A COMPUTER PROGRAM FOR
BASIC DURABILTY COMPLIANCE TECHNOLOGY
("BDCT")

INTRODUCTION

In our January 1999 Statistical Bulletin we outlined the mathematical procedure involved in Basic Durability Compliance Technology. In this February Statistical Bulletin we present a computer program which will automatically determine the Evidence in favor of a product's acceptability or unacceptability as far as its compliance to a required life in service is concerned.

This computer program takes the mathematical formulations in the January 1999 Statistical Bulletin and asks for input values of all the various factors going into the decision process calculations. Finally, a complete printout of all these factors is produced, together with the conclusion arrived at about EVIDENCE OF COMPLIANCE. The program is quite simple and is written in GW-BASIC language. We have named the program "BDCT" , which is our acronym for BASIC DURABILITY COMPLIANCE TECHNOLOGY.

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10 PRINT"DECISION PROGRAM FOR BASIC DURABILITY COMPLIANCE TECHNOLOGY (BDCT)"
20 LPRINT"DECISION PROGRAM FOR BASIC DURABILITY COMPLIANCE TECHNOLOGY (BDCT)"
50 INPUT"NO.OF ITEMS TO BE SOLD";N
60 LPRINT"NO.OF ITEMS TO BE SOLD=";N
70 INPUT"NO.OF DEFECTIVES PERMITTED IN THE SOLD COLLECTION";D
80 LPRINT"NO.OF DEFECTIVES PERMITTED IN THE SOLD COLLECTION=";D
90 INPUT"DOLLAR GAIN PER GOOD ITEM (COMPLYING)";G
100 LPRINT"DOLLAR GAIN PER GOOD ITEM (COMPLYING)=";G
110 INPUT"DOLLAR LOSS PER BAD ITEM (NOT COMPLYING)";L
120 LPRINT"DOLLAR LOSS PER BAD ITEM (NOT COMPLYING)=";L
130 INPUT"DESIRED PROFITABILITY RATIO FOR GAINS/LOSSES";K
140 LPRINT"DESIRED PROFITABILITY RATIO FOR GAINS/LOSSES=";K
150 INPUT"REQUIRED LIFE";M
160 LPRINT"REQUIRED LIFE=";M
170 W=(K*L)/G
180 PRINT"REQUIRED ODDS=";W
190 LPRINT"REQUIRED ODDS =";W
200 E=LOG(W)
210 PRINT"REQUIRED NO.OF UNITS OF EVIDENCE=";E
220 LPRINT"REQUIRED NO.OF UNITS OF EVIDENCE=";E
230 INPUT"TOTAL SAMPLE SIZE OF TEST DATA";N1
240 LPRINT"TOTAL SAMPLE SIZE OF TEST DATA=";N1
250 INPUT"WEIBULL SLOPE OF TEST DATA";B
260 LPRINT"WEIBULL SLOPE OF TEST DATA=";B
270 Q=(D+1)/(N+1)
280 E2=-LOG(1-Q)
290 PRINT"GOAL ENTROPY=";E2
300 LPRINT"GOAL ENTROPY=";E2
310 PRINT"QUANTILE LEVEL INVOLVED IN THE ANALYSIS=";Q
320 LPRINT"QUANTILE LEVEL INVOLVED IN THE ANALYSIS=";Q
330 INPUT"NO.SUSPENDED PRIOR TO QUANTLIE LEVEL UNDER STUDY";S1
340 LPRINT"NO.SUSPENDED PRIOR TO QUANTILE LEVEL UNDER STUDY=";S1
350 INPUT"CHARACTERISTIC LIFE OF THE TEST DATA";T
360 LPRINT"CHARACTERISTIC LIFE OF THE TEST DATA=";T
370 F=1-EXP(-(M/T)^B)
380 PRINT"FRACTION OF TEST FAILED AT REQUIRED LIFE=";F
390 LPRINT"FRACTION OF TEST FAILED AT REQUIRED LIFE=";F
400 R=1-F
410 PRINT"TEST RELIABILITY AT REQUIRED LIFE=";R
420 LPRINT"TEST RELIABILITY AT REQUIRED LIFE=";R
430 E1=-LOG(R)
440 PRINT"TEST ENTROPY AT REQUIRED LIFE=";E1
450 LPRINT"TEST ENTROPY AT REQUIRED LIFE=";E1
460 E3=1.8138*SQR(.5*(N1-S1)*(1+Q))*LOG(E2/E1)
470 PRINT"TEST EVIDENCE=";E3;"UNITS"
480 LPRINT"TEST EVIDENCE=";E3;"UNITS"
490 IF E3>=E THEN 530
500 PRINT"PRODUCT IS UNACCEPTABLE"
510 LPRINT"PRODUCT IS UNACCEPTABLE"
520 GOTO 550
530 PRINT"PRODUCT IS ACCEPTABLE"
540 LPRINT"PRODUCT IS ACCEPTABLE"
550 STOP
560 END
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DECISION PROGRAM FOR BASIC DURABILITY COMPLIANCE TECHNOLOGY (BDCT)
NO.OF ITEMS TO BE SOLD= 1000
NO.OF DEFECTIVES PERMITTED IN THE SOLD COLLECTION= 0
DOLLAR GAIN PER GOOD ITEM (COMPLYING)= 500
DOLLAR LOSS PER BAD ITEM (NOT COMPLYING)= 4000
DESIRED PROFITABILITY RATIO FOR GAINS/LOSSES= 2
REQUIRED LIFE= 2000
REQUIRED ODDS = 16
REQUIRED NO.OF UNITS OF EVIDENCE= 2.772589
TOTAL SAMPLE SIZE OF TEST DATA= 10
WEIBULL SLOPE OF TEST DATA= 9.54
GOAL ENTROPY= 9.994891E-04
QUANTILE LEVEL INVOLVED IN THE ANALYSIS= 9.99001E-04
NO.SUSPENDED PRIOR TO QUANTILE LEVEL UNDER STUDY= 0
CHARACTERISTIC LIFE OF THE TEST DATA= 4869
FRACTION OF TEST FAILED AT REQUIRED LIFE= 2.058744E-04
TEST RELIABILITY AT REQUIRED LIFE= .9997941
TEST ENTROPY AT REQUIRED LIFE= 2.059576E-04
TEST EVIDENCE= 6.409603 UNITS
PRODUCT IS ACCEPTABLE
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CONCLUSION

We have presented the useful computer program "BDCT", which represents a convenient decision tool in BASIC DURABILITY COMPLIANCE TECHNOLOGY. It is so very important to have a systematic approach in deciding whether or not a product is acceptable in service for a required life by the user, and for a desired profitability ratio to the seller. The numerical example clearly demonstrates how very useful this automated computer program is in such product decisions.