



European Materials Handling Federation

Revision of Directive 97/68/EC on emissions from non-road mobile machinery engines

FEM position on the European Commission proposal for a revision of Directive 97/68/EC on non-road mobile machinery

Brussels, 12 December 2014

Introduction

FEM represents European manufacturers of materials handling, lifting and storage equipment. The sector employs 300,000 people directly and generates €55bn annual turnover with a largely positive trade balance (+€18bn in 2013).

Three of our product groups are directly impacted by legislation on exhaust emissions from non-road mobile machinery: industrial trucks, mobile elevating work platforms and mobile cranes. Therefore, FEM has been actively involved in the revision of Directive 97/68/EC from the outset.

FEM supports the overall aim to further protect human health and the environment. Since the current legislation has been in place, our manufacturers have achieved a significant reduction in exhaust emissions of their products: to be more specific, a cut in emissions of particulate matter and nitrogen oxide by 95% and 96% respectively was reached in most engine power categories. The proposed legislation goes even further and will make our machines the least polluting in the world. Whilst we support this objective, we restate the need to preserve our industry's competitiveness. This is also commensurate with the overall EU objective of achieving an "industrial renaissance", notably by "*mainstreaming competitiveness aspects into other policy fields*"¹.

With this in mind, FEM would like to present its position and some suggestions for adaptations to ensure that the proposal's objectives are achieved without disproportionately hindering our industry's competitiveness.

1. New limits and dates

FEM appreciates the Commission's extension of the scope to all CI and SI engines from 0 to above 560 kW and generally supports the proposed staggering of the introduction dates which will apply to the different power categories in scope.

Moreover, the fixed date for the introduction of a new stage at 1 January of a given year is very important for our manufacturers to make the required planning.

¹ See <http://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:52014DC0014>

Finally, FEM welcomes the earliest possible date for the adoption of the delegated and implementing acts allowing engine type approval in relation to the mandatory dates of application of stage V.

2. Transition provisions

Important efforts have been made to clarify and simplify the transition scheme for machine manufacturers. FEM acknowledges these efforts and is in general supportive of the proposed regime. However, the proposed transition period of 12 months (and 6 months for the placing on the market) is insufficient.

Materials handling equipment manufacturers do not produce their own engines and are therefore entirely dependent on the availability of engines from engine manufacturers. Experience with previous stages has shown that OEMs usually receive engines very late and these are often still under development. The time span proposed between the first possible type approval of the engine and the introduction of the new stage unfortunately provides no guarantee that OEMs will receive engines on time to re-design their machines. Late availability of engines coupled with a short transition period means a risk that machines equipped with the new engines are not ready by the end of the transition period. Therefore, OEMs need a transition period that enables them to move from one stage to another without undue disruption to their business. Consequently, FEM requests an extension of the transition period by 12 months (24 months and 6 additional months for the placing on the market, so 30 months in total).

Such an extension would also address the specific challenge faced by our industrial trucks manufacturers. According to the proposed dates of application (annex III), the engine power categories 19-37 and 37-56 kW have the same schedule for type approval (1 January 2018) and placing on the market (1 January 2019) which de facto creates a large engine power category (19-56 kW). The vast majority of the engines used by industrial trucks (both SI and CI engines) fall within this large category. The proposed timetable would mean concentrating two years' worth of R&D into one, which would be disproportionate to the low environmental impact of industrial trucks (see the FEM Industrial Trucks Product Group position in Annex I). Extending the transition period would enable industrial truck manufacturers to spread the re-design over two years.

Mobile cranes are in a similar yet critical situation (Annex II). Since these machines are currently not equipped with diesel particulate filters, the re-designing effort to reach stage V will be substantial. The majority of mobile cranes are homologated for use on public roads. Road regulations includes numerous restrictions regarding weight, loads and dimensions, and manufacturers have to optimise cranes to fully integrate these restrictions. The homologation procedure by national authorities also takes a significant amount of time.

Only about 2000 mobile cranes are placed on the EU market every year. They represent up to 170 different models all in the 130-560 kW engine power category with a single introduction date. As a sector with small volumes, mobile crane manufacturers receive engines from engine manufacturers very late. Ongoing discussions with engine manufacturers suggest this will also be the case with stage V engines.

