TECHNICAL PRESENTATION NUMBER : 28

LOADING ARMS

AUTHOR : ANDRE KUBECKA

DATE : 4 AUGUST 1997

Contents

1. **What is a Loading Arm?**
2. **How many different types of loading arms do we manufacture?**
3. **What are the components that make up a Liquip Loading Arm?**
4. **What are the features and options of our Loading Arms?**
5. **Who are our customers?**
6. **How do we process orders?**
7. **What is the Production Process?**
8. **Quality Control Issues**
9. **Shipment**
10. **How much does a loading arm cost?**
11. **Who are our main competitors?**

Appendix 1. Velvet Touch Mk2 Loading Arm New & Retrofits - (Drawing)

Appendix 2. Velvet Touch Mk3 Loading Arm New & Retrofits - (Drawing)

Appendix 3. Long Reach Spear Loader Flanged (SLF) Arm & Retrofits (Horizontal Reach 5100mm) - (Drawing)

1. What is a Loading Arm?

A loading arm is a construction of;

- Pipes
- Swivels
- A Hose and
- A Coupler

Specifically designed to load liquid product into a transport vessel (in our case usually Road or Rail transport).

Loading of liquid fuel product is usually done from a gantry at a terminal or depot. Loading may be made by either top loading or bottom loading into a tanker compartment.

Bottom loading is a far safer method however is not always possible or appropriate.

Products that Liquip Loading arms may be used for are;

- Petroleum
- Diesel
- Various Chemicals
- Bitumen
- Paint
- LPG

Loading arms may also be used to load food product, however there are some stringent standards that must be adhered to in these applications.

2. How many different types of loading arms do we manufacture?

There are basically three (3) general types of loading arms that we manufacture;

1. Bottom Loading Arm
2. Pantograph loading arm
3. Long Reach Top Loading - up to 5.5 metre span

The Pantograph and Long Reach loading arms are used in Top Loading applications.

All of the Liquip loading arms now incorporate our unique gas strut technology - known as "Velvet Touch".

Velvet Touch, as the name implies, enables the operator of the loading arm to manoeuvre or position the loading arm with minimal effort for a fast and efficient load of a compartment.

We mainly manufacture the 4-inch (100mm) loading arms, however we have quoted and made loading arms considered non-standard by us. These include loading arms for mine sites – usually 2-inch (50mm) as well as 3-inch (75mm) – this is a current quote we have prepared for applications in India.

3. What are the components that make up a Liquip Loading Arm?

When negotiating a sale for Liquip loading arms, Liquip's Engineering Department must be fully involved as almost every application for a loading arm is somewhat unique and requires specific design considerations.

Loading arms can consist of several swivels, a typical 4" bottom loading arm can comprise of the following components ;

1. Riser Pipe
2. Balance Mechanism
3. Horizontal Pipe
4. Intermediate Swivel
5. Drop Pipe
6. Drop Hose
7. Coupler Swivel
8. Coupler Spool
9. Coupler

Note also that klingerite gaskets are used at the joints along with High Tensile Studs, Bolts and Nuts when erecting the loading arms. Liquip also offer earthing straps and clips to ensure continuity where applicable.

Component Detail

1. Riser Pipe - May or may not be required depending on the situation. When required, it is usually made from steel tube with ASA150 raised face flanges. The length is as specified by Engineering.

2. Balance Mechanism - Can be either a VNB-I4 (Mark 2) or a VWBS100 (Mark 3). Usually the VNB-I4 is used, as this is the preferred balance mechanism. They are both made from steel (SG iron).

3. Horizontal Pipe - The pipe length is determined by our Engineers and can be made up of aluminium tube with BF4 flanges or steel pipe or tube. Note - The Mark 3 is normally direct welded and therefore always steel.

4. Intermediate Swivel - VNI-A4 is made from AP601 Cast Aluminium then T6 heat-treated.

5. Drop Pipe - Again, this pipe may or may not be required depending on the situation. If required, the pipe length is determined be our Engineers and is usually made up of aluminium tube with BF4 flanges.

6. Drop Hose - the drop hose typically is two metres in length and is a braided stainless steel hose. However the drop hose may also be made from code 901 hose, again what Engineering specifies (customer requirements).

7. Coupler Swivel - VNC-A4 again is made from AP601 Cast Aluminium then T6 heat-treated

8. Coupler Spool - VSA4 or VSS4 is a cast aluminium pipe piece with shear points cast into the pipe piece.

9. Coupler - API513 (or API555 new) is the bottom loading coupler.

4. What are the features and options of our Loading Arms?

Some of the features of our loading arms are;

- We use gas springs to counter-balance the weight of the arm.
- All the swivels run on needle and ball bearing thereby having a much lower coefficient of friction hence our swivels are less prone to wear.
- The swivels also have a proper greasing system and a relief valve designed into them, enabling the user to keep the swivels in top condition.
- The size and weight of our loading arms is also a major advantage as it is by far the lightest balance assembly making it not only easy and safe to operate but also very easy to install and maintain.
- There is no problem fitting six loading arms to a gantry.

