RESEARCH ON THE STUDY OF MATERIAL DEFECTS AND SOME COAL MILLS SUBASSEMBLIES LIFE TIME

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Abstract:*The defectsfrom the structureof metallic materials of whichare manufactured the pieces, can beputoutbyNDT. One ofNDTmethods, commonly usedin practiceisultrasonicmethod.*
In this paper are rendered the results of the determinations by the effects of coal mills bars by type DGS 100, obtained with ultrasound devices by type PHASOR XS.

Keywords:coalmill, the bar,NDT,ultrasonicmethod.

1.INTRODUCTION[2]

The main machine of drying and preparation system of coal dust necessary for burn in the power plant is the die-fan, with hammer, type DGS100, which has the role to dry and to grind the coal, and also to transport the coal dust mixture and flue gas to the toboilerfireboxburners. DGS100millwas designedfor grinding the lignite from the Oltenia Basin.

Some of the highlights that need to find the defects to ensure the safety work are the bars (Fig.1) of coal grinding mills typeDGS100 oftheThermoRovinari.

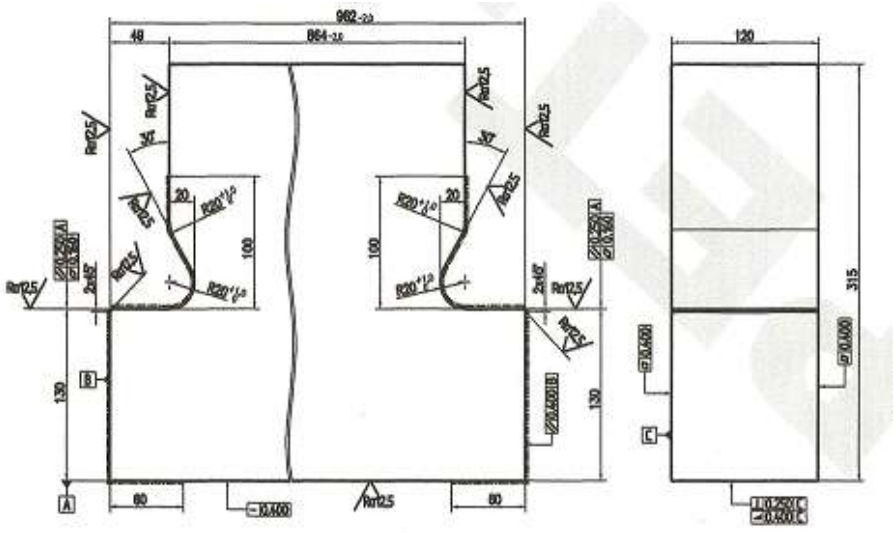

Figure 1.Overall drawingof the barforDGS100coalmill.

The elaborationof metallic materialsis acomplextechnological process in whoseprogressintervenea number of factors, which favormoreor lessthe presence ofdiscontinuities. Insome cases, discontinuities fall under the category of admitted defects and in others, is constituted in impermissibledefectsfor the partsthat will be partof an installationoran equipment.

It is known that the presence of discontinuities in metallic materials affects their mechanical properties and is due to:

- the drafting process of the material (molding);
- the manufacturing process of the parts (forging, rolled metal, welding, heat treatment);
- the operation, following the requests, which is subject to the material (corrosion, cracking).

The discontinuities from the structure of metallic materials of which are manufactured parts can be put out by NDT. One of NDT methods currently used in practice is ultrasonic method. The successful use of ultrasonic methods in identifying discontinuities in metal structure parts is conditioned by the knowledge of source, the shape or probable orientation of the discontinuities, so finally it can accurately determines the presence or their absence.

Once identified, the discontinuities, must be reconciled with the stipulations of standards, of rules, or of the contractual technical conditions that determine whether they are admissible or inadmissible remedies.

For rolled products or drawn from steel, defects are included in the STAS 6656-66.

From the defects group provided in the above-mentioned standard we mentioned the compactness categories of defects namely:

a) the voids are discontinuities of compactness, formed in the casting or the steel making, in proportions not admitted and not removed in processing of ingots;

b) compactness deterioration that appears as discontinuities in laminates and paths compactness in the form of gaps, relatively narrow and prolonged (regular or irregular line of continue lengths, interrupted or shifted).