Only an exemption from Stage V for mobile cranes would really solve these issues. If this is impossible, mobile crane manufacturers should be granted at least three years to be able to redesign their portfolio. In order to avoid severe disruption of production, the transition period has therefore to be extended by 24 months (36 months and another 6 months for the placing on the market, so 42 months in total).

3. Replacement engines

FEM deeply regrets the absence of a replacement engine provision. This would enable the replacement of a failed old-stage engine with a new one from the same stage so that the machine can still be used. Several arguments justify such a provision.

First, newly built replacement engines are necessary because the market for remanufactured engines is not sufficient and often not adapted. Indeed, internal research among our affected companies indicates that the vast majority of replacement engines are newly built and not remanufactured because the latter are not available in sufficient quantity to cover the need for replacement engines. Moreover, the re-building time (two to three weeks on average) is not adapted to requests at short notice and can bring users' business to

a standstill. Finally, in case of serious engine breakdown during the warranty period, customers generally insist on having a new engine provided and installed rather than a remanufactured one.

Second, the proportionality principle needs to be considered when looking at the environmental impact of a replacement engine provision. The proportion of the machine population which requires the replacement of an engine within the machine's working life within the EU can range between 0.5 and 6% for industrial truck manufacturers, depending on the engine model and power category. The percentage of engines that require replacement within the first two years after machine production is less than 0.5%. These figures therefore account for an insignificant environmental impact.

Therefore, FEM calls for the inclusion of a provision allowing the use of newly built replacement engines. Such a possibility is especially critical during the legal warranty period.

4. Other issues

ATEX

FEM welcomes the Commission's provision on ATEX² emission limits laid down in Annex VII, which are coherent with the proposed exhaust emission values. We also believe that type approval and placing on the market of engines which meet the ATEX values need to be authorised by the Member States.

Separate shipments

FEM welcomes and supports the proposed provision allowing a manufacturer to deliver an engine separately from its exhaust after-treatment system to an OEM (Article 32, point 2).

Field test engines

FEM welcomes and supports the provision enabling Member States to authorise the temporary placing on the market, for the purposes of field testing, of engines that have not been EU type-approved (Article 32, point 3).

Legacy fleet

The current legislation has led to huge reductions in engine emissions from non-road mobile machinery. Levels will be further reduced with the new framework. As a result, the majority of emissions now come from the legacy fleet of machines with old engines. These certainly make it difficult to respect current and future limits on the overall volume of emissions. National schemes encouraging users to switch to new equipment should be set up, in order to unleash the full potential of the upcoming legislation.

² http://ec.europa.eu/enterprise/sectors/mechanical/files/atex/direct/text94-9_en.pdf

ANNEX I
FEM Industrial Trucks Product Group Position

FÉDÉRATION EUROPÉENNE DE LA MANUTENTION
Product Group
FLURFÖRDERZEUGE
INDUSTRIAL TRUCKS
CHARIOTS DE MANUTENTION



Frankfurt, 15 December 2014

**FEM Product Group Industrial Trucks position on
the proposal for a revision of Directive 97/68 on exhaust emissions
from non-road mobile machinery
(COM (2014) 581)**

Manufacturers of industrial trucks (IT) within the European Materials Handling Federation (FEM) share the general objective of improving air quality in Europe and therefore support the proposed revision of NRMM emission limit values in the current proposal.

However, environmental aspects must be balanced against economic realities and notably the impact of the ever more stringent emission limits on our industry. In particular, it must be ensured that sufficient time is given to the OEMs to adapt their production programme to the design of the new stage engines.

To address this challenge, FEM Industrial Truck manufacturers request an extension of the proposed transition period by an additional year for the following key reason: a single application date for almost all NRE and NRS engine categories in NRMM applications would result in massive R&D investments in a short period of time, which is disproportionate to the minimal environmental impact resulting from the introduction of Stage V limits for engines installed in industrial truck applications.