- The Liquip loading arms have a built in adjustable safety stop for up and down limits – so if there is a component failure, the coupler will not drop to ground level.

Optional extras that we can provide for our loading arms, dependent on customer requirements are;

- Parking adapters - used to ensure bottom loading arms are correctly stowed and secured.
- Proximity sensors - used to ensure loading only occurs when it is safe to do so.
- Vacuum Breaker - screws into the loading valve to ensure complete drainage (top loading only).
- Drip bucket – used to clip onto the spear as it is removed from the tanker to catch drips or surges as the loading arm is swung back onto the gantry (top loading only).

A big selling point for our loading arms is Liquip's ability to provide solutions for difficult situations or improve on existing layout designs thereby enabling users to save time and effort in their day to day operations. e.g. One six Liquip arm bay can often replace two four arm bays and four long reach top loaders can do the work of eight pantographs.

5. Who are our customers?

Our customers for loading arms are predominantly the oil companies, however our loading arms may be used in any application where liquid product needs to be transferred from a fixed storage area into a container or vessel that is to be transported.

Some examples of potential customers may be;

- Oil Companies
- Chemical Manufactures
- Mine Sites
- LPG companies

You may come across a potential application that is totally unexpected, so remember what the principles of our loading arms are.

6. How do we process orders?

Loading Arm sales are treated as projects. They can be quite large such as the Tre Pi project or the current Ampol project for 90 loading arms or relatively small involving only a few

loading arms.

With each project there are a number of steps that must be followed so that the project may be completed successfully and on schedule.

- Our Sales and Engineering people must establish the full requirements of the customer as well as detail any unusual site specifications. A handy drawing / questionnaire has been produced by Engineering to make this job easier - see the appendices.
- The Engineering department will produce the specifications of the loading arm(s) required. This is done on an official drawing, detailing every aspect of the loading arm.
- The sales department then produces a job sheet from the drawing so that the project can be monitored and costs accurately recorded.
- A copy of the job sheet along with drawings is sent to the production manager for the job to be processed. The materials are allocated by the production department. Copies of the job sheet are also sent to the Logistics Manager and the Warehouse Manager so that various other aspects may be addressed.
- Quality Control produces test certificates for the loading arms.
- A copy of the relevant installation and maintenance manual is sent with every loading arm order.

7. What is the Production Process?

Liquip usually holds some stock of the various components that make up our most common loading arms, however, with every sale for Loading arms, there are still additional requirements;

- At best - to make up the individual pipe pieces,
- At worst - reverse hanging balance mechanisms, painted to a strange specification etc.

Generally, if we do not have stock of some of the major components of a loading arm or the customer requests something non-standard, the lead-time may be as long as 6 to 8 weeks. However, if the components are available and all that is required is that the pipe pieces are made up, the lead-time may be as little as a few days.

As we treat any loading arm sale as a project – the Production Department must be consulted if delivery times of less than 6 weeks are requested. This consultation will hopefully enable you to provide your customer with realistic delivery dates and save you the embarrassment of going back on a promise.

Some of the manufacturing processes involved with producing loading arm components are;

- Heat treating
- Vacuum sealing
- Sand blasting
- NC machining
- Welding
- Painting
- Testing

Many of the above processes are done with outside suppliers so coordination of the processes does take time hence the reason for the 6 to 8 week lead-times where no stock is available or something special is required.

8. Quality Control Issues

All balance mechanisms are allocated a Serial Number during the manufacturing process.

When a loading arm assembly order is believed to be completed and is ready for packaging, our Quality Control Officer makes a final check of the order ensuring that all components have been supplied and are in proper condition.

The Quality Control Officer records the serial number of the Balance Mechanism into our Tracker system when any loading arm is sold, he also produces a Test Certificate for the entire loading arm before signing off the project.

9. Shipment

As loading arms are quite bulky and heavy, we organise wooden crates for transporting them. This also can take some time to organise, so it is important that the Warehouse Manager is given the dimensions for the components of the loading arm at least 1 week prior to the scheduled dispatch date.

10. How much does a loading arm cost?

A loading arm assembly, due to the range of variants it may have, does not have a set cost.

The individual swivels, balance mechanism, drop hose etc. do have a list price on our computer system like any other Liquip inventory item.

In general a singular loading arm assembly may cost as little as a couple of thousand dollars or as much as five or six thousand dollars – it all depends on what the customer requirements are.

It is important to cost in requirements of the customer for example pressure testing, continuity testing, x-rays, special paint etc...

11. Who are our main competitors?

The main competitors that we run into, both in our domestic market and on the international scene are;

- OPW, have manufactured replica's of our own loading arm swivels. As always the original is the best.
- Emco-Wheaton, with their spring style swivel is both bulky and cumbersome to use. Their newer coil-spring type is an improvement but clashes with other arms due to spring position and size.
- FMC - Smith Meters, also manufacture spring style swivels and are a competitor in the international market.

These styles of loading arms are still popular based on their price.