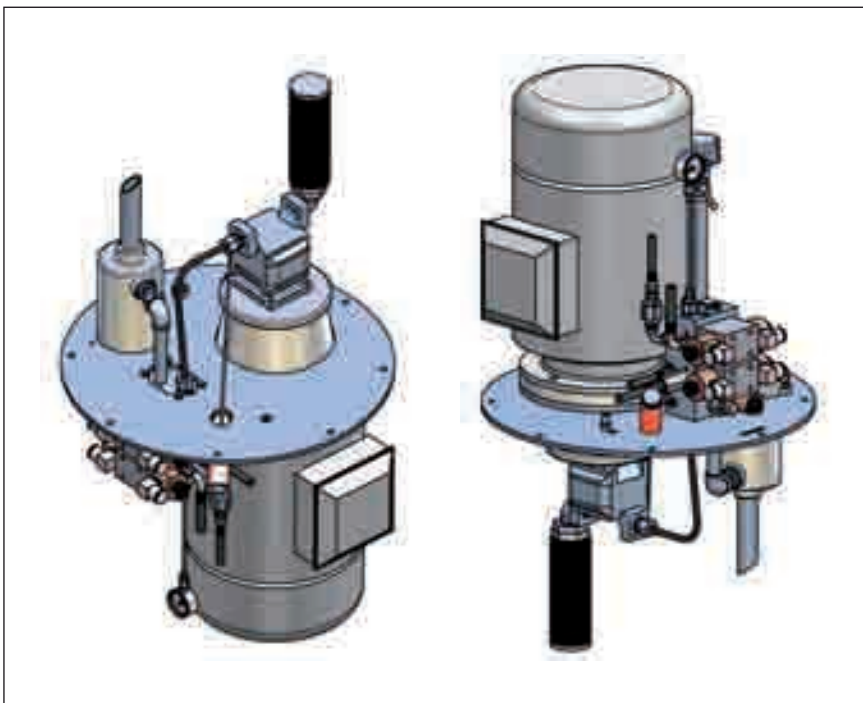


Figure 5. Views of the hydraulic unit, incorporating the old grabs, completely replacing it

carburised, tempered and rectified, resulting in the joints being freed of lubrication and maintenance.

4. - Failures, cracks and breaking up of entire bodies, due to fatigue, strains, incorrect or exaggerated welds, design faults or reinforcements distributed incorrectly. Sometimes this type of anomaly is produced simply because the structures had not received a suitable treatment of stabilisation.

Usually they are replaced by totally newly constructed bodies in laminated steel plate, spot-welded and properly reinforced. These bodies always receive a stabilisation and standardisation treatment to avoid and to eliminate all the stresses and strains.

The new structure installed, is designed to withstand **4 million cycles when loaded**, calculated according to the DIN 15018 norm for the H2-B4 class of construction and complying with that laid down by the **F.E.M. for category A8-M8**. Evidently, this body has the fixed defences for the cylinders and which are adequately protected in their interior.

5. - Rigid Suspensions between the shackle and the hook of the crane with problems of rubbing, wear and tear and frequent failure of axes and other important elements and with important consequences in the suspension and, thereby, safety.

The modification consists of incorporating a flexible suspension that avoids the rigidity and premature wear in the hook and hitching ring. The simplest solution is to incorporate "the cardan joint effect" achieved by means of a shackle and a hitching ring.

But there are also other options, even more suitable, as illustrated in the figures. If there are problems with lifting height limitations, it is even recommended to incorporate chains; for very large grabs the inclusion of two or more fixing points is recommended in order to give them greater stability.

Equipping the grab with flexible suspension will allow it to adapt better to any type of load, product or bulk material, above all when slopes and steep banks are involved in lifting material from a pit. In short, the grab will work more thoroughly, with less chafing and wear, and therefore with more safety.

6. - Deformation, warping or rupture of the claws because either they have not been well designed or were constructed with unsuitable materials. The company owning an old grab can have it replaced by claws which are built of Hardox 500 steel with high elastic limit and which has anti-erosion and anti-abrasive properties with the corresponding anti-twisting lateral stiffeners and reinforcements. In these cases, the new claws are provided with mechanical stops limiting the stroke in order to protect against blows at the top end of the cylinder.