The power range of 19 – 56 kW covers almost the entire IC production programme of industrial trucks. Although this power range was split into two parts (19 – 37 kW and 37 – 56 kW) with two separate introduction dates for prior Stages, Stage V now combines both parts and also the power range 130 – 560 kW with the same introduction date for both CI and SI engines on 01.01.2019.

Even in the past, industrial truck manufacturers struggled to acquire the new stage engines in due time to redesign their machines, but measures such as the flexibility scheme and different introduction dates allowed a successful transition to the next Stage.

The proposal for the new Stage V has not only removed the flexibility scheme, but has also introduced limits for the engine categories NRS > 19 kW. A large part of the industrial trucks market is equipped with LPG or CNG engines of category NRS in the range of 19 – 56 kW for which the application of the new NRMM Emissions Regulation is totally new.

As a result of the single application date for almost all categories of NRE and NRS engines, the Commission proposal will lead to a high concentration of personnel and financial resources for re-designing nearly the whole IC production programme of industrial trucks, which manufacturers can simply not achieve within the proposed timetable.

Moreover, the Commission's proposal leads to a massive imbalance between the necessary investments and the minimal environmental effect.

To be more specific, for the majority of engines (NRE, $37 < P < 560$ kW), the environmental effects of introducing Stage V limits for engines in industrial truck applications will be very low due to the reduction of the particle mass (PM) limits from 0.025 g/kWh to 0.015 g/kWh, compared to previous stages such as Stage II (e.g. 0.4 g/kWh for engines $37 < P < 75$ kW) and Stage IIIB (0.025 g/kWh).

Bearing in mind the above-mentioned challenges industrial truck manufacturers will face as a result of the mandatory implementation date of Stage V, FEM IT stresses the importance of extending the Transition Period (Art. 57, (5)) by 12 additional months during which the production of machines using earlier stage engines is allowed.

ANNEX II
FEM Mobile Cranes Product Group position

FÉDÉRATION EUROPÉENNE DE LA MANUTENTION
Product Group
Krane und Hebezeuge
Cranes and Lifting Equipment
Grues et ponts roulants et Appareils de levage



Document FEM CLE MC N 0697 Final

Frankfurt, 12 December 2014

Position paper of
FEM Product Group Cranes and Lifting Equipment
Sub-Group Mobile Cranes

Commission Proposal regarding requirements relating to emission limits and type-approval for internal combustion engines for non-road mobile machinery

Executive summary

FEM is concerned by the impact of the Commission Proposal on Mobile Crane Manufacturers.

- The members of FEM mobile cranes support and promote environmentally friendly technology. During the past 15 years since directive 97/68/EC entered into force, mobile crane manufacturers have successfully invested large parts of their R&D budgets into re-designing their products and thus reducing NOx and PM mass by more than 95% in order to create a clean environment.
- The proposal will impact the competitiveness and the position on the world market of European mobile crane manufacturers, who are facing increasing global competition.
- Mobile crane manufacturers need a transition period of a total of 42 months (36 months for the redesign of machines and another 6 months for the placing on the market) in order to adapt their equipment to the proposed Stage V emission limit values. This extended transition period can be limited to mobile cranes to take into account the special situation of the sector.

1. Introduction

On 25 September 2014, the European Commission published a proposal for a new regulation on exhaust emissions from non-road mobile machinery (NRMM) [COM (2014) 581] to replace the existing NRMM Directive 97/68/EC. The proposal regulates a diverse range of sectors and engine-powered equipment with a single regulation.

During the Commission's consultation FEM Mobile Cranes explained the specific situation of mobile cranes and requested a provision clarifying that stage IV engines can be used in mobile cranes under the proposed new NRMM regulation [Mobile Cranes position paper, FEM CLE MC N 0660 REV 2, dated 31 March 2014]. The Commission did not follow this recommendation.

In the power range of 130 – 560 kW relevant for mobile cranes, the Commission proposes very strict emission limit values forcing the introduction of diesel particulate filters (wall-flow filters). If introduced,

these requirements will cause huge challenges for manufacturers as the entire mobile cranes product portfolio will have to be redesigned in a very limited period of time. For equipment manufacturers, just 12 months are foreseen between placing on the market of the new engines and the point in time when all products have to be modified.

FEM Mobile Cranes is convinced that a transition period for equipment manufacturers of at least 36 months is necessary and the best option for society and the sector, although only the formerly proposed exemption would solve their problems. The following explains and justifies this approach in detail.

2. Special situation of Mobile Cranes

Mobile Cranes are self-powered jib cranes capable of travelling loaded or unloaded without the need for fixed runways and relying on gravity for stability (see EN13000:2010).

The market for mobile cranes has a number of specific characteristics, which need to be taken into account when setting exhaust emission requirements:

- a) The total number of mobile cranes **produced** every year **is comparatively small**. In Europe, typically **less than 2000** mobile cranes are **placed on the market** every year.

This includes All-Terrain Cranes, Crawler Cranes, Rough-Terrain Cranes, Mobile Harbour Cranes and Special Cranes and covers a variety of about **170 different product types** (see in Annex II a partial overview of the product offering of the main European manufacturers) all of which will have to be redesigned. **This means that an average of only 12 machines per year are produced for each product type!**

Most product types have to be offered in two engine-variants with different exhaust emission stages, as many non-EU countries still need Stage 3A engines due to the unavailability of low sulphur diesel fuel. In future a minimum of three engine-variants will be necessary: Europe, USA and other countries.

Due to the low numbers of mobile cranes produced for each product type, the price of the product will have to be increased more substantially compared to high-volume production.

- b) The proposed Stage V limit values can only be reached by installing diesel particulate filters (wall-flow filters). Currently no mobile cranes use engines with this technology. Manufacturers need to redesign the entire mobile crane portfolio due to the following facts:
- The majority of mobile cranes are homologated for use on public roads (according to Directive 2007/46/EC); the rules relative to road homologation include numerous **restrictions regarding weight, loads and dimensions**. Manufacturers optimise cranes to fully comply with these restrictions. Any modification of the engine system including its exhaust gas treatment will lead to **significant re-design and major in-depth modification of the whole machine in order to fulfil road regulations**.
 - As mobile crane engines operating in crane mode idle substantial amounts of time, a specific provision to burn out clogged filters needs to be provided.
 - The engine modification affects compliance with the Outdoor Noise Directive (2000/14/EC).
 - In addition, compliance with all other laws and regulations needs to be ensured, e.g. road regulations and safety regulations requiring new homologation.
- c) Depending on the type of crane, **the re-design** of the engine and all parts and systems of the crane impacted by the diesel emission regulation **has used about 50% of the available engineering resources** during recent years (and still does so today). This directly affects the capability of European crane manufacturers to design new models and impacts their competitiveness in the worldwide marketplace.

3. Transition time

The proposal made by the Commission forces machine manufacturers to re-design all mobile crane types by the end of 2019. Based on the on-going discussions with engine manufacturers and the experience from previous stages, engine manufacturers will have the final engines ready at the earliest in mid-2018, most likely even later. Challenges with engine proto-types show that it is too risky to start re-designing machines at an early stage of the engine development as changes to the final engine design may make it necessary to further redesign the machine. Depending on the date of finalisation of the internal combustion engine, mobile crane manufacturers have in the worst case only 12 months to redesign their entire product portfolio and to build up a new logistic flow with all related consequences. This is not possible and only some products will be available leading to a halt in production which will significantly impact employment.

The transition period for equipment manufacturers for placing on the market machines equipped with stage IV engines needs to be 42 months in total (i.e. a 24-month extension of the proposed 12 months in the transition scheme, plus the allocation of 6 months for the placing on the market)

This will allow mobile crane manufacturers to keep their production running and will help to ensure the availability of most product types throughout the introduction phase of stage V. At the same time the environmental impact of extending the transition period to three years will be very limited, as Annex I shows. Due to the particular situation of the mobile crane sector, the 36-month transition could be limited to mobile cranes.

While extending the transition period is necessary, it does not address all challenges:

- It is financially risky as manufacturers have to pre-buy engines.
- Due to the small number of engines, mobile crane manufacturers will be heavily dependent on engine manufacturers, i.e. the engine manufacturer may decide who will get the “old” engines and how many (based on the engine production capability this may also be limited) and this could lead to a lack of engines available for mobile crane manufacturers.
- The competitiveness issue: manufacturers active in Europe face huge investments which do not apply to equipment manufacturers not operating in Europe.

