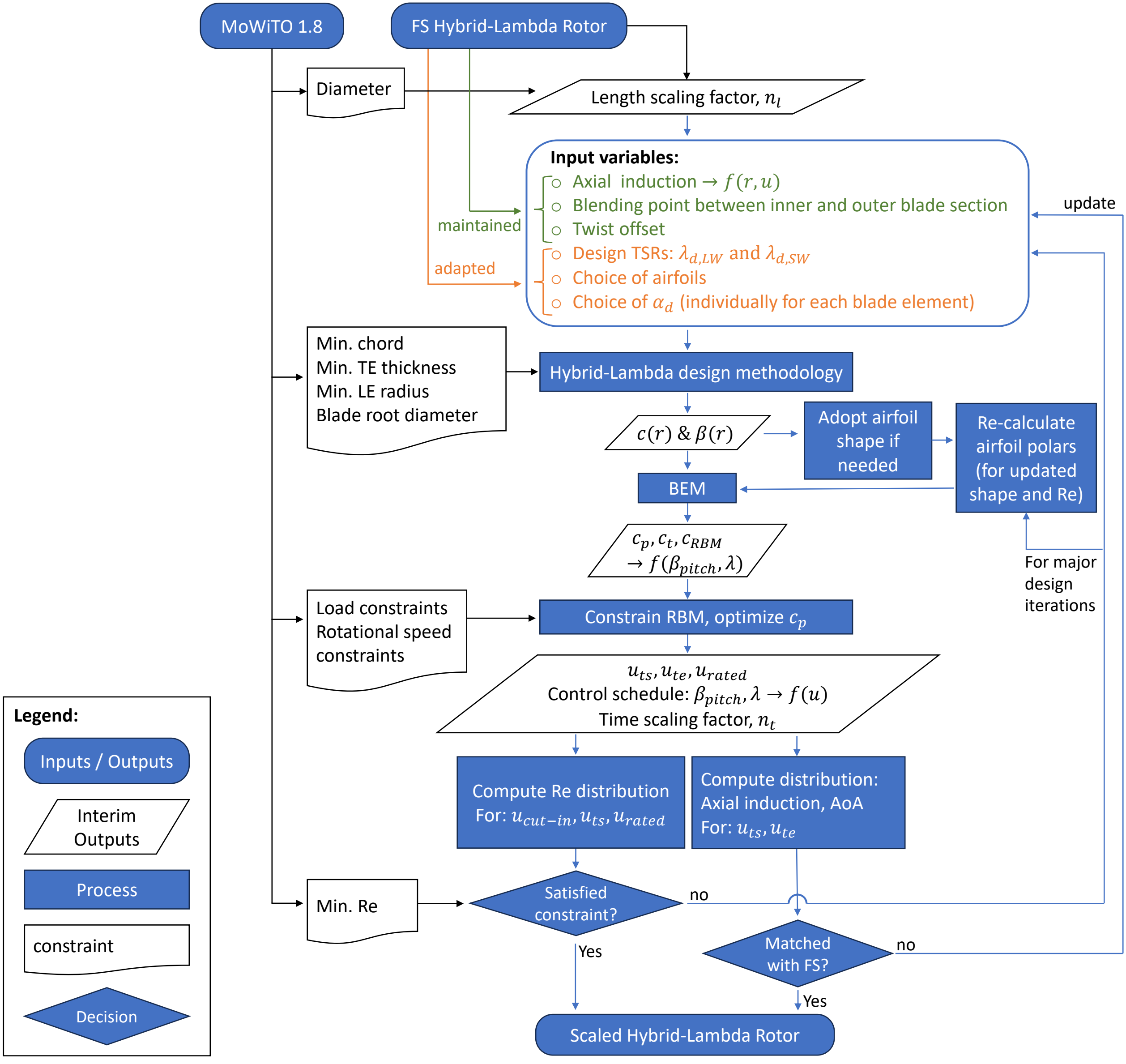
MoWiTO 1.8
FS Hybrid-Lambda Rotor
Diameter
Length scaling factor, n_l
Input variables:
Axial induction → $f(r,u)$
Blending point between inner and outer blade section
Twist offset
Design TSRs: $\lambda_{d,LW}$ and $\lambda_{d,SW}$
Choice of airfoils
Choice of α_d (individually for each blade element)
maintained
adapted
update
Min. chord
Min. TE thickness
Min. LE radius
Blade root diameter
Hybrid-Lambda design methodology
$c(r)$ & $\beta(r)$
Adopt airfoil shape if needed
Re-calculate airfoil polars (for updated shape and Re)
BEM
c_p, c_t, c_{RBM} → $f(\beta_{pitch}, \lambda)$
For major design iterations
Load constraints
Rotational speed constraints
Constrain RBM, optimize c_p
$u_{ts}, u_{te}, u_{rated}$
Control schedule: $\beta_{pitch}, \lambda \rightarrow f(u)$
Time scaling factor, n_t
Compute Re distribution
For: $u_{cut-in}, u_{ts}, u_{rated}$
Compute distribution:
Axial induction, AoA
For: u_{ts}, u_{te}
Min. Re
Satisfied constraint?
no
Yes
Matched with FS?
no
Yes
Scaled Hybrid-Lambda Rotor
Legend:
Inputs / Outputs
Interim Outputs
Process
constraint
Decision