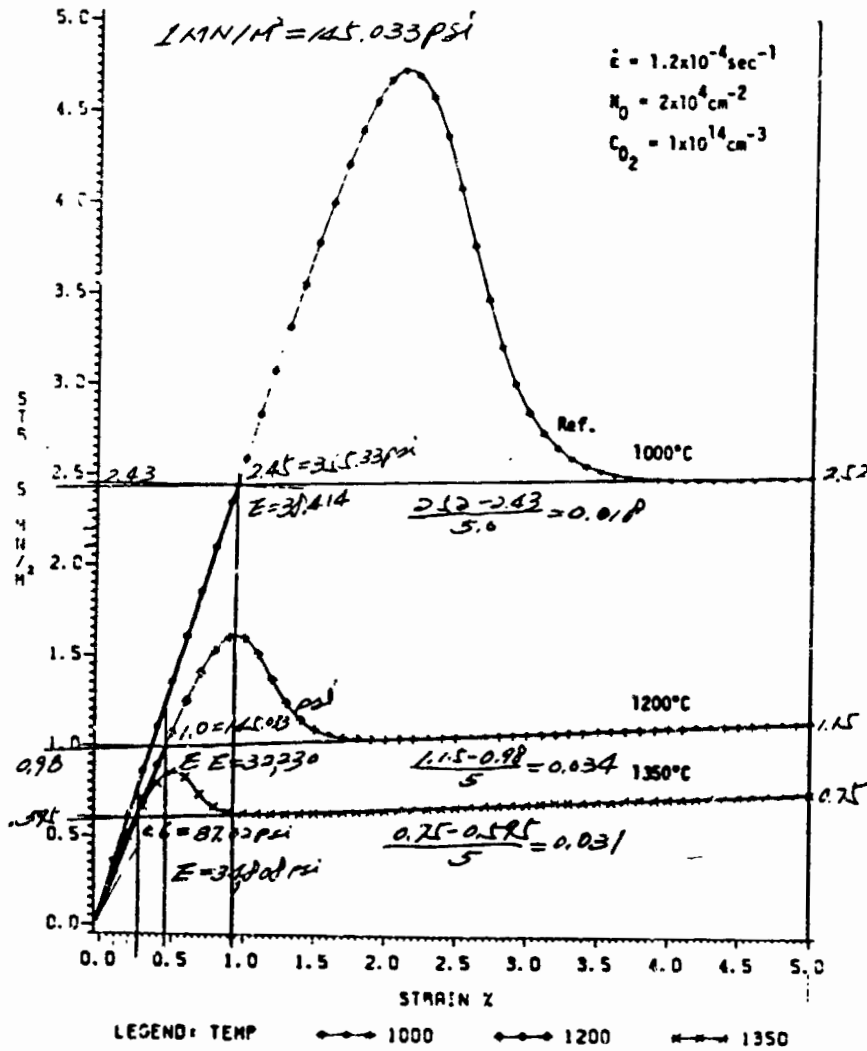


ANALYSIS OF STRESS-STRAIN RELATIONSHIPS IN SILICON RIBBON

UNIVERSITY OF KENTUCKY

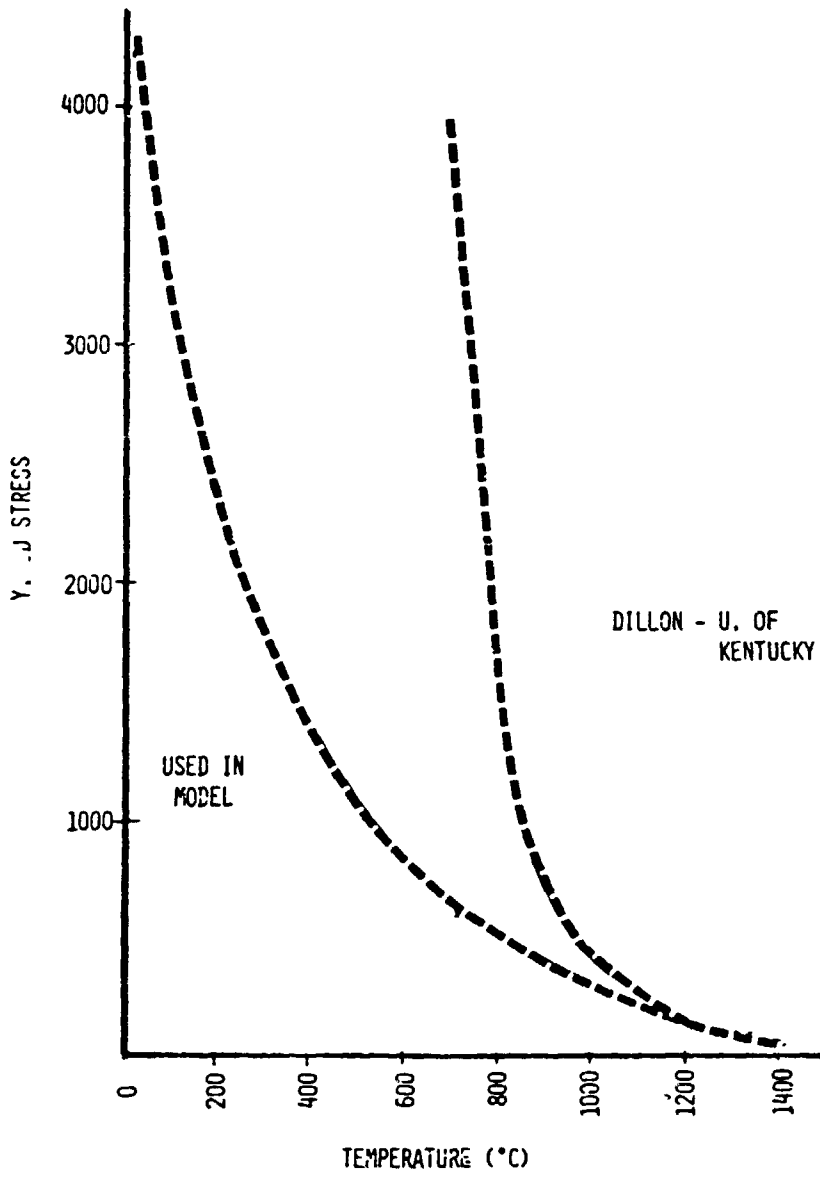
O. Dillon

Stress vs Strain for Si (Temperatures in °C)



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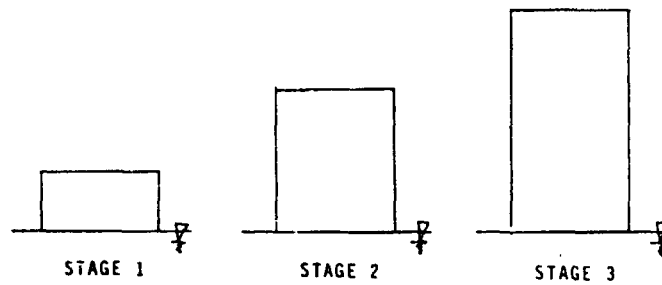
SILICON SHEET



Approaches

