CATALOGUE of EQUIPMENT RENTAL INDUSTRY
ISSUES, NEEDS and REQUIREMENTS
for CONSTRUCTION & ACCESS EQUIPMENT

Version 3.0 (Feb. 2015)

Introduction:

This document is being produced by the European Rental Association's (ERA) Committee on Equipment Technology.

Resulting from a common sharing and analysis between OEMs and rental companies, the following chapters describe the issues, needs and requirements of the rental industry in relation to the main product categories of equipment of the rental companies' fleets.

The document is in working process and will be complemented over time with additional chapters.

Targeted Audience:

This document is deemed to serve as a support for communication between rental companies and OEMs.

It will allow OEMs willing to better serve the needs of the rental industry to understand the issues and the needs that the rental companies are facing in their day to day operations as well as in the management of their equipment fleets.

It should also help the rental companies to develop a long term partnership type of relationship with these suppliers.

Mission Statement:

Making it safer, easier and cost effective for the rental industry by working together with equipment stakeholders on:
1. The key drivers of the total cost of ownership (damages, accidents, maintenance, etc.).
2. Standardisation wherever possible (telematics, decals, compaction, etc.).
3. Simplified instructions manuals and training (operation, maintenance, safety?, e-learning).
4. Parts management and key drivers of repair and maintenance total costs.
5. New legislations impact on rental industry

Contents

CHAPTER 1 - Total Cost of Ownership

A guidance document (reproduced below) has been drafted by the European Rental Association's Committee on Equipment Technology

It represents a common understanding of the key drivers of the total cost of ownership of equipment shared by the rental companies and the construction equipment manufacturers represented in the Committee for the three main phases of the lifecycle of equipment: acquisition, operations and maintenance and divestment.

The objective of this document is to serve as tool or a general frame for discussions between rental companies and equipment manufacturers on the specific advantages of a given type of equipment. It therefore lists and prioritizes, for each of the main phases of the lifecycle of equipment, only the drivers of interest to rental companies that can be influenced in one way or another by the design or manufacturing of the equipment. Other key drivers may enter into consideration depending on the activities of a specific company.

The ERA Equipment Technology Committee will be over time addressing the various issues identified in the "Key drivers for the total cost of ownership of equipment".

EUROPEAN RENTAL ASSOCIATION

TOTAL COST OF OWNERSHIP OF CONSTRUCTION EQUIPMENT

ACQUISITION

	Product Costs (direct)	Process Costs (indirect)	Opportunity Costs (indirect)	Description / Related Activities	Cost Drivers
FIRST PRIORITY ISSUES	Equipment cost			Depreciation over Lifetime	Purchase price – Economic life time
		Transport / PDI cost		Inbound transport from supplier to warehouse	Delivery terms – Shipping mode
		Administration cost		Registration of new equipment (asset booking)	Rental items
SECOND PRIORITY ISSUES		Purchasing cost	Cost of capital	Demand planning, testing and selecting of new products	Type of investment – Size of investment
		Handling cost		Receiving and storing of new equipment	Shipments - Rental items
		Storage cost		Storage area and infrastructure	Rental items – Size and weight
				Internal interest rate on tied-up capital	Payment terms – Internal interest rate

OPERATIONS & MAINTENANCE

	Product Costs (direct)	Process Costs (indirect)	Opportunity Costs (indirect)	Description / Related Activities	Cost Drivers
FIRST PRIORITY ISSUES	Spare parts costs			Spare parts needed to service/repair equipment	Purchase price – Repair/service frequency
		Handling cost -spare parts		Planning, ordering, receiving, storing and picking of spare parts	Spare parts – Repair/service frequency
		Handling cost - equipment		Picking, packing, receiving and storing of rental equipment	Rentals
		Service cost		Exchanging wear parts according to service schedule	Service frequency – Service cycle time
		Repair cost		Exchanging broken parts	Repair frequency – Repair cycle time
		Training cost		Training of sales and service personel	Trainings – Product/application complexity – Hazardousness of equipment
		Sales cost		Advicing and training of customers	Active customers - Product / application complexity - Hazardnousness of equipment
		Marketing cost		Communication of product and service offering	Potential customers
			Lost sales	Days equipment is not available to rent	Rentals (inspection frequency) – Inspection, repair, service cycle time
SECOND PRIORITY ISSUES	Insurance cost	Inspection cost	Rental rates	Insurance fee for potential theft, damage	Purchase price – Risk of damage / theft
		Transport cost		Testing and cleaning of rental equipment	Rentals – Product design
		Transfer cost		Shipping equipment to & collecting from customers	Rentals - Unplanned returns
		Administration cost		Transferring equipment among depots	Transfers – Product availability
				Administration cost	Rentals
				Chargeable daily fees	Rental duration – Service offering – Brand recognition