Concretely can be illustrated some of the defects that appear frequency, namely:

- producing shrinkholes, contraction gap with oxidized edges, or with others impurities formed at the ingot solidification;
- indoor porosity or microretasura in the form of small and numerous gaps, usually coming from shrinkage and formed at edges crystals;
-Flawsin the form of not weldedorpartiallyweldeddiscontinuities, which appearin therolledsectionbeingcaused bythesolidification ofliquid steelfrom ingot and rolled during thelaminationandpulling; its surfaceisgenerallysmoothandnon-oxidizingwhich allowsits welding more orless completely,depending on thetemperatureand pressure conditionsin the case ofhot lamination.
- The cracksthat aredamages of thecompactness, canbederivedfromthe original material,or from theprocessingandheating, or from theformation, respectively, inadequatecooling.

At ultrasoniccontroloflaminatedpartscanhighlightinternaldiscontinuities place, having regard abouttheir origin(eitherinsufficientingotcuttingeitherdue tocoolingandthermal treatment of the material).

In this paperare rendered the results of defects barsDGScoal millstype100 determinations.

2. RESEARCHES REGARDING ULTRASONIC DETERMINATION OF MATERIAL DEFECTS OF BARSCOAL MILLSTYPE 100DGS.[1]

DGS100millsbars(from Thermo Rovinari) are made of laminated steel (P460NH). The ultrasonicapplianceused to determine a bar defects(Fig.1)isoftype PHASOR XS.

Work technique consists in the survey through reflection of the ultrasonic impulses, ultrasonic waves are reflected by the opposite surface of that probe is applied (bottom echo), or the inclusions area, or other defects which existing in metal (defect echo). The control is realized so that all the explored region points to be probed by continue moving of the probe.

The couplantwill benormallytheoil, whichensuresufficient contactbetween theflash andbararea. The barscan be controlledeither immediatelyafterhot rolling(beforethe annealingtreatment) or in alater stageof production. Inthe first case check ifthe oxide layeris welladherent, continuousand if is possible, palpatingahealthyregionof the bar, to distinguishat least twoechoesbottomsuccession.Inthesecond case,the barsmust undergopossiblybefore control, of apreliminarypreparation surface(sanding, polarization, etc.), ensuring a good contact between theprobesand work piece(in orderto obtainminimumtwosuccessivebottom echoes).

The used controlwaves, are of longitudinaltype, andtheir directionisperpendicular tothe probe surface. Probesare used with normaldiameterbetween 10 and24mm.Depending on thesituationsthat occur, the bars can be controlledusingfrequencies between2 and 6Mhz.

Ultrasonic testingofbarsis doneby moving theprobeinthe longitudinal direction, on theparallel stripsofequal widthandwiththat of theprobe, until the entire surfaceexploration. Forrectangular sectionbarsthis controlwas performedon one of thesurfaces, thena second, perpendicular to thefirst.

The probethat workedincoal mills bars: of quartz 24mm.

Examinationresultsare appreciatedby the shape, size and discontinuities arrangement, inaccordance with the rulesof acceptance providedin the technical documentationof the product.The barswhich presentssplits, cracks, crowded inclusions or with the tendencyof alignment, are notadmitted tothe reception.

InFigures 2 and 3are shownbars havingfunctioned1500hoursand which must be analyzedto discoverarising ultrasonicdefectsduring operation.Transducerswere usednormal(perpendicular to 90°) and inclinedtransducers(to an angle of45º).

Figure.2.BareofDGS100millsthat werein working.

Figure.3.BareofDGS100millsthat werein working.

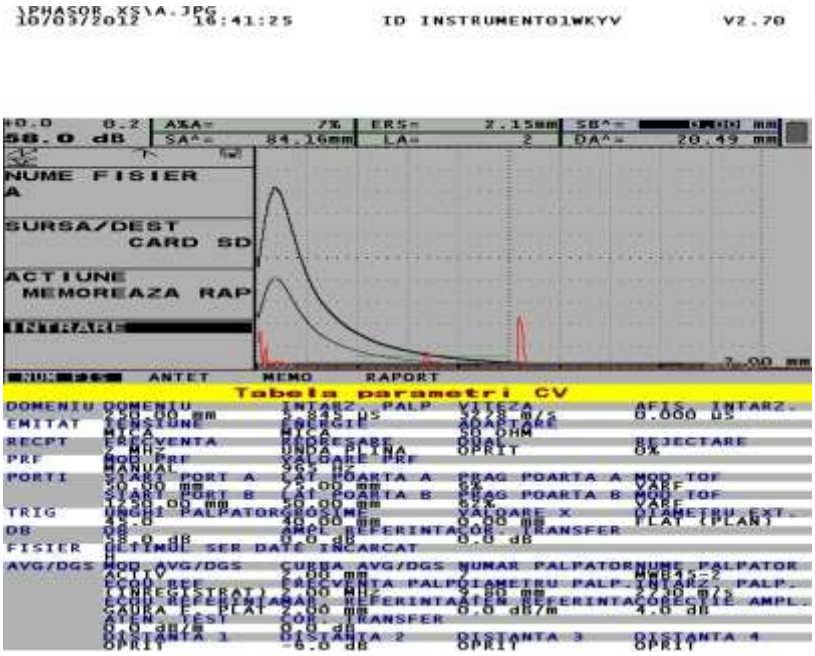

Figure.4. Assessment curve (1 mm) and the reference curve (2 mm)

The transducer with inclined angle of 45 º allows the identifying of defects until the parts edges of controlled that which a normal transducer of 90 ° is not possible because it does not 'see' the last 2 mm of piece.

In order the pieceto be declaredgoodallechoesregistered(Fig. 4) by thedevicemust not exceed2 mm.

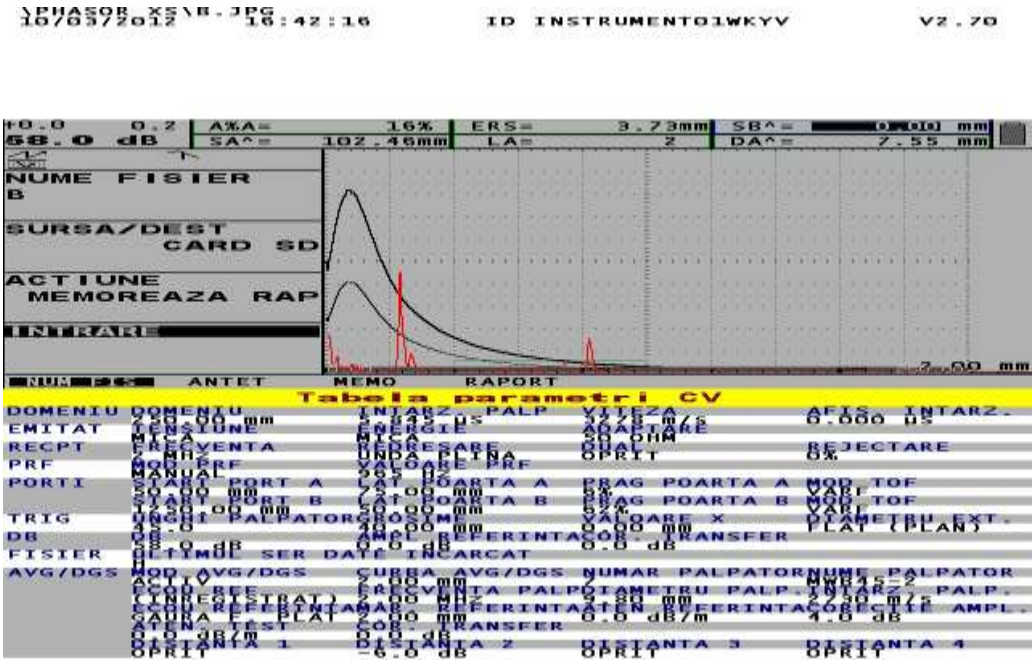

Figure.5.Defectlinear

InFigure 5there is shown a found defectat a depth of20mm fromthe upper edgeof the piece,defect that exceeding thereferencecurvewith 2mm.

Linear indication declareddefectin Figure 5isin the reality a string ofexcessive elongatedgranulates at rolling (non-compliant deformation process).

Suchdefectproduces abreakingof the barinthe first 100hours of working.

The examined piececouldbeused 20hours of working but will beconsideredjetsamand will be replacewith a new one.

InFigure 6are represented thetwocurves of referenceand evaluationfora bar without defects. The bar isalsoevaluatedwith a transducer withinclinedanglewithtwo bottom echoes.

The life time ofDGS 100coal millsbarsfromRovinari Thermo is80000-100000hours of operationwithoutbreakingonly with theuse.

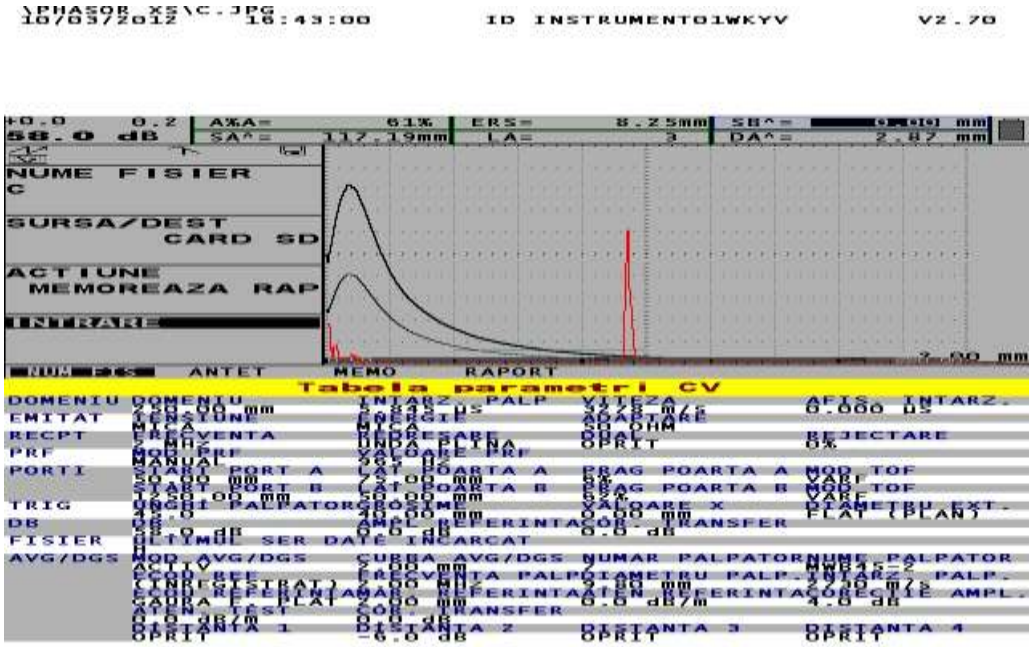

Figure.6Reference an evaluation curves for a bar without defects

3.CONCLUSIONS

The results of research regarding on the defectoscpic study with ultrasonic of a landmarks how is the case ofthe bars from type DGS 100 mills, it shows that the detection of possible defects constitutes an effective way of avoiding some interrupting in the working of this machinery and of the related production losses.

Size, orientation and location of faults can be done more accurately using the phasor.This is because the following reasons:

-In phasor technique the transducer is made of several crystals-16 in this case, which makes at the geometrical place of the maximum sonic pressure of points to be a plan and not a right;

- Moving from one-dimensional to two-dimensional determines the increase of thr detection probability by substantially reducing of the unfavorable orientation grade of possible reflectors;

- The mobility of the transducer is a three-dimensional; the variation of the incidence angle is achieved through the equipment and requires no manual movement of the transducer as it does when at the using of conventional transducers;

- Respecting the principle of Huyghens, equivalent sonogram being one spatial,the propagation surface being higher and the number of points that becomes spreading centers from where, isnoticeably higher.

REFERENCES

[1].The user manual of the devices with **PHASOR XS ultrasound**

[2].STAS 6656-66-Defects of metallic materials