NOMENCLATURE

$A^c_p$  \hspace{1cm} $p^{th}$ LCC attribute

$A^n_n$  \hspace{1cm} $n^{th}$ LCD attribute

$A^s_y$  \hspace{1cm} $y^{th}$ sustainability attribute

$A^t_z$  \hspace{1cm} $z^{th}$ LCA attribute

BIT  \hspace{1cm} built in time

$C_i$  \hspace{1cm} value of $i^{th}$ LCC attribute

$c_{ij}$  \hspace{1cm} degree of influence of $i^{th}$ LCC attribute upon $j^{th}$ attribute

$C_e$  \hspace{1cm} wear rate \hspace{1cm} $(K_w * F_s V)/(L_s D)$

$D_b$  \hspace{1cm} diameter of plain bearing

$D_i$  \hspace{1cm} value of $i^{th}$ LCD attribute

DFD  \hspace{1cm} design for disposal/recycle

DFE  \hspace{1cm} design for environment

DFM\_AINT.  \hspace{1cm} design for maintenance

DFM  \hspace{1cm} design for manufacture

DFM\_KTI.  \hspace{1cm} design for marketing

DFP  \hspace{1cm} design for performance

DFS  \hspace{1cm} design for safety

E  \hspace{1cm} economical aspects

EC  \hspace{1cm} energy conservation

EP  \hspace{1cm} environmental preservation

$E^c, E^d, E^s, E^t$  \hspace{1cm} a set of edges in $G^c, G^d, G^s$ and $G^t$, respectively

$e^c_{ij}, e^d_{ij}, e^s_{ij}, e^t_{ij}$  \hspace{1cm} an edge from node $i$ to node $j$ in $G^c, G^d, G^s$ and $G^t$, respectively

$E^M$  \hspace{1cm} Environmental preservation

$E_t$  \hspace{1cm} energy consumed by plain bearing \hspace{1cm} $(E_t = \mu * K_h)$

F  \hspace{1cm} radial load

$F^c, F^d, F^s, F^t$  \hspace{1cm} LCC, LCD, Sustainability and LCA function matrix, respectively

FMCEA  \hspace{1cm} failure mode and cause effect analysis

FMEA  \hspace{1cm} failure mode and effects analysis
FTA

fault tree analysis

G_c, G^d, G^s, G^t

LCC, LCD, Sustainability and LCA attributes digraph, respectively

H_c, H^d, H^s, H^t

LCC, LCD, Sustainability and LCA diagonal matrix, respectively

Γ_c, Γ^d, Γ^s, Γ^t

LCC, LCD, Sustainability and LCA identity matrix, respectively

Γ_c^i, Γ^d^i, Γ^s^i, Γ^t^i

LCC, LCD, Sustainability and LCA index, respectively

Γ_c^ideal, Γ^d^ideal, Γ^s^ideal, Γ^t^ideal

ideal value of LCC, LCD, Sustainability and LCA index, respectively

Γ_c^r, Γ^d^r, Γ^s^r, Γ^t^r

relative value of LCC, LCD, Sustainability and LCA index, respectively

ISO

international organization for standardization

J

Joules

K

design alternative of LCA of a product

K_b

design alternative of LCA of a product

power loss in bearing (F*V)

K_w

wear coefficient (W_v / (S_d * F))

L

length of plain bearing

LCA

life cycle assessment

LCAA^g, LCD^g, LCC^g

LCA, LCC and LCD attributes relationship digraph, respectively

LCC

life cycle cost

LCD

life cycle design

LTL/LLL

lifetime lubrication/longlife lubrication

M

mechanical properties

MC

material conservation

MS^g

sustainability attributes digraph

N_c, N^d, N^s, N^t

a set of nodes in G_c, G^d, G^s and G^t, respectively

N_p

p\text{th} node in G_c

N_n^d

n\text{th} node in G^d

N_y^s

y\text{th} node in G^s

N_z^t

z\text{th} node in G^t
p
Per(C), Per(D), Per(S), Per(T)
PTFE
Q
Q_c, Q_d, Q_s, Q_t
QFD
R_c, R_d, R_s, R_t
r_{ij}
S_d
S_f
S_i
s_{ij}
TER
T_i
t_{ij}
u
VLCA_{per}, VLCC_{per}, VLCD_{per}, VMS_{per}
VPF
VPF-c, VPF-d, VPF-s, VPF-t
w
W_v
y
z
\mu
\varepsilon

p^{th} attribute in a LCC attributes digraph
permanent function of LCC, LCD, Sustainability and LCA, respectively
Polytetrafluoroethylene
No. of q alternatives of a product for LCD
LCC, LCD, Sustainability and LCA attributes relationship permanent matrix
quality function deployment
LCC, LCD, Sustainability and LCA relationship matrix, respectively
degree of influence of i^{th} attribute upon j^{th} attribute for LCD matrix
sliding distance
life of bearing \((\varepsilon / C_\varepsilon * 3600)\)
value of i^{th} sustainability attribute
degree of influence of i^{th} attribute upon j^{th} attribute for product sustainability matrix
triboelement recycling
value of i^{th} life LCA attribute
degree of influence of i^{th} LCA attribute upon j^{th} attribute
product sustainability alternative
variable LCA, LCC, LCD and Sustainability attributes relationship permanent matrix
variable permanent function
Variable LCC, LCD, Sustainability and LCA permanent function
life cycle cost product alternative
wear volume
y^{th} attribute in a sustainability attributes digraph
z^{th} attribute in a LCA attributes digraph
coefficient of friction
permissible bearing clearance