DIVESTMENT

	Product Costs (direct)	Process Costs (indirect)	Opportunity Costs (indirect)	Description / Related Activities	Cost Drivers
FIRST PRIORITY ISSUES	Recycling cost			Fee for recycling of equipment	Recyclable materials – Product design (ease of separation) – Size and weight
			Second-hand sales	Revenue generated by selling off second-hand equipment	Second-hand sales price – Economic life time – Brand recognition
SECOND PRIORITY ISSUES	Warranty cost	Transport cost		Accruals for potential liability claims	Equipment claims
		Administration cost		Shipping to customer / recycling company	Sell off equipment – Economic life time – Size & weight
		Handling cost		Invoicing, book keeping…	Sell off equipment – Economic lifetime
		Storage cost		Picking, packing, shipping	Sell off equipment – Economic lifetime
		Sales cost		Providing storage area for excess equipment	Sell off equipment – Economic lifetime – Size & weight
		Marketing cost		Acquiring and contacting potential customers	Sell off equipment – Economic lifetime
				Advertising of used equipment	Sell off equipment – Economic lifetime

CHAPTER 2 - Reducing Operational Costs

In 2012, a survey of rental companies was performed by the ERA in order to identify the areas in which damages caused by end-users of equipment and accidents were the most frequent, as well as maintenance and service calls issues. (The results of this survey are summarized in the table below).

Following this initial assessment through the survey reported above, 2 workshops were held in April 2013, taking advantage of the Bauma exhibition.

One workshop was on general construction equipment, with technical experts from rental companies and OEMs.

Another workshop was on access equipment, with technical experts from rental companies and OEMs.

These workshops resulted in a list of areas of concerns and/or suggestions for improvement of the equipment destined to rental fleets.

These findings will serve later as a support for further developments by rental managers.

SURVEY ANALYSIS	1° What are the most common damages to rented equipment caused by inexperienced users?	2° What are the most common accidents caused by inexperienced users?	3° What categories of equipment are "undermaintained" most by customers when rented out?	4° What are the most frequent reported issues in service calls (such as, for example, empty fuel tank or flat batteries)?
Priority n°1	Broken Windows, mirrors and working lights	Access: falls from heights from persons, body crushing, overload	Earth moving cleaning and greasing	Out of fuel, wrong fuel
Priority n°2	Lack of maintenance checks	Cutting power cable or gas line	Access cleaning and greasing	Flat batteries
Priority n°3	Hoses breakage	Transportation roll on/off trailer	Generators poor maintenance (oil changes…)	Dirty fuel filters
Priority n°4	Damages to tools (cutting cables...)	Exhaust gas poisoning due to lack of ventilation	Vehicles cleaning and fluids levels	Oil level and leakage
Priority n°5	All types of physical damages, including body, undercarriage, doors, tires, rubber tracks, broken belts...	Foot injuries for not using footstep when leaving the cab	2 stroke cut off saws	Hydraulic hose cut
Other Priorities	Transportation damages Wrong fuel "Cash paying" customers (inexperienced) Water pump put in silt	Rollovers (bobcats) Burns from the exhaust pipe	Accidents by cutting Electric shock	Emergency button pushed by mistake How to fix/use attachments Lost key Flat tire

2 - 1 - Construction Equipment

- Equipment damages resulting from wrong usage

Windows

Damages are most frequent with doors windows and more often in compact machines working in contained environment. The risk of damage looks difficult to prevent and/or to reduce (even better materials would be more expensive).

Body parts

The two main concerns of renters are the cost of parts and their delivery time.

Transport / Lifting

Rental companies often have difficulties in finding easy ways to lift machines or fix them on transport trucks.

There is a need for more standardization on the design and the positioning of hooks and attachment points and the OEMs agree that something can be improved in this area.