### Additional services

#### Virtual visits

All Stemm clients can track their order on the Internet. That is to say, a virtual visit of the manufacturing process can be accessed through our web page, visualising the real and precise state of manufacture of each one of the parts and components of the machine that is under order. The update of photos and videos takes place weekly and will be effective on the Net for 30 days from the date of shipment of the machine.

The clients can watch a video of variable duration (2-3 minutes) about the tests undertaken during the provisional reception, thus avoiding what can be long journeys to be present at routine series tests of machines.

#### Comparison service

Stemm has recently put into operation a new service known as "Comparison", which enables a comparative technical analysis with any other grab on the market. This service draws up a comparative table of characteristics comparing the equipment ordered with similar ones or with alternatives made by Stemm, helping to make the choice of the most suitable equipment in each case.

#### Online spare parts service

Within the Plan Renove a new online spare parts service has been launched with access on our web page [www.stemm.com](http://www.stemm.com). This service, enabling orders to be made for spare parts, components and all types of deteriorable materials for any grapple, bucket or tongs. This online service provides original, authentic, and interchangeable spare parts from any manufacturer, at reasonable prices.

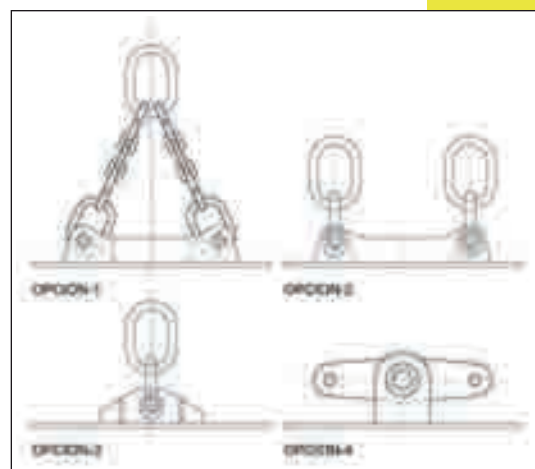


Figure 6. Different Stemm options with flexible suspensions

To date there has been some disarray in the pricing policy of spare parts with some unacceptable margins applied.

Stemm provides spare parts with reductions in prices of up to 40%. Keen prices in spare parts have pleasantly surprised clients as well as the promptness in responding to requests for information and orders - Stemm participates in organisations such as Handling Network Parts (HNP) and Parts Trade Centers Network (PTCN) that enable the supply of services and industrial components of all types, 24 hours a day, to any country in the world. When supplying **metalworked or machined parts**, the order is undertaken with maximum celerity and quality guarantee.

The Spare Parts Department is very conscious of the needs, urgency and deadlines at times when repairs and start-ups are required during bank holidays, vacations, etc., and provides a **special service** for those cases where references and reliable data of the component are not known.

#### Online prices service

Through this web page it is also possible to consult the prices of all equipment, instantly and as a general guideline. This service helps to evaluate and to calculate the investments and projects, as well as to compare the prices with those of the regular suppliers. The visitors to [www.stemm.com](http://www.stemm.com) web page are invited to register themselves and to ask for the free access password

#### After sales service

The guarantee of Stemm equipment is 2 years and any component is

supplied within 24 hours to any place of the world.

The after sales service of Stemm Equipment is assured in 89 countries worldwide through accredited collaborating centres which are prepared and trained to provide optimal and effective after-sales service. Each Centre has hydraulic, electrical and mechanical professionals who receive a thorough training at our premises. In each Centre there is always a stock of spare parts, having all the documentation and manuals for the machines sold in its area. Care is also taken to attend to Preventive Maintenance and the monitoring of the life of each machine, informing our control centre in Spain in an ongoing manner.

#### Engineering and consultancy service

Stemm engineers actively participate as consultancy experts in multiple projects for new recycling, municipal waste and solid waste treatment (MSW) Plants.

The Department of Engineering is always prepared and available to help, collaborate in and to support any new project or to study installations, whether involving manual, semiautomatic or totally automatic processes.

