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THE NOISE EMISSION OF FORGING PRESSES

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INTRODUCTION

In forging factories, there is today a noise level of about 90 dB(A). This permanent level is caused by manifold noise sources and superimposed with impact noise from the sledge hammers and forging presses. The highest levels occur with the last hard forging stroke. At screw presses and eccentric presses, the equipment noise from clutch and brake can be louder than the forging noise.

In these examinations the noise emission of forging presses was determined with measurements in the factories and the effectiveness of measures for noise reduction was registered.

SOUND ARISING

The forging process excites with its force-time-curve the machine structures into vibrations. The effects are structure-borne sound and concussions. From the place of excitation and the machine surface the air-borne-sound will be emitted.

The influence parameters of the forging process on the hight of the impulse soundlevel and the disturbing high frequencies are impact speed, dwell-time, maximum forging force and the force increment per unit of time. Therefore the speed and the force-time-curve were determined and compared with the noise measurements.

WAY OF MEASURING NOISE

The maximum impulse soundpowerlevel (SWL) was determined in accordance with the german standards (DIN 45635) as the comparable noise emission reference value. The following SWLs were calculated from 36 soundpressurelevels (SPL) at one meter distance from the machine's outer surface. They were determined seperately for impact-noise and equipment-noise. For some machines we also measured the equivalent continuous soundlevel Leq at the operater's place.

RESULTS

The noise emission values, determined at 24 forging eccentric presses and 12 screw presses during operating conditions are represented in figure 1 and 2. In these figures the soundpowerlevels in dB(AI)max are shown as scatter-ranges as a function of the nominal force of the machines. The scatter-ranges are represented seperately for blow-noise and equipment-noise.

This research has not yet been concluded, so that a little change in the results shown here may be expected.

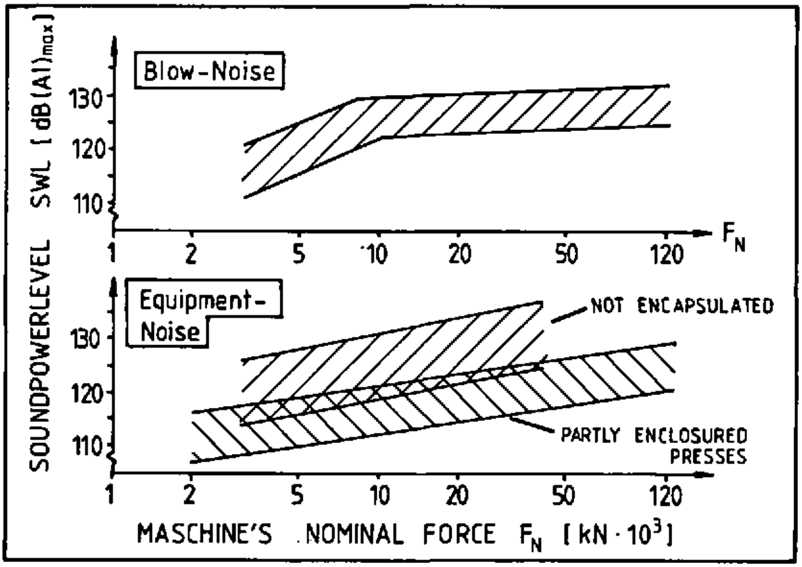

Fig. 1. Soundpowerlevel ranges as a function of nominal force for 24 measured forging eccentric presses, seperately for blow- and equipment-noise.

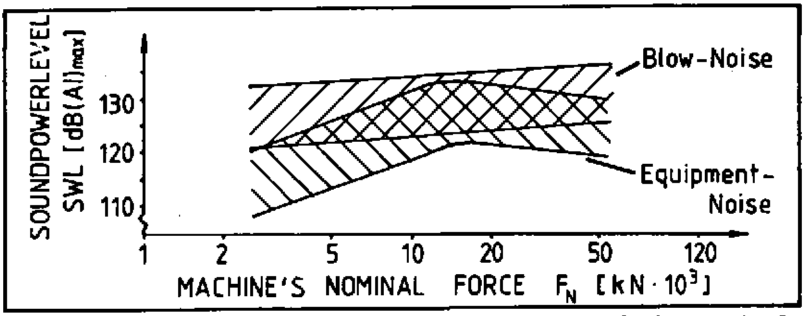

Fig.2. Soundpowerlevel ranges as a function of the nominal force for 12 measured forging screw presses.

For forging eccentric presses (Fig.1 above) with a nominal force of above 10.000 kN there is a nearly constant range of 8 dB with SWLs up to 130 dB(AI). For the equipment-noise of the start- and stop-process (Fig.1 below) there are two scatter-ranges for partly encapsulated and not encapsulated machines. The 10 dB scatter-range increases with 3dB for each doubling of nominal force. The equipment-noise of not enclosured machines is as high as the blow-noise.

In figure 2 the equipment- and blow-noise for screw presses are shown. In all these cases the screw presses were not encapsulated. The 10 dB scatter-range of the blow-noise is nearly constant for all presses. There are SWLs from 120 up to 135 dB(AI) for the blow-noise. The 12 dB scatter-range for the equipment-noise is mostly a little bit below the blow-noise.

As it has been mentioned in the beginning, there is a continouis noise level of about 90 dB(AS) in the forging factories. At the operater's place on the forging presses we measured an average continuous equivalent sound pressure level of Leq= 101 dB(AI) (measurement values between 97 and 105 dB(AI)).

MEASURES FOR NOISE REDUCTION

A primary noise reduction through lengthening and flattening of the force-time-curve is not possible because of the technological disadvantages. The isolation of structural parts in order to reduce structure-borne sound with daming materials is because of the loss of stiffness only advantageous for those machine-parts, which do not lie in

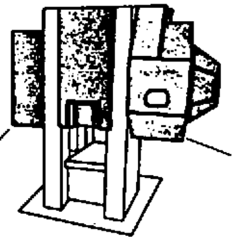

Fig.3. Design of an eccentric press with encapsulated clutch and brake /1/.

the force-flux. In this case, this method proves to be less effective as one would measure a reduction in the air-borne sound only in a very few cases; besides it would lead to the disadvantage of inaccurate forging /1,2/.

The equipment-noise of forging presses can be reduced with damped clutch- and brake-systems /1/. An additional enclosurement of these parts like that in figure 3 is a common practice today for new eccentric presses. The following noise reductions for equipment-noise were measured at a partly enclosured eccentric press represented in figure 3.

Difference between measurements with opened and closed capsule-doors:

at 1 meter distance from the noise source: (clutch or brake)	$\Delta SPL = 19\ dB(AI)_{max}$
soundpowerlevel:	$\Delta SWL = 11\ dB(AI)_{max}$
operater's place:	$\Delta SPL = 4\ dB(AI)_{max}$

REFERENCES

/1/ G. Humbert and H.D. Oelkers, "Lärmminderungsmaßnahmen an Schmiedehämmern und Schmiedepressen", HFF-Bericht No.6 (1980), University of Hannover, F.R. of Germany

/2/ R. Rohbeck and K.-P. Schmidt, "Lärmminderung an einer Schmiedepresse", Research-report of the Bundesanstalt für Arbeitsschutz, 1979, NW-Verlag Bremerhaven, FRG