Currently transport operators have to jump on and off the truck often to affix machines, which is one of the most important causes for work accidents in rental companies. Hooks and attachment points should be accessible from the ground. Simplifying and standardizing things may increase productivity and reduce accidents. For transport, the exact height and weight of the machine should be indicated on the machine itself and easily readable by the operator. (This is not always the case).

Wrong fuel

Rental companies need easy ways to empty / clean the tanks. OEMs warned that this may ease fuel theft. Rental companies also suggested putting in place a standard for caps to avoid wrong fuel being put into machines (stickers with indication of fuel to be used get worn out over time). Comments were made for the hose of hydraulic tank not to be too close from the fuel hose to avoid confusion. Checking the presence of water in the fuel tank is also a big concern for rental companies.

- Most frequent issues in service calls

Flat tires

This corresponds for some rental companies to 15% of replacement cost. Delivery time is more important than the right specifications for rental companies. Rental companies expect more options on specs from OEMs in order to improve the lifetime. OEMs ask rental companies to be more specific (which type of tires particularly needs improvement).

Empty tank

To install warnings to avoid running out of fuel.

- On machines, besides the warning indicating “low fuel”, it could be sensors on dashboard indicating running time left (1 hour…);
- On generators and compressors (and generally idle equipment), besides an alarm, flashing light or remote warning indicating low fuel, it could be a sensor indicating, upon starting the equipment, the remaining time.…

Clogged filters

Possibility of sensors. One OEM comments that this point, as many others, could be part of the options menu offered by OEMs (see below in conclusion)

Misuse of emergency buttons

There should be an alarm when the emergency button is used to deter operators from using them simply to shut down the machines. Such buttons should be put in clearly identified places, different from the machines’ normal operation commands.
Some standardization is necessary as there are all kinds of features for emergency devices. (From manual brakes to red buttons…)

Hydraulic hoses and couplings

Standards would save many problems; however it is very difficult because of too many attachments.

Lost Keys

Trend is on standard key for door and engine with separate anti-theft device. To notice a trend in North America to supply machines without locks

2 - 2 - Access Equipment

- Issues for improvement

Noise signals

Should be accompanied by relevant indicators on dashboard/control panel

Fuel indicators

Should be precise and should be added in the basket's dashboard to be visible from the operator

Fuel gauge

A fuel gauge should be visible to check the colour of the fuel

End-users education

Is the key to mitigate damages and service calls? For access equipment the issue is less about training (on access equipment) than familiarization (at the model level).

Checklists

Another demand is the provision of safety / return control checklists (i.e. sensors location varies). This could be delivered together with the equipment.

Size

Some rental companies would welcome smaller access equipment (some manufacturers are looking into it). This would reduce cost for equipment in instances where much height is not needed.

- Most frequent issues in service calls

Flat battery

Considered as an issue mostly for MEWPS and not developed further.

- Issues for standardization

Marking and Indicators

Should be placed where possible at the same location, irrelevant the brand of the equipment

The use of colours and of sounds

For safety signals (i.e. red, orange and green) should be harmonized.

Holes for fixing transport cables

Are often too small (foreseen for putting on trucks but not for lifting). A standard could set a minimum size for such holes and specify the location for different types of equipment

2 - 3 - General Lessons

- It is estimated that 70 to 80% of the cost of repair in rental companies comes from damages.

- The main expectations from rental companies are:
  - To reduce delivery time of parts (to reduce the number of down days)
  - *To reduce logistic cost/ item (remember hoods)*
  - To find cheaper parts (i.e. less special glasses)
    Not necessary cheaper but in total cheaper to repair, easier to replace, less wrench hours, less logistic cost, less time to find the right part number ……..
  - To ease the replacement processes (i.e. for glasses: access, size, sealing…)
  - To standardize where ever possible

- Pictograms on equipment are very welcome. BUT sticker plates with many pictograms (up to 40) are confusing and not read anymore because too complex. Pictograms should be used for important / essential information.

- Generally, equipment for the rental market should be characterized by ‘simplicity’. This means rental companies want simple and robust equipment but are not opposed to electronics as a lot of the information they require for their operations is coming from electronics. The electronic components should be robust and replaceable at moderate cost.

- The equipment design itself should be kept simple and where possible the type of parts used from one model to another should be the same as much as possible. *Even the way to wire should be the same, or the colour code should be the same.*

- Rental companies underlined that aesthetics is not a criteria for purchase.

2 - 4 - Essential & Effective Information to operators

The 2012 survey mentioned in page 5 above was including an additional question about the type of information that equipment users must know and the most effective way to communicate it. The results of this survey are summarized in the table below:

SURVEY ANALYSIS	**5° What type of information on operations and maintenance do you believe would customers like to receive?**
Priority n°1	Easier user manual (how to start, how to stop…)
Priority n°2	Daily-weekly maintenance operations with pictures or pictograms (to see Speedy)
Priority n°3	Easy to use Safety instructions/guide attached to the equipment
Priority n°4	Simple failures/most common repair guidance
Priority n°5	Simpler control system on the machine
Other Priorities	Sticker on the machine with the basic of handling Mandatory training of running and showing functions of the machine

Instructions Manuals (Operation - Maintenance - Safety)

- To be developed

Stickers & Pictograms

- To be developed...

CHAPTER 3 - Evaluation framework for damage events

In Annex 1 of this catalogue, will be reproduced the detailed results of this evaluation framework.

A continuation are presented the summary for:

- Construction equipment in the next 2 charts
- Access equipment in the third chart

The workshop results – The top 9 damage events within Construction Equipment (I)

4. The guidance from Rental Industry on top damage events

Damage events	Guidance/ key considerations	Equipment cluster relevance
Inappropriate lifting and tie down points	- Lifting points should suit common lifting methods/ devices (e.g. chains, hooks, straps) - Preferably create one single lifting point - Lifting point should be easily accessible (from round level) and visible	Telehandlers, Wheel Loaders, Excavators, Skidsteers , Rollers
Lack of simplified user manuals	- Example: like Manitou (exclude safety), Merlo (incl. Safety) - Headlines in the template: Technical characteristics, how to operate, maintenance guide, lifting and transporting (incl. un-/ loading) - - Suitable document holder/ box (e.g. rain protected)	
Operator broken hydraulic cylinders	- Hydraulic cylinders and related connections should be protected/ covered appropriately	
Operator hydraulic hoses breakage	- Hydraulic cylinders and related connections should be protected/ covered appropriately	

The workshop results – The top 9 damage events within Construction Equipment (II)

4. The guidance from Rental Industry on top damage events

Damage events	Guidance/ key considerations	Equipment cluster relevance
Operator damages on bonnets and canopies	- Create crashing zones (e.g. rubber buffers), which protect the bonnet from damage	Excavators
Operator broken windows	- Straight forward design (e.g. not necessarily curved) - Less fragile material - Should be easy to be replaced - Create crashing zones (e.g. rubber buffers), which protect the windows from damage	
Operators front visibility on dumpers (<10t)	- Can the loading height be limited technically? - Can solutions be provided to improve visibility by additional visual aids? - Can the design/ dimensions be changed? - Can the operators seat position (direction be improved?	Dumpers
Inappropriate loading (e.g. overloading of the skip, un-balanced loading, high loading)	- Can functionality of the machine be linked to the load weight/ form? - Can equipment design/ dimensions support avoiding inappropriate loading?	
Operations with seatbelts off	- Inspiration from car industry: sound indicators when seatbelts aren't in proper use.	

The workshop results – The top 5 damage events within Access Equipment

4. The guidance from Rental Industry on top damage events

Damage events	Guidance/ key considerations	Equipment cluster relevance
Inappropriate lifting and tie down points	- Lifting points should suit common lifting methods/ devices (e.g. chains, hooks, straps) - Preferably create one single lifting point - Lifting point should be easily accessible (from round level) and visible	Booms, Scissors, Mast Lifts
Lack of simplified user manuals	- Example: like Manitou (exclude safety), Merlo (incl. Safety) - Headlines in the template: Technical characteristics, how to operate, maintenance guide, lifting and transporting (incl. un-/ loading)	
Operator broken hydraulic cylinders	- Hydraulic cylinders and related connections should be protected/ covered appropriately	Booms
Operator hydraulic hoses breakage	- Hydraulic cylinders and related connections should be protected/ covered appropriately	
Flat battery (power train for electrical machines)	- How can battery failure be avoided in operation (e.g. longer maintenance cycles (if at all), emergency power levels)? - Can the design of the machine impact the awareness of the user that the batteries need to be charged?	Scissors, Mast Lifts (electrical drivetrain)

CHAPTER 4 – Telematics

In 2008, AEMP and AEM agreed on standardizing at least six data points that can be shared, such as hours of operation, location and fuel consumption.

In 2009, VDBUM's first works on Telematics started in cooperation with the University of Munich (research project).

In 2010, AEMP and AMP published the first version of the Telematics Data Standard, with manufacturers such as Caterpillar, Volvo, Komatsu, Atlas Copco.

The first standard had 6 points:

- Identification,
- Last position known,
- Cumulative work hours,
- Cumulative consumption of fuel,
- Consumption of fuel in the last 24 hours,
- Cumulative distances.

In 2011, a survey about standardisation of the construction equipment's data was done, in 60 companies, in order to understand the needs. The same year, VDBUM starts having contacts with AEMP. The Americans were interested in the European data.

In 2012, the Telematics committee decided, on the basis of the results of the survey, a standardisation of the data for construction equipment.

In 2013, VDBUM, AEMP and AMP decided an extension of the Telematics Data Standard (version 2.0).

The version 2.0 was approved by Caterpillar, Liebherr, Volvo, and John Deere. But Komatsu is still discussing.

There are 11 data elements (optional):

- Cumulative unoccupied time,
- Notification of fuel,
- Engine on or off,
- External connection (possibility of attaching an outside sensor, for instance sensor to the accelerator pedal),
- Cumulative auxiliary drive hours,
- Load factor on a daily basis,
- Maximal speed,
- Cumulative load play,
- Cumulative Handling achievement,
- Active time of regeneration of the diesel particulate filter,
- Transmission of a wrong code.

Today, the objective with BAUFLOTT is to come to a version 3.0.

BAUFLOTT has a technical objective but also an economic one:
- Based on process control of the job sites,
- Paperless invoicing in the back office,
- Analyse of the machine employment overlapping the job sites.

The survey launched by VDBUM and Munich University will be sent to the ERA rental companies members of the Equipment Technology Committee.

So far, 75% of construction companies and 18% of manufacturers have answered. But 85% of the answers come from medium and large companies (more than 50 employees).

To the question, do you already use Telematics, 81% have answered yes.

52% use a system of a service provider and 41% a manufacturer’s system.

The 3 functions mostly used are:
- Surveillance of the machine,
- Controlling,
- Scheduling.

According to the surveyed companies, the most important technical functions of version 2.0 are:

- GPS positioning,
- Capture of the operating hours,
- Information about the unoccupied time,
- Engine on or off,
- Forwarding of wrong codes.

Some other functions like:
- Protection against theft,
- Status of the machine,
- Workload of the machine,

are also mentioned as very important.

On the business administration side, the most important for the surveyed companies is to be able to control the activity of the machine outside of the utilisation time.

By the end of the first quarter 2015, AMP will have fixed the 19 parameters. But, from that date, the manufacturers will need time to update their equipment. Each parameter is optional and depends on the manufacturer.

For the time being, there is no real advantage for a manufacturer already conforming to the standards (since the customers are not interested).

So far, the manufacturers' systems are various and the users need one system.

Now there is a standard and the customers must pay attention that the machines they purchase comply with the standard and that the devices are updated.

AEM realised a survey in 2014:
- 35% of the companies answered that they had no plan to incorporate Telematics in the 5 coming years,
- 27% that they don't know how to use it,
- 22% that they understand the technology.

The automotive industry has been using Telematics for a very long time but it has taken them 30 years to be where they are today.

There remain many questions:
- Who shall process the data?
- Optimisation of the fleet belongs to the construction companies.
- How and when (to which frequency) shall the data be brought from A to B?
-Do we have too many data?
- Will it be too expensive?
- What do the rental companies wish to have?

VDBUM wants to get a standard between the German manufacturers.

ERA should wish the same for the European manufacturers but what do the European rental companies really want? What do they really need?

ANNEX 1 – Evaluation framework for damage events in the equipment rental industry

Please consult the document “Appendix to the catalogue – Evaluation framework for damage events in the equipment rental industry”