1 A	В	С	D	E	F	G	Н	I	J	K	L	ΜN
	MAT	TLAR P	roject (#2) - Metallic	Failure A	nalysis							
3			ace Structural Analysis, Uni			go (Copyright	J.B. Kosmati	ka, 2020)				
5		Version:	Winter, 2020 (v1)									
6		VC13iOii.	vinter, 2020 (v1)									_
7	Pr	oject Title:	Reader Example, Volume 1,	page 151 (3.25),	3-D Principal St	resses						7
8												
9		Variable	Description	Value	Units				Units Re			
10		ilnput	Input Units	1	1 = US, 2 = SI		A		US	SI		
11	nanananananananana	iOutput	Output Units	1	1 = US, 2 = SI			σ, τ	$10^3 lb/in^2$	МРа		rananan mananan
12		ioption	Analysis Option	1	1 = Stress, 2 =	Strain		E, G	10 <sup>6</sup> lb/in <sup>2</sup>	GPa	personanenenenenenen	
13												
14 15		<i>Material Pr</i> Variable	Operties  Description	A Posis	B-Basis	Units					-	
16		E	Young's Modulus	A-Basis 10.3	10.3	Msi						
17		G	Shear Modulus	3.9	3.9	Msi						
18		$\sigma_{vT}$	Yield strength - tension	68	70	Ksi						
19		$\sigma_{\scriptscriptstyle uT}$	Ultimate strength - tension	78	80	Ksi			-			
20		$\sigma_{\it yc}$	Yield strength - compressio	-70	-73	Ksi						
21		$\sigma_{\it uC}$	Uultimate strength - compr	-78	-80	Ksi						
22		$\tau_y$	Yield strength - shear	35.25	35.25	Ksi		***************************************				
23		$\tau_u$	Ultimate strength - shear	46	48	Ksi						
24		C								******************************	-	
25 26		Safety Facto Variable	Description Description	Value	Units							
27		SF <sub>v</sub>	Safety Factor - yield	1.1	1	_						
28		SF ,,	Safety Factor - ultimate	1.5	1							
29				-								
30												
31	Х	Option 1:	Applied Stress State				ž					
32												
33 34		Applied Stre Variable	Description	Value	Units						-	
35		σ <sub>xx</sub>	Stress ( $\sigma_{xx}$ )	-7	Ksi						-	
36		$\sigma_{yy}$	Stress $(\sigma_{yy})$	1	Ksi						-	
37		σ <sub>zz</sub>	Stress (σ <sub>zz</sub> )	0.5	Ksi							
38		τ <sub>yz</sub>	Stress (τ <sub>yz</sub> )	0	Ksi							
39		τ <sub>xz</sub>	Stress (τ <sub>xz</sub> )	0	Ksi							
40		$\tau_{xy}$	Stress (τ <sub>xy</sub> )	3	Ksi							
41												
42 43	Х	Ontion 2:	Massured Strain State From	Danattan			Table 1					
44	^_	Option 2:	Measured Strain State From	Rosettes								
45		Strain Gage	Rosette									
46		Variable	Description	Value	Units							
47		$ heta_{A}$	Orientation Angle (A)		degree				dipendentia			
48		$\theta_{\mathtt{B}}$	Orientation Angle (B)		degree							
49		$ heta_{C}$	Orientation Angle (C)		degree	*********************************						
50	*************	θ	Gage Rotation Angle		degree						ļ	******
51 52		Measured S	trains				To a second					
53		Variable	Description	Value	Units				1			
54		$\mathcal{E}_{A}$	Strain (A)	Taluc	μ in/in						-	
55		$\mathcal{E}_{B}$	Strain (B)		μ in/in							
56	~~~~~~~	ε <sub>C</sub>	Strain (C)		μ in/in						-	enenenhenenen:
57												
58												
59 <b>0</b>		END OF F	ILE									

Α	В	С	D	E	F	G	Н	1	J	K	L	ΜN
1	MA	TIAR D	roject (#2) - Metallio	. Failura Str	ace Analys	ic						+