Stemm technicians support, assiduously help and collaborate with all European engineering enterprises making available their wide experience in electro-hydraulic design and grab manufacture, as well as in Automated Installations.

The Department of Engineering has published the attached table with **real data for the handling of MSW** gathered during the 1980-2009 period at various installations in Spain, Portugal, France, Belgium, Germany, Norway, England, the Philippines, Taiwan, Singapore, etc.

The values indicated in the crane capacity (SWL) column should be interpreted as minimum values. They are values that are not always common amongst manufacturers of the European travelling cranes but are so on other continents.

In each case, each manufacturer of the travelling crane will have to determine the capacity of the most suitable standard crane, taking into consideration the safety coefficient required of the crane according to the

**Table 1. Loads for each operation, handling MSW**

Model	Capacity (m <sup>3</sup> )	Minimum crane SWL (t)	Load at each operation for waste handling			Weight of grab unloaded with oil included (kg)
			Minimum load (kg)	Average Load (kg)	Main Load (kg)	
PH5-500-0,9	0.5	1.25	170	250	310	890
PH5-750-0,9	0.75	1.5	280	370	490	995
PH5-1000-0,9	1	2	400	540	660	1,290
PH5-1250-0,9	1.25	2.5	490	650	820	1,560
PH5-1600-0,9	1.6	3	670	890	1,120	1.600
PH5-2000-0,9	2	3.2	835	1,100	1,400	1.800
PH5-2500-0,9	2.5	4	1,050	1,390	1,750	2.150
PH6-3000-0,9	3	4.5	1,280	1,680	2,100	2.750
PH6-3500-0,9	3.5	5	1,470	1,950	2,450	2.950
PH6-4000-0,9	4	5.5	1,660	2,240	2,838	3.500
PH6-4500-0,9	4.5	6.3	1,900	2,570	3,240	3.700
PH6-5000-0,9	5	7	2,230	2,958	3,751	3.950
PH6-6300-0,9	6.3	9	2,852	3,803	4,801	5.000
PH6-8000-0,9	8	10	3,307	4,410	5,600	5.340
PH7-10500-0,9	10.5	14	4,286	5,715	7,200	8.170
PH7-12000-0,9	12	16	4,655	6,182	7,810	8.520
PH8-15000-0,9	15	18	5,500	7,350	9,300	9.900

classification and premises laid down by the F.E.M norm, considering the load limiter tare (approx +10%), besides other parameters and safety factors.

#### R+D+i service

Stemm develops new products, equipment and components in an ongoing manner, always related to the maintenance and handling of bulks and waste.

A state-of-the-art **automatic control and telediagnostic kit** which integrates a number of sensors, weight measurement cells, signal transmitters microdetectors, etc., has recently been incorporated and put into operation at a BETA-level quality of working, with its corresponding computer equipment that allows signals to be sent to the work station of the employee or to the signal panel of the crane itself or directly to a computer, terminal or to the Internet server.

This option allows a perfect telediagnostic remote control of the machine to be registered, enabling work sequences, problems, alert signals of temperature and levels, state of filters, running hours, manoeuvres and production of a machine to be monitored in real time

in any place of the world. It is an optimal tool both for the preventive maintenance service as for the production service.

Also a **radio control system for the clamshell grabs** has been successfully developed the operation of which can be viewed on video at the Stemm web page. This type of grab does not require the installation of any electrical motor and is a single-rope machine working under its own gravity and combined with a system of mechanic-hydraulic feedback which is tele-commanded by radio by means of controls with 4 simultaneous and/or alternative frequencies.

The uniqueness of this equipment is that it is of great interest for ports where there are single-rope cranes that do not have electrical cable coilers to feed the grabs with electro-hydraulic drives. It is equipment that does not cause any interference to the navigation equipment of the ships, complying with the basic international safety norms that govern all ports.

Ten radio-controlled grabs have been used highly successfully in the Port of Damman in Saudi Arabia since the beginning of 2009, unloading cereals, coal, fertilizers and minerals from large 40,000 and 60,000 metric ton ships.