FAST+MORE

Derived Results & License Types

1. Which Derived Result Value is available in with FAST+MORE License

Unique Name	**Unit** example	**Caption**	**Equation**	**Explanation**	available with **Starter** License	available with **Profess.** License	available with **Enterpr.** License
i_Max_DoU		Maximum DoU of all DoU's	for Screws: max(i_DoU_StickFric_min, f_DoU_AxialCombStress_Thread_max, i_DoU_ShearStress_Thread), for Rivets: max(f_DoU_AxialStress_Shaft, i_DoU_ShearStress_Shaft, i_DoU_CombStress_Rivet)	Maximum Degree of Utilization (DoU) of all available DoU's.	✓	✓	✓
i_DoU_StickFric		Utilization of Friction at Body Interface	(i_F_shear * f_Input-SF_StickFric * f_Input-SF_ModelClass) / i_F_StickFric	Degree of Utilization (DoU) of the action Shear Force in relation to Stick Friction at an Intersection, including user defined SaftyFactor f_Input-SF_StickFric and f_Input-SF_ModelClass	✓	✓	✓
i_DoU_StickFric**_max**		Utilization of Friction at Body Interface **with max. Bolt Pretension**	(i_F_shear * f_Input-SF_StickFric * f_Input-SF_ModelClass) / i_F_StickFric_max	Degree of Utilization (DoU) of the action Shear Force in relation to Stick Friction at an Intersection with max. Bolt Pretension, including user defined SaftyFactor f_Input-SF_StickFric and f_Input-SF_ModelClass	⊘	✓	✓
i_DoU_StickFric**_min**		Utilization of Friction at Body Interface **with min. Bolt Pretension**	(i_F_shear * f_Input-SF_StickFric * f_Input-SF_ModelClass) / i_F_StickFric_min	Degree of Utilization (DoU) of the action Shear Force in relation to Stick Friction at an Intersection with min. Bolt Pretension, including user defined SaftyFactor f_Input-SF_StickFric and f_Input-SF_ModelClass	⊘	✓	✓

i_DoU_ShearStress_Shaft		Utilization of the Fastener Shear-Strength at the Shaft	(i_ShearStress_Shaft * f_Input-SF_ShearStrength * f_Input-SF_ModelClass) / (Factor_'tau_a/Rm' * UltimateStrength_Rm)	Degree of Utilization (DoU) of the Fastener Shear Strength at the Shaft-Crosssection, already including user defined SaftyFactor f_Input-SF_ShearStrength and f_Input-SF_ModelClass	✓	✓	✓
i_DoU_ShearStress_Thread		Utilization of the Fastener Shear-Strength at the Thread	(i_ShearStress_Thread * f_Input-SF_ShearStrength * f_Input-SF_ModelClass) / (Factor_'tau_a/Rm' * UltimateStrength_Rm)	Degree of Utilization (DoU) of the Fastener Shear Strength at the Thread-Crosssection, already including user defined SaftyFactor f_Input-SF_ShearStrength and f_Input-SF_ModelClass	✓	✓	✓
f_DoU_AxialCombStress_Thread		Utilization of the Bolt Yield Strength at the Thread	(f_CombStress_Thread * f_Input-SF_AxialYieldStrength * f_Input-SF_ModelClass) / BoltYieldStrength_Re	Degree of Utilization (DoU) of the Bolt/Screw Strength at the Thread for static loads, already including user defined SaftyFactor f_Input-SF_AxialYieldStrength and f_Input-SF_ModelClass	✓	✓	✓
f_DoU_AxialCombStress_Thread**_max**		Utilization of the Bolt Yield Strength at the Thread **with max. Bolt Pretension**	(f_CombStress_Thread_max * f_Input-SF_AxialYieldStrength * f_Input-SF_ModelClass) / BoltYieldStrength_Re	Degree of Utilization (DoU) of the Bolt/Screw Strength at the Thread for static loads with max. Bolt Pretension, already including user defined SaftyFactor f_Input-SF_AxialYieldStrength and f_Input-SF_ModelClass	⊘	✓	✓
f_DoU_AxialCombStress_Thread**_min**		Utilization of the Bolt Yield Strength at the Thread **with min. Bolt Pretension**	(f_CombStress_Thread_min * f_Input-SF_AxialYieldStrength * f_Input-SF_ModelClass) / BoltYieldStrength_Re	Degree of Utilization (DoU) of the Bolt/Screw Strength at the Thread for static loads with min. Bolt Pretension, already including user defined SaftyFactor f_Input-SF_AxialYieldStrength and f_Input-SF_ModelClass	⊘	✓	✓

