KAWASAKI STEEL TECHNICAL REPORT

No.9 (March 1984)

Structural Analysis System for Construction and Relining of Blast Furnaces

Koshi Iwata, Teruaki Morimoto, Hiroshi Kanaya, Isao Ichihara, Masao Fujita, Shozo Kiyohara

Synopsis :

A Structural analysis system (KBSD System) for construction and relining of blast furnaces was established in order to save input data generating, judge speedily results of structural analysis and use effectively structural analysis program NASTRAN. Characteristics of this system are as follows: (1) The system is constituted by subsystems for generating input data, judging strength of framed structure member and deciding shell thickness of blast furnaces. (2) Structural analysis data is systematically stored in data-file. (3) Standard calculation sheet is make by computer output journal. (4) As this system is interactive, it is an efficient system with immediate correspondence. The system reduced about 70% of time conventionally required for structural analysis.

Structural Analysis System for Construction and

Relining of Blast Furnaces*

Koshi IWATA * *   Teruaki MORIMOTO * *   Hiroshi KANAYA * *
Isao ICHIHARA * * *   Masao FUJITA * * * *   Shozo KIYOHARA * * * *

A Structural analysis system(KBSD System) for construction and relining of blast furnaces was established in order to save input data generating, judge speedily results of structural analysis, and use effectively structural analysis program NASTRAN.

Characteristics of this system are as follows:
(1) The system is constituted by subsystems for generating input data, judging strength of framed structure member and deciding shell thickness of blast furnaces.

(3) Standard calculation sheet is made by computer output journal.
(4) As this system is interactive, it is an efficient system with immediate correspondence.
    The system reduced about 70 % of time conventionally required for structural analysis.

nalysis. Furthermore, detailed planning of the shell is carried out and at the same time a shell

Input data generating

4 Features of Each Subsystem

Input data
· Basic load data of deck and apparatus
· Member group of each equipment

Distribution of deck load | Distribution of apparatus load | Calculation of member own weight

Generating of long-term load | Generating of short-term load

Output data
· Result of load distribution
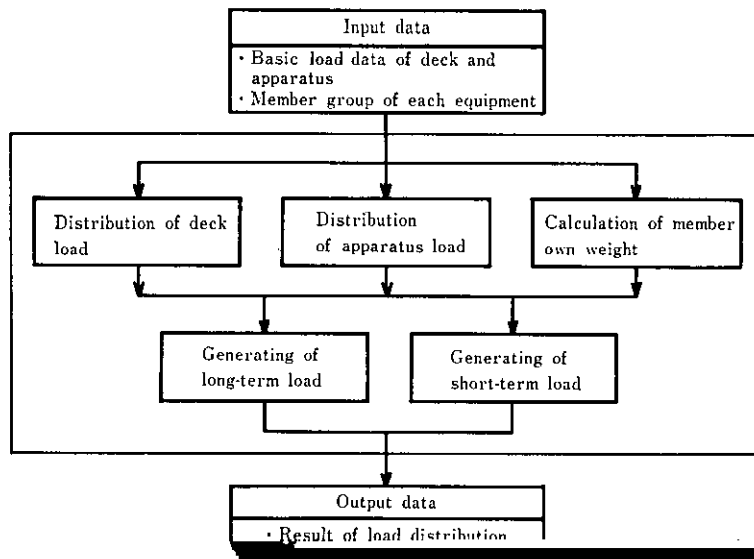
Fig. 5 Flow of furnace body load calculation subsystem
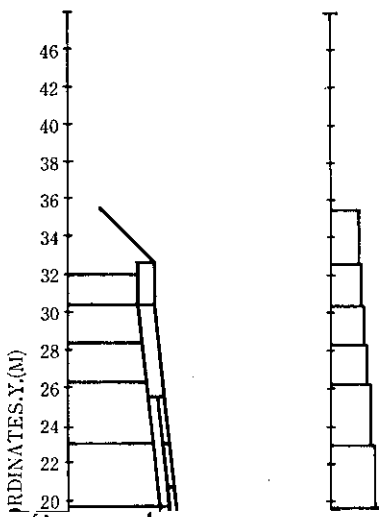
### 4.3 Structural Frame Load Calculation Subsystem

Figure 7 shows the flow of calculation of this subsystem. In this subsystem, the distribution of floor live loads and apparatus loads to members and joints of framework, own weights of members, and short-term loads are calculated by inputting basic data on floor live loads of each deck of furnace structural frames and on apparatus loads, member groups of each piece of equipment, etc.

Input data

Load calculation by
in-furnace pressure

Calculation of blast

Calculation of stock

Girder and support
of top trolley

Up-take

Down-commer
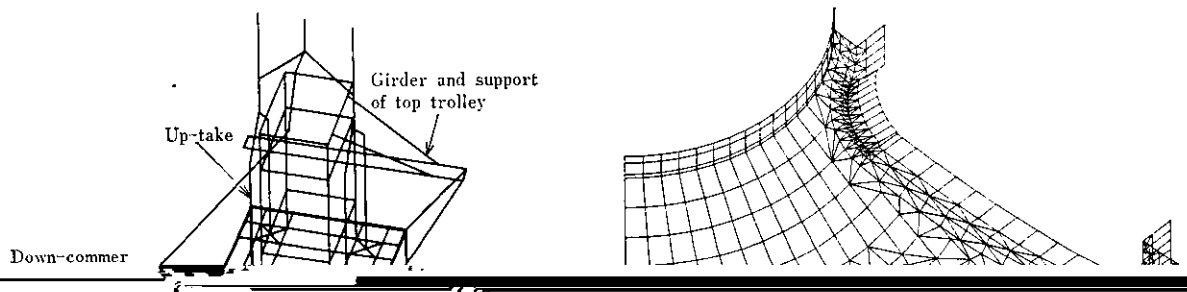
Input data

stress concentration factors, shell material properties, etc. Necessary allowable stresses in li....

Table 1 Effect of KBSD system on working hour reduction in case of 2 000 m³

Item of calculation	Conventional structural analysis	KBSD system
Furnace body load calculation	21	2