3			roject (#2) - Metatit ice Structural Analysis, Uni				P. Vosmatk	~ 2020)			<del>                                     </del>	_
_	3L-10				mu, sun biege	o (copyright )	.b. Kosiiiatki	u, 2020)				
5 6		Version:	Winter, 2020 (v2) - Input: US	S, Output: US/SI								_
7	Stu	dent Name:	John Kosmatka									
8			A0123456789									_
9												
10	Р	roject Title:	Reader Example, Volume 1,	page 151 (3.25), 3	-D Principal Str	esses						4
12	INPUT	ECHO:										
13												
14		Variable	Description	Value	Units				eference			
15		ilnput	Input Units	1	1 = US, 2 = SI			$US$ $10^{3} lb/in^{2}$	SI			
16 17		iOutput	Output Units	1	1 = US, 2 = SI	`troin	σ, τ Ε, G	$10^{-10/in}$	MPa GPa	1	<del>                                     </del>	+
18		Ioption	Analysis Option	1	1 = Stress, 2 = S	otrain	E, G	10 10/111	Gra			
19		Material Pro	operties									_
20		Variable	Description	A-Basis	B-Basis	Units						
21		<i>E G</i>	Young's Modulus Shear Modulus	10.3000 3.9000	10.3000 3.9000	Msi Msi					-	+
23		$\sigma_{_{yT}}$	yield strength - tension	68.0000	70.0000	Ksi						+
24		$\sigma_{uT}$	ultimate strength - tension	78.0000	80.0000	Ksi						
25		$\sigma_{\it yC}$	yield strength - compression	-70.0000	-73.0000	Ksi	_					
26		$\sigma_{\sf uC}$	ultimate strength - compres	-78.0000	-80.0000	Ksi					<u> </u>	+
27		$\tau_y$ $\tau_u$	yield strength - shear ultimate strength - shear	35.2500 46.0000	35.2500 48.0000	Ksi Ksi					-	+
29		r u	ditiliate strength shear	40.0000	40.0000	KJI						+
30		Safety Facto	ors									
31		Variable	Description	Value	Units							
32		SF <sub>y</sub>	Safety Factor - yield Safety Factor - ultimate	1.1 1.5	1							_
34		31 <sub>u</sub>	Safety Factor - ultimate	1.5	1							+-
35		Applied Stre	ess State									+
36		Variable	Description	Value	Units							
37		$\sigma_{xx}$	Normal Stress - x	-7.0000	Ksi						<u> </u>	
38		$\sigma_{yy}$ $\sigma_{zz}$	Normal Stress - y Normal Stress - z	1.0000 0.5000	Ksi Ksi						-	+
40		τ <sub>yz</sub>	Shear Stress - yz	0.0000	Ksi							+-
41		τ <sub>xz</sub>	Shear Stress - xz	0.0000	Ksi							
42		$\tau_{xy}$	Shear Stress - xy	3.0000	Ksi							
43												_
45	OUTP	UT:										
46												
47 48	1.)	Principal Str	ress State			1 1		ı	l	ı	I	4
49		Variable	Description	1	2	3	Units					+-
50		$\sigma_p$	Principal Stresses	-8.0000	0.5000	2.0000	Ksi			1	†	+[
51				-0.9487	0.0000	-0.3162	1					
52 53		{Φ}	Eigenvector {Q}	0.3162 0.0000	0.0000 1.0000	-0.9487 0.0000	1				<u> </u>	+
54				0.0000	1.0000	0.0000	1				<del>                                     </del>	+
55		Variable	Description	Value	Units					1	†	+[
56		$\tau_{max}$	Maximum Shear Stress	5.0000	Ksi							
57	<u> </u>											+
58 59	-	E000		_							<del>                                     </del>	+
60		5000								1	1	+[
61		4000										$\prod$
62 63	-	3000									<del> </del>	+
64	-	3000								+	+	+[
65		2000			\							
66		1000			\							1
67 68	-	(si)									<del> </del>	+[
69		tau (Ksi)	- <del>•</del>		<del>                                     </del>	<b>\</b>				1	1	+
70		-1000 ·				$\sim$						П
71		. 300	\		/							

	J 6	-	D	E	F	G	Н			V		4 5.1
72	A B	С	l n	E	F  /	G,		ı	J	K	L N	'II IN
72	1	-2000	- 1								<del></del>	-
73	<u> </u>											-
74		-3000										_
75	ļ				/ /							_
76		-4000					-					_
77												
78		-5000		1000	-							
79			-8000 -6000	-4000 -20	00 0	2000						
80				sigma (Ksi)								
81												
82	2.)	Allowable S	trengths									
83												
84		Variable	Description	A-Basis	B-Basis	Units						
85		$\sigma_{\scriptscriptstyle \sf T}^*$	Allowable Tension	52.0000	53.3333	Ksi						-
86		$\sigma_{c}^{*}$	Allowable Compression	-52.0000	-53.3333	Ksi						-
87		τ*	Allowable Shear	30.6667	32.0000	Ksi						-
88		τ*	Allow Shear Tresca (Mixed)	26.0000	26.6667	Ksi						-
89												-
90	3 )	Margin of S	afety (MS)						1			-
91	J.,		, (1110)		1				I			
92		Minimum N	largin of Safety	Rankine	Tresca*	Von Mises						-
93		MS <sub>min</sub> (A)	Min Margin of Safety (A Basi	5.5000	4.2000	4.5670						-
94												-
		MS <sub>min</sub> (B)	Min Margin of Safety (B Basi	5.6667	4.3333	4.7097						_
95												_
96		• •	ess State for (MS=0) - A Basis									_
97		Variable	Description	Rankine	Tresca*	Von Mises	Units					_
98		$\sigma_{xx}$	Normal Stress - x	-45.5000	-36.4000	-38.9689	Ksi					
99		$\sigma_{yy}$	Normal Stress - y	6.5000	5.2000	5.5670	Ksi					
100		$\sigma_{zz}$	Normal Stress - z	3.2500	2.6000	2.7835	Ksi					
101		$\tau_{yz}$	Shear Stress - yz	0.0000	0.0000	0.0000	Ksi					
102		$\tau_{xz}$	Shear Stress - xz	0.0000	0.0000	0.0000	Ksi					-
103		τ <sub>хγ</sub>	Shear Stress - xy	19.5000	15.6000	16.7010	Ksi					-
104		,	·									-
105		Applied Stre	ess State for (MS=0) - B Basis									
106		Variable	Description	Rankine	Tresca*	Von Mises	Units					
107		σ <sub>xx</sub>	Normal Stress - x	-46.6667	-37.3333	-39.9682	Ksi					
108			Normal Stress - y	6.6667	5.3333	5.7097	Ksi				+	-
109		σ <sub>γγ</sub>	Normal Stress - z	3.3333	2.6667	2.8549	Ksi		1		+	-
	$\vdash$	σ <sub>zz</sub>										-
110		$\tau_{yz}$	Shear Stress - yz	0.0000	0.0000	0.0000	Ksi				-	-
111	-	$\tau_{xz}$	Shear Stress - xz	0.0000	0.0000	0.0000	Ksi				-	-
112		$\tau_{xy}$	Shear Stress - xy	20.0000	16.0000	17.1292	Ksi					
113												
114		* Note: Fo	r the Tresca Criteria; the Mar	·		•						_
115			for pure <u>tension</u> , MS is the minimum of the tension ( $\sigma_{\tau}^*$ ) criteria, shear ( $\tau^*$ ) criteria, and shear ( $\sigma_{\tau}^*/2$ ) criteria									
116			for <u>pure compression</u> , MS is the minimum of the compression ( $\sigma_c^*$ ) criteria, shear ( $\tau^*$ ) criteria, and shear ( $ \sigma_c^* /2$ )									
117			for mixed stress, MS is the minimum of tension ( $\sigma_1^*$ ), compression ( $\sigma_c^*$ ), shear ( $\tau^*$ ), and shear ( $(\sigma_1^* - \sigma_c^*)/4$ ) criteria									
118												
119	End of	Output										
120												$\Box$
121												П
122												П