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SOME LOOSE NOTES ON

STEAM ENGINE CYLINDER TRIBOLOGY.

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comentarios al de vapor - tribología - a los días - en la carrera - portadas

1. Object.

The Author's paper on steam engine cylinder tribology (1) detailed the state of his knowledge about 1975. In the mean time, up to 1980, some additional information (extracted from the enormous volume available) has been incorporated together with further thoughts and reflexions. The object of the present notes is no more than to record such observations, leaving for a future exercise its analysis.

2. Comments on the Author's 1975 paper (1).

It is very good to read the own papers after a time, and find them all right! If the yardstick of past "good enough" locomotive engineering is taken, it is clear that, at least, many unsuspected problems have been attacked, starting with the collection of other people's experience. If the yardstick is I.C. engine technology, the enormous gap between the latter's knowledge and the paper is appalling. This means that, (i) contrary to what was assumed by the last golden steam days, a large room for progress lies ahead; (ii) the path for this progress is traced, (iii) it can be expected that with no more progress than that resulting from the better (offered) understanding of steam cylinder tribology, substantial improvements can be accounted for SGS (Second Generation Steam) locomotive technology. And (iv), advanced, future, Third Generation Steam Locomotive Technology, can be looked at with confidence.

The paper contains many assertions still remaining on the qualitative level, thereby waiting...!!!

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///--- quantitative formulations and experimental checks. Perhaps the most pressing need is to be able to "see" (in the broadest sense of the word) inside the cylinder so as to judge what is the actual consist of the lubricating film. New measuring technologies are now available; but even crude experiences could be organized measuring wear in the various rubbing parts, direct looking through windows, etc.

Since the time the paper was written, two new enters on the locomotive picture require adequate consideration: (a) TGS (Third Generation Steam), for which triple expansion, 60 ate, 550 °C, steam conditions are proposed, and (b) condensing. Wear theory should be reworked incorporating recent knowledge in the field, while film thickness forecasting (hence leading to improved design) should increase the accuracy of many statements still being at the level of "steps in the right direction". However, it is strongly felt that no significant changes respect to what has been said can be expected. At least, this applies to the material analyzed during the 5 years following the issue of the paper.

While every effort is done to increase the hydrodynamic component of film support, more emphasis should be placed upon the knowledge of mixed lubrication phenomena. After all, WEAR OBTAINS IN SUCH RÉGIME, on which, unfortunately, knowledge becomes more and more uncertain at higher rubbing surface temperatures. In this connection, gear technology can make a considerable contribution.

The idea of poppet valves as a means of dispensing valve lubrication and getting better steam distribution