f_DoU_AxialStress_Shaft		Utilization of the Rivet Axial Yield Strength	(f_AxialStress_Shaft * f_Input-SF_AxialYieldStrength * f_Input-SF_ModelClass) / BoltYieldStrength_Re	Degree of Utilization (DoU) of the Rivet Strength in the Shaft for static loads, already including user defined SaftyFactor f_Input-SF_AxialYieldStrength and f_Input-SF_ModelClass	✓	✓	✓
i_DoU_CombStress_Rivet		Utilization of the Combined Strength of a Rivet	DoU_ShearStress_Shaft + DoU_AxialStress_Shaft * Rivet_Comb_Axial_Factor	Degree of Utilization (DoU) of the Combined Axial and Lageral Rivet Strength: F_lateral / F_lateral_allowed + F_axial / (F_axial_allowed * Rivet_Comb_Axial_Factor) <= 1	✓	✓	✓
f_DoU_Fatigue	1	Utilization of the Fastener Fatigue	for Screws: see detailed calculation steps at the end of 'Fastener Details'-Report, for Rivets: not available)	Degree of Utilization (DoU) of Screw Fatigue (not available for Rivets). Is calculated separately for each Interface of a Fastener and the worst Interface-DoU is applied for the entire Fastener. The SAME DoU is assigned to each LoadSet, as it depends on the max. Amplitude between two LoadSets.	⊘	⊘	✓
f_Nb_Cycles	1	Fatigue Limit Number of Cycles	for Screws: see detailed calculation steps at the end of 'Fastener Details'-Report, for Rivets: not available)	Number of alternating cycles for finite life fatigue strength. 2 000 000 cycles is assumend as fatigue life. Smallest permissible value is 10 000, smaller life is marked with -1. The SAME value is assigned to each LoadSet, as it depends on the max. Amplitude between two LoadSets.	⊘	⊘	✓
f_LS-A_fromFatigueAmplitude	1	First LoadSet of max. Stress Amplitude for Fatigue-Assessm.	see calculation at the end of 'Fastener Details'-Report	FIRST of two LoadSet Numbers, between which the maximum Amplitude of the Nominal Stress (Axial+Bending) occurs for Fatigue assessment in 'f_DoU_Fatigue' and 'f_SF_Fatigue'.	⊘	⊘	✓

f_LS-B_fromFatigueAmplitude	1	Second LoadSet of max. Stress Amplitude for Fatigue-Assessm.	see calculation at the end of 'Fastener Details'-Report	SECOND of two LoadSet Numbers, between which the maximum Amplitude of the Nominal Stress (Axial+Bending) occurs for Fatigue assessment in 'f_DoU_Fatigue' and 'f_SF_Fatigue'.	⊘	⊘	✓
i_Min_SF		Minimum SF of all SF's	1 / i_Max_DoU	Minimum Safety Factor (SF) of all relevant SF's	✓	✓	✓
i_SF_StickFric		Safety Factor (SF) for Friction at Body Interface	1 / i_DoU_StickFric	Safety Factor (SF) for the action Shear Force in relation to Stick Friction at an Intersection, already including user defined SaftyFactor SF_StickFriction and SF_ModelClass	✓	✓	✓
i_SF_StickFric**_max**		Safety Factor (SF) for Friction at Body Interface **with max. Bolt Pretension**	1 / i_DoU_StickFric_max	Safety Factor (SF) for the action Shear Force in relation to Stick Friction at an Intersection with max. Bolt Pretension, already including user defined SaftyFactor SF_StickFriction and SF_ModelClass	⊘	✓	✓
i_SF_StickFric**_min**		Safety Factor (SF) for Friction at Body Interface **with min. Bolt Pretension**	1 / i_DoU_StickFric_min	Safety Factor (SF) for the action Shear Force in relation to Stick Friction at an Intersection with min. Bolt Pretension, already including user defined SaftyFactor SF_StickFriction and SF_ModelClass	⊘	✓	✓
i_SF_ShearStress_Shaft		Safety Factor (SF) for the Fastener Shear-Strength at the Shaft	1 / i_DoU_ShearStress_Shaft	Safety Factor (SF) for the Fastener Shear Strength at the Shaft-Crosssection, already including user defined SaftyFactor SF_FastnerShearStrength and SF_ModelClass	✓	✓	✓