(1) CONVENTIONAL APPROACH

A SERIES OF MODELS TO PRESENT EACH INTERMEDIATE STAGE
(QUASI-STATIC ANALYSIS)

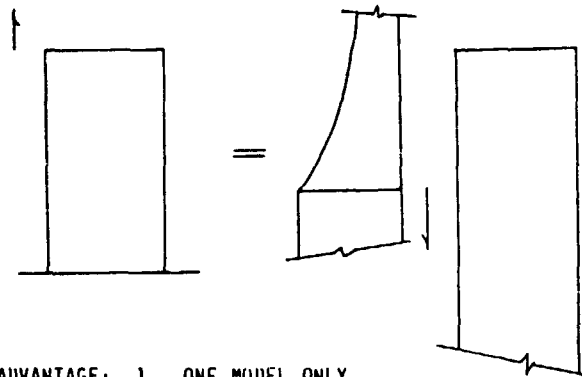


ADVANTAGE: SMALL MODEL IN EARLY STAGES

DISADVANTAGE: 1. A SERIES OF MODELS (LABOR INTENSIVE)
2. POST-STRESS HISTORY IGNORED

(2) RECOMMENDED APPROACH

A MODEL TO PRESENT ENTIRE PROCESS (DYNAMICAL TRANSIT ANALYSIS)

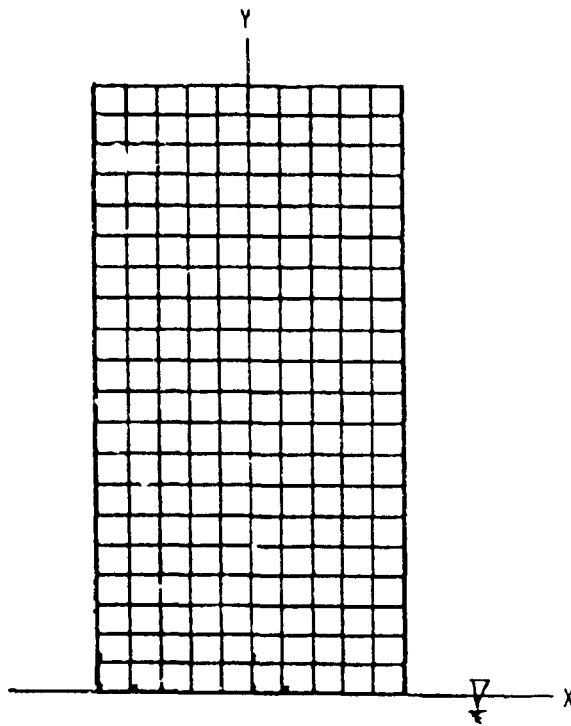


ADVANTAGE: 1. ONE MODEL ONLY
2. ALL PAST-DEFORMATION INCLUDED

DISADVANTAGE: COSTLY AT EARLY STAGE ANALYSIS

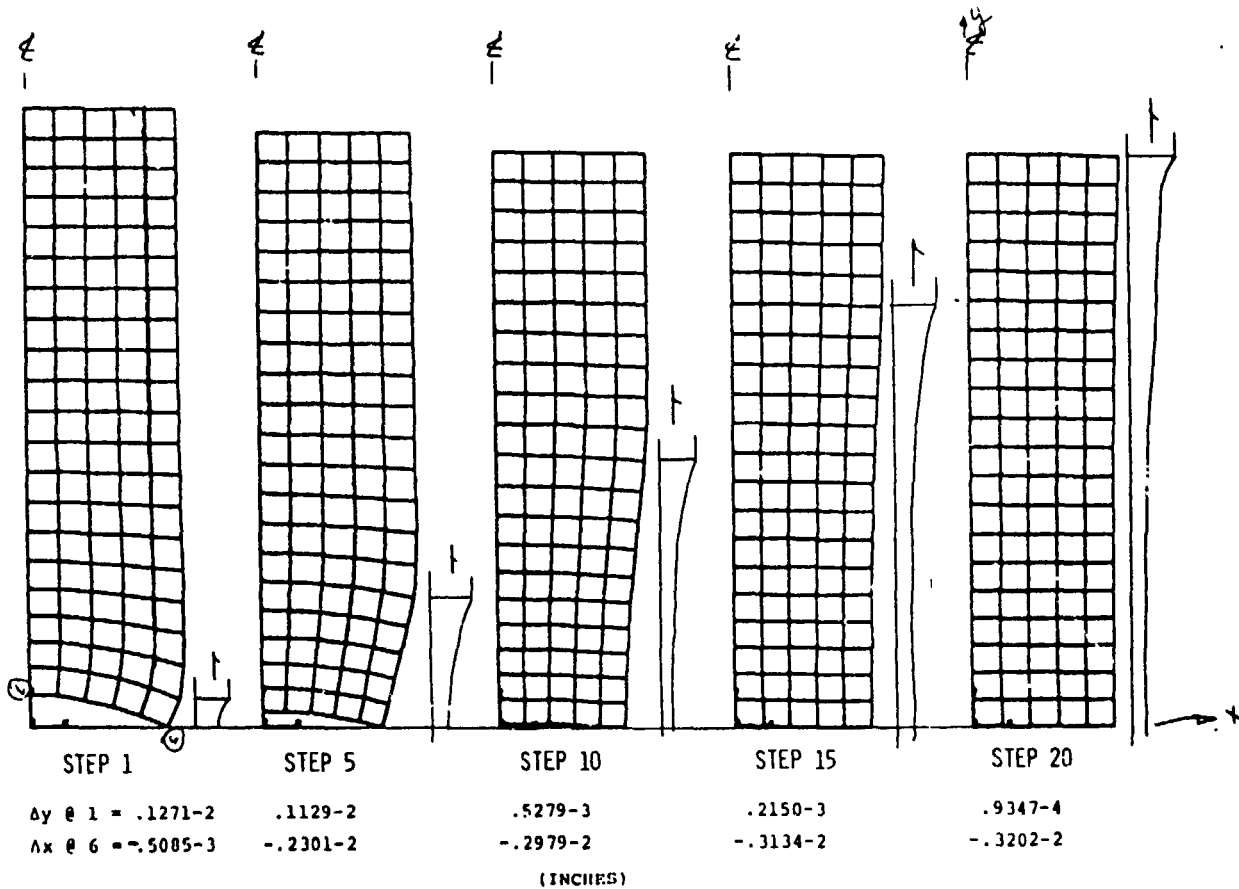
SILICON SHEET

Model



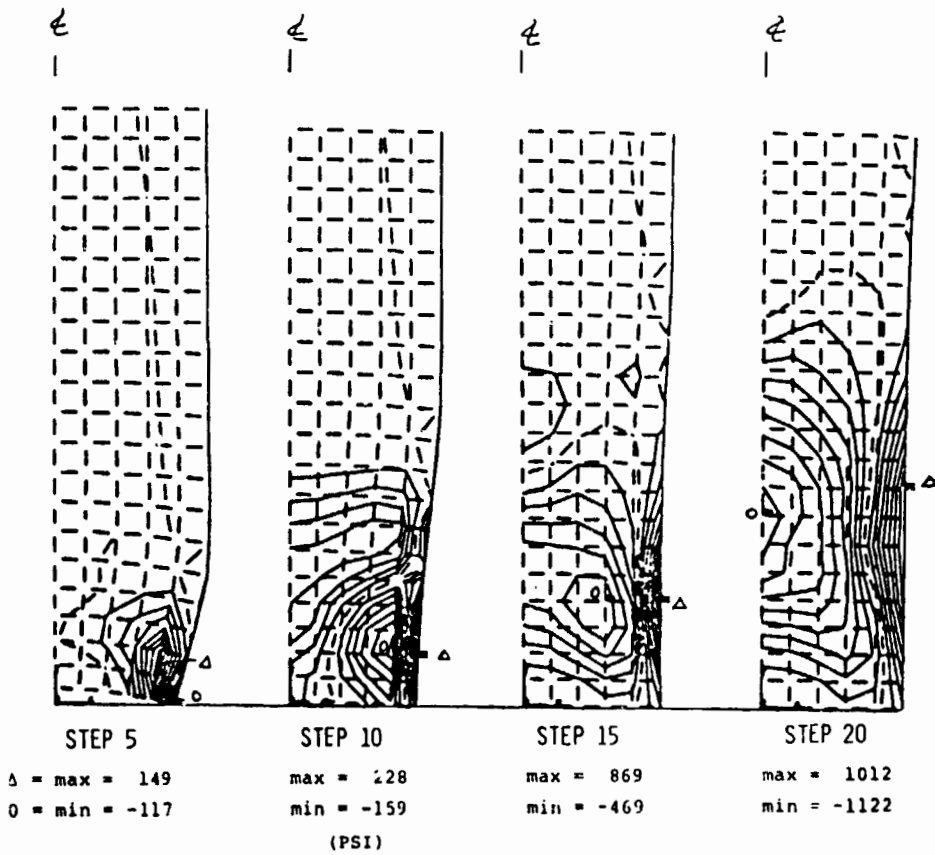
ORIGINAL PAGES
OF POOR QUALITY

Deformed Shapes by Steps



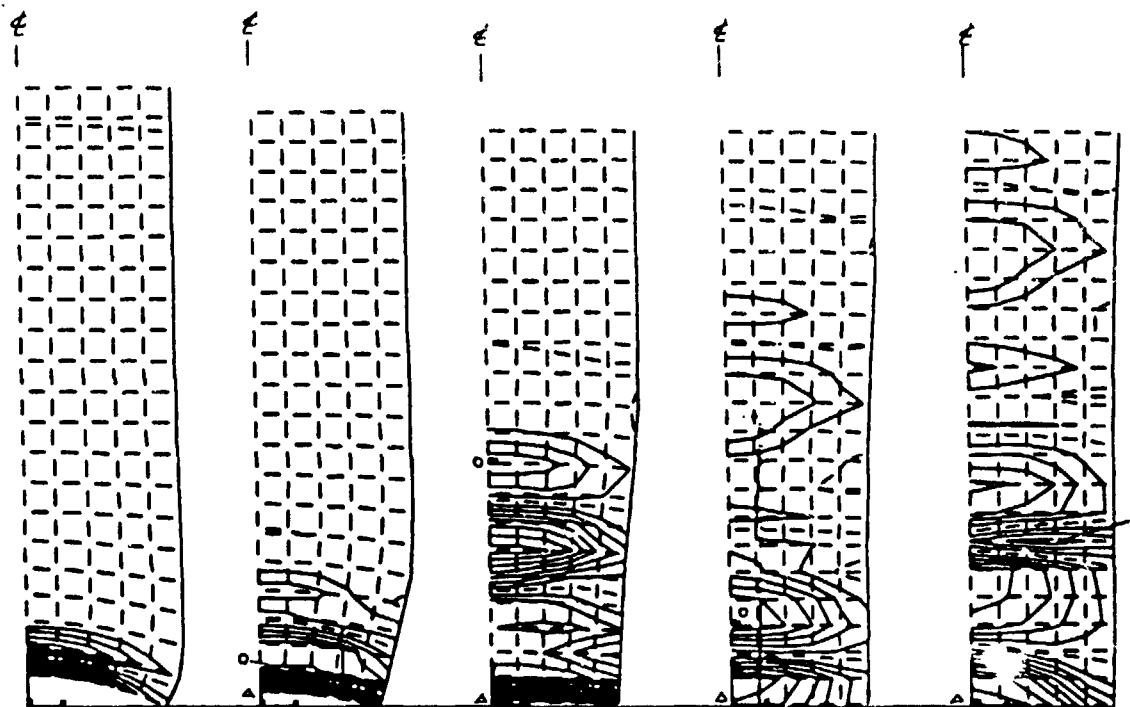
SILICON SHEET

Stress Contours of σ_y by Steps



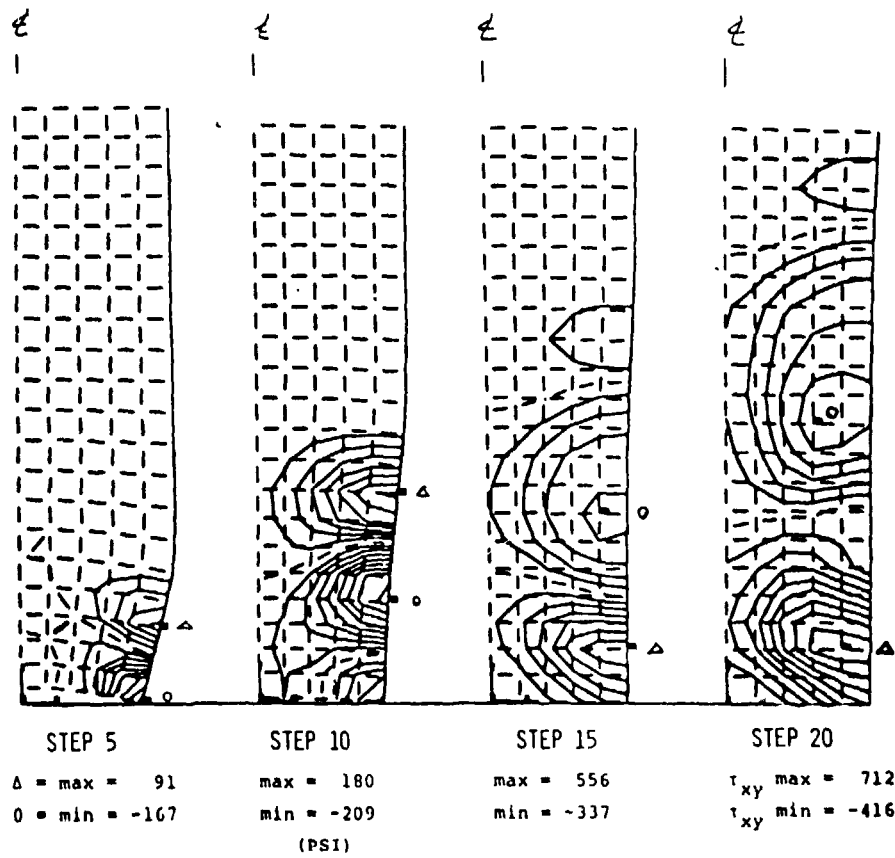
ORIGINAL PAGES
OF POOR QUALITY

Stress Contours of σ_x by Steps



STEP 1	STEP 5	STEP 10	STEP 15	STEP 20
$\Delta = \text{max} = .05$	$\text{max} = 374$	$\text{max} = 782$	$\text{max} = 1293$	$\text{max} = 1885$
$0 = \text{min} = -.02$	$\text{min} = -657$	$\text{min} = -314$	$\text{min} = -1159$	$\text{min} = -858$
		(PSI)		

Stress Contours of τ_{xy} by Steps



Conclusion

- DYNAMICAL TRANSIT APPROACH WORKS
- PAST-STRAIN HISTORY IS SIGNIFICANT