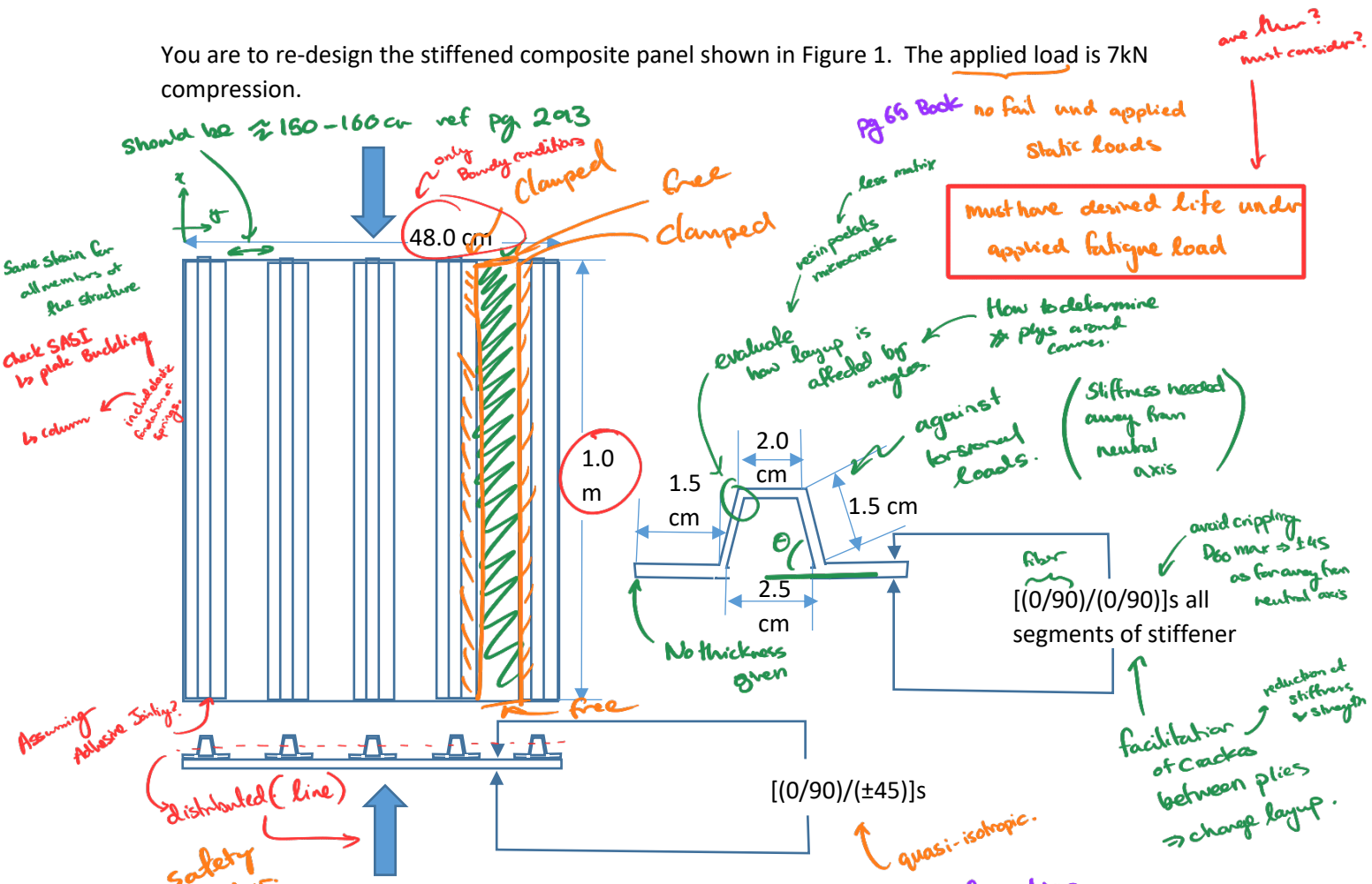
AE4ASM109 – Design and Analysis of Composite Structures I
Final Project (CK portion) Due: April 21 at 5:00 pm via e-mail

You are to re-design the stiffened composite panel shown in Figure 1. The applied load is 7kN compression.



As designed, the panel fails before the ultimate load of 7kN is reached. The engineering manager tasks two of her engineers, who graduated from the University of South-Western Beach Somewhere, to re-design the panel to meet the applied load. The two engineers are hard at work trying to figure out how to do that while adding the minimum amount of weight to the existing panel. While they are working on this, an engineer who graduated from TUDelft approaches them and looks over their shoulders. After a while he claims: "You know you can actually remove material and significantly increase the load carrying capability of this panel?"

The two USWBS graduates, think he is crazy but, because he is from TUDelft, they do not completely dismiss his idea and decide to spend some time investigating that option also.

Is the TUDelft engineer right? If yes, how can this be done/re-designed to maximize the load carrying ability of the panel? If no, how would you re-design the panel to meet the load and minimize the associated weight increase?

Material properties:

E_x= 62.046 GPa
E_y= 62.046 GPa
G_{xy}= 4.826 GPa

cancel contraction

ν_{xy}= 0.05
t_{ply}= 0.1905 mm ← of one ply.

X^t= 1517 MPa } parallel to fibers
X^c= 1379 MPa }
Y^t= 1450 MPa
Y^c= 1379 MPa
S = 99 MPa

(1) No post-buckling is allowed
(2) Do not check for panel breaker condition
(3) You may work in teams of up to 4 members per team. Each member of a team submits his/her own report in his/her own words. On the first page of the report he/she mentions the names of all the team members.

1. list function of panel / design process
2. sources of uncertainty in design
3. Design variable & allowables
4. Additional considerations at Design process
5. Composite plate under localised in plan load

↳ 5.3.1 pg 92 ☆

↳ energy methods (5.4 pg 106)

⑥ Buckling ~ governing Equations 6.1 pg 119
pg 123

Revisar pg 125 6.2.1 Table 6.1

↳ failure modes

⑦ Analysis of composite beams

⑧ Chapter 9.1 ← goldmine
until pg 232

⑨ 9.3 additional considerations

↳ Exercise 9.1
reduction # of stiffeners to reduce weight while ok with applied load.

+ thickness of stiffner has be increased

⑩ Good design Practices.