i_SF_ShearStress_Thread		Safety Factor (SF) for the Fastener Shear-Strength at the Thread	1 / i_DoU_ShearStress_Thread	Safety Factor (SF) for the Fastener Shear Strength at the Thread-Crosssection, already including user defined SaftyFactor SF_FastnerShearStrength and SF_ModelClass	✓	✓	✓
f_SF_AxialCombStress_ Thread		Safety Factor (SF) for the Bolt Yield Strength at the Thread	1 / f_DoU_AxialCombStress_Thread	Safety Factor (SF) for the Bolt/Screw Strength at the Thread for static loads, already including user defined SaftyFactor SF_FastenerAxialYieldStrength and SF_ModelClass	✓	✓	✓
f_SF_AxialCombStress_ Thread**_max**		Safety Factor (SF) for the Bolt Yield Strength at the Threadwith **with max. Bolt Pretension**	1 / f_DoU_AxialCombStress_Thread_max	Safety Factor (SF) for the Bolt/Screw Strength at the Thread for static loads with max. Bolt Pretension, already including user defined SaftyFactor SF_FastenerAxialYieldStrength and SF_ModelClass	⊘	✓	✓
f_SF_AxialCombStress_ Thread**_min**		Safety Factor (SF) for the Bolt Yield Strength at the Threadwith **with min. Bolt Pretension**	1 / f_DoU_AxialCombStress_Thread_min	Safety Factor (SF) for the Bolt/Screw Strength at the Thread for static loads with min. Bolt Pretension, already including user defined SaftyFactor SF_FastenerAxialYieldStrength and SF_ModelClass	⊘	✓	✓
f_SF_AxialStress_Shaft		Safety Factor (SF) for the Rivet Axial Yield Strength	1 / f_DoU_AxialStress_Shaft	Safety Factor (SF) for the Rivet Strength in the Shaft for static loads, already including user defined SaftyFactor SF_FastenerAxialYieldStrength and SF_ModelClass	✓	✓	✓
i_SF_CombStress_Rivet		Safety Factor (SF) for the Combined Strength of a Rivet	1 / i_DoU_CombStress_Rivet	Safety Factor (SF) for the Combined Axial and Lageral Rivet Strength: F_lateral / F_lateral_allowed + F_axial /	✓	✓	✓

				(F_axial_allowed * Rivet_Comb_Axial_Factor) <= 1			
f_SF_Fatigue	1	Safety Factor (SF) for the Fastener Fatigue	1 / f_DoU_Fatigue	Safety Factor (SF) of Screw Fatigue (not available for Rivets). Is calculated separately for each Interface of a Fastener and the worst Interface-DoU is applied for the entire Fastener. The SAME DoU is assigned to each LoadSet, as it depends on the max. Amplitude between two LoadSets.	⊘	⊘	✓
f_Input-SF_ ModelClass		Already included Safety Factor for Modeling Method	defined by user	Used Safety Factor to cover uncertainties from simplified Fastener modeling method - depending on Model-Class	✓	✓	✓
f_Input-SF_ StickFric		Already included Safety Factor against slipping at an Interface	defined by user	Used Safety Factor to cover uncertainties from simplified Fastener modeling method - against slipping at an Interface	✓	✓	✓
f_Input-SF_ ShearStrength		Already included Safety Factor against Shear Strength (Factor_'tau_a/Rm' * UltimateStrength_Rm)	defined by user	Used Safety Factor to cover uncertainties from simplified Fastener modeling method - against Shear Strength (Factor_'tau_a/Rm' * UltimateStrength_Rm)	✓	✓	✓
f_Input-SF_ AxialYieldStrength		Already included Safety Factor for Axial Strength against Yield Strength	defined by user	Used Safety Factor to cover uncertainties from simplified Fastener modeling method - for Axial Strength against Yield Strength	✓	✓	✓
f_Input-SF_Fatigue	1	Already included Safety Factor for Fatigue Strength	defined by user	Used Safety Factor to cover uncertainties from simplified Fatigue Assessment method - for Fatigue Strength	⊘	⊘	✓

i_ShearStress_Shaft	MPa	Intersec. Shear Stress at Shaft	i_F_shear/A_Shaft	Acting Shear Stress at Intersection, if Shaft-CrossSection is relevant	✓	✓	✓
i_ShearStress_Thread	MPa	Intersec. Shear Stress at Thread	i_F_shear/A_Thread	Acting Shear Stress at Intersection, if Thread-CrossSection is relevant	✓	✓	✓
f_AxialStress_Shaft	MPa	Fastener Axial Stress in Shaft	f_F_S_Head / StressCrossSection_Shaft	Nominal Axial Normal Stress in the Shaft	✓	✓	✓
f_AxialStress_Thread	MPa	Fastener Axial Stress in Thread	f_F_S_Head / StressCrossSection_AS	Nominal Axial Normal Stress in Thread on the Nut-Side	✓	✓	✓
f_CombStress_Thread	MPa	Fastener Combined Stress in Thread	(f_AxialStress_Thread**2 + 3*(k_tau * MomentShearStress)**2)**0.5, with k_tau=0.5	Combined (comparative or reduced) Stress in Thread. Axial Stress and Torsional Shear Stress combined.	✓	✓	✓
f_CombStress_ Thread**_max**	MPa	Fastener Combined Stress in Thread **with max. Bolt Pretension**	(f_AxialStress_Thread_max**2 + 3*(k_tau * MomentShearStress_max)**2)**0.5, with k_tau=0.5	Combined (comparative or reduced) Stress in Thread with max. Bolt Pretension. Axial Stress and Torsional Shear Stress combined.	⊘	✓	✓
f_CