The process within the International Maritime Organisation (IMO) to implement the mandatory verification of a container weight before it is loaded on to a vessel is progressing as expected. In a May 2014 meeting, the Maritime Safety Committee (MSC) approved draft amendments to SOLAS (the International Convention for Safety of Life at Sea) chapter VI to require the mandatory verification of the gross mass of containers, either by weighing a packed container, or by weighing all packages and cargo items and adding the tare mass. The requirements are expected to enter into force in July 2016.

It is clearly stated in the draft amendment that the responsibility for obtaining and documenting the container weight lies with the shipper. This means that the burden to comply with the new regulations is not with terminal operators as such, but the situation—where many shippers will not have access to the facilities needed to fulfill their duties—provides terminal operators with an opportunity to offer such a service to shippers.

**THE METHODS**

The SOLAS regulations prescribe two methods by which the shipper may obtain the verified gross mass of a packed container:

- To weigh the packed container after loading and sealing. The shipper can do this or have a third party do it.
- A shipper weighs all packages and cargo items including pallets, dunnage and packing material. The sum of all the single masses plus the tare mass of the container forms the verified gross mass of the container.

Certified methods must be employed for the individual masses and the total gross container mass.

**BUSINESS CASE FOR TERMINAL OPERATORS**

It is likely that the second method may bring an administrative burden for the shipper that will actually lead to, or encourage, the use of the first method. There are also some cargo types such as scrap metal and unbagged grain that are not as easy to weigh as individual items, therefore the second method will be inappropriate and impractical.

There seems to be an interesting, if not a necessary, case for terminal operators to offer a weighing service to shippers. It is necessary because a terminal does not want to end up in a situation where containers arrive at the terminal without having certified container weights declared. It is interesting strictly from a business point of view.

**AVAILABLE TECHNOLOGY**

A quick review of the various technologies available to accomplish the weighing service quickly boils down to two main alternatives: weigh bridges and load sensing devices fitted to, or integrated into, spreader twistlocks. The sensors and load sensing devices available in different cranes and mobile lifting equipment are primarily used as safety devices. The accuracy of these systems is probably not high enough to meet the requirements for container weight verification.

Taking a deeper look into the characteristics of the two main systems, there are a number of areas that distinguish them. This does not necessarily mean that one is better or more suitable than the other, but each will have a different effect on the logistical flow and procedures in the terminal.

**SYSTEM ACCURACY**

A weigh bridge is the long-established technology which has typically been used to measure the weight of vehicles. This is the technology that offers the highest ‘system accuracy’ of the two main solutions. However, the process and algorithms for deriving the container weight out of the total weight of a vehicle adds both complexity to the logistical flows of a terminal and/or inaccuracy, as the weight of the vehicle (including the driver, fuel, etcetera) is estimated and deducted from the total mass of the vehicle measured.

Load sensors installed in or on twistlocks have an advantage in that they only measure the weight of a container. The measure that is obtained is the gross mass of a container. The accuracy of these measuring systems is what is expected to be in line with prospective requirements, especially when looking at the accuracy relating to a container weight, the difference in accuracy to the weigh bridge is small (assuming a truck weight estimate rather than an actual weighing).
EFFECT ON TERMINAL LOGISTICS FLOW
When weigh bridges are employed, they add an extra step in the handling process. The vehicles carrying containers will have to go to and pass over a weigh bridge. Traditionally, the vehicle has to stop on the weigh bridge but technologies where the truck can continue to roll over the bridge are available. In either case, the weigh bridge will require space to be dedicated for the task and be one of the stations all containers have to pass in order to be weighed.

The biggest advantage for terminal operations regarding a twistlock based system is that it measures as part of the regular lifting cycle. Installed on, for instance, an RTG, the load will be measured and the weight derived as part of the lifting cycle. This simplifies the logistical flows of a terminal by eliminating the extra step to pass a weighing station.

TWIN LIFT
When two twenty-foot containers are loaded on a truck, the weigh bridge cannot measure the weight of each individual container. A possible procedure for obtaining the individual weight is to unload one of the containers, weigh the vehicle again and then apply the mathematics to achieve the individual weights. When a spreader twistlock based system is employed, individual twenty-foot containers can be weighed as there are sensors in each of the eight twistlocks on a spreader for twin-lifting.

SUMMARY OF THE TECHNOLOGY COMPARISON
To conclude the comparison of the two main alternatives; the twistlock based system provides benefits from a handling and terminal logistics point of view, while the weigh bridge is expected to provide a slightly higher accuracy in the container weighing. The accuracy of both systems is expected to be within requirements (which are to be defined while the equipment is in use).

CALIBRATION AND CERTIFICATION
One of the requirements of the equipment that is to be used is that it has to be ‘calibrated and certified’. The text in the SOLAS amendment defines what this means: “Calibrated and certified equipment means a scale, weighbridge, lifting equipment or any other device, capable of determining the actual gross mass of a packed container or of packages and cargo items, pallets, dunnage and other packing and securing material, that meets the accuracy standards and requirements of the state in which the equipment is being used.”

This definition leaves some room for interpretation. The accuracy requirement is clear and straightforward; based on the specification of the equipment it will be easy to see if the national requirements are met. The certification part however is less obvious, and there is a risk that suppliers will have excellent equipment available but will not know how to qualify to the certification requirement.

Certification means that someone, typically a third party accredited by a national regulatory body, confirms certain characteristics of a system. Characteristics that will be addressed in this case are accuracy, documentation, quality control and so forth. However, when we start to look at the possibility that standards and directives can be made by different bodies of legislature for different countries, the situation becomes quite ambiguous. The IMO currently have 170 member countries, theoretically,
this could mean that certification must be agreed between 170 different national standards.

In reality we know that the number of different standards will be lower. For example, the different countries within the European Union typically follow the same European directives. Also, many countries adhere to, or at least accept, the corresponding US standards. It will not be 170 different standards, but the number will be high enough to present the suppliers with a challenge.

The approach I believe will be taken is to go through the process of “Type Approval” of equipment. This means that a third party, qualified according to the above mentioned criteria, will issue a certificate for the equipment, again in accordance with what has been described above. I am hoping, for the sake of the industry, that the big and commonly acceptable standards and directives, such as European and US standards, will be widely accepted in the other member countries of the IMO.

CONCLUSION

There is an appealing business case for terminal operators to offer a weighing service to shippers. The choice of system to do the weighing depends on a number of criteria. Currently, there seem to be two main options for weighing systems: weigh bridges or the twistlock based load sensing systems. Certification of the equipment and system may become a bottleneck unless the big standards and directives (such as those from the EU and US) are widely accepted by the other IMO member countries.