Only an exemption for mobile cranes would really solve these issues.

4. Impact Study regarding mobile cranes

To provide evidence for the position taken, FEM Mobile Cranes started an impact study which will be carried out by Prof. W.A. Günthner, Professor for Materials Flow, Handling & Logistics (fml), Technical University Munich. Mobile crane manufacturers have up to 40 models in their product range (mainly with small volumes below 50 units for the whole world market). The experience with the transition of Stage IIIA to IIIB and IIIB to IV showed that up to 30% - 50% of a manufacturer's engineering resources were fully dedicated to the redesign of the cranes. This is no longer economically feasible for mobile crane manufacturers who must also maintain competitiveness and design new innovative cranes.

In the impact study the efforts required to comply with the emission limits during the transition period and before the implementation of Stage V will be evaluated and correlated with the environmental impact of mobile cranes.

A short analysis of such an environmental impact is given in Sub-annex I to this position paper.

Sub-annex I

Environmental aspects regarding PM

The environmental effect due to postponement of the application date by an additional 2 years is not measurable in practice as shown in the following calculation:

$$PM_{EU} = m * P_{ave} * WL * t * X$$

Note: For details of the formula see key below.

As no statistical data is available on how many engines are placed on the market in the EU in one year, the calculation must estimate the number (X) of engines necessary for a comparable amount of emissions. Here the calculation will use **one per mil** of EU emissions (PM_{EU}) as a reference.

$$X = 1 \text{‰} * PM_{EU} / (m * P_{ave} * WL * t)$$

X = 133,000 engines/year

Such a volume of CI engines in the category 130 – 560 kW will never be placed on the market in Europe within 1 year.

In other words, the postponement by 1 and even 2 years leads to an increase of total traffic emissions in Europe of less than one per mil.

Note: The number of 133,000 engines is independent of the type of NRMM machines.

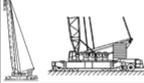
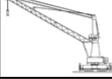
Key:

		Dimension	Description	Bibliography
PM_{DE}	45000	t/a	total PM emission of traffic in Germany	45000 t/a in 2012, http://www.umweltbundesamt.de/en/node/11358
PM_{EU}	276000	t/a	total PM emission of traffic in Europe	total DE emissions extrapolated at EU level by size of population; source EU (DE 82 Mio. EU 503 Mio.)
m	0,01	g/kWh	Delta PM limits Stage V to Stage IV (IIIB)	0.025 (Stage IV) – 0.015 (Stage V)
P_{ave}	345	kW	average of rated engine power in category 130 - 150 kW	97/68/EC
WL	0,5		work load	factor for average engine power from rated power (80% truck engines, 15% crane engines)
t	1200	h/a	average running time of engines per year	estimated, average of a few hundred hours, e.g. mobile cranes or harvesting machines and several thousand hours, e.g. industrial trucks, construction machines
X		1/a	number of engines per year	

Sub-annex II

Overview of Mobile Crane types currently available on the market (main EU manufacturers)

NOTE: this overview is not exhaustive and only serves as an illustration of the variety of machine models → see examples of mobile crane models on following pages.

Mobile Crane Type	Illustration Sources: -EN13000 Annex A -OEM brochures	Terex	Liebherr	Manitowoc	Tadano Faun	Sennebogen
All Terrain Crane (from 2 to 9 axles) (incl. City crane)		21	22	15	9	
Truck Mounted Crane		1	3		3	
Lattice Boom Truck Crane		1	1			
Lattice Boom Crawler Crane		10	14	15		5
Telescopic Crawler Crane		3	4			
Rough-Terrain-Crane (assumption: 50% on EU market)		10		5	4	
Telescopic Crane						4
Mobile Construction Cranes			3			
Mobile Harbour Crane		7	6			4
Number of product models per OEM:		53	53	35	16	13
Total number of product models:		170				

Annex II

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Mobile Construction Cranes			3			
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Number of product models per OEM:		53	53	35	16	13
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**Partial overview of the currently existing product portfolio for Mobile Cranes
(does not include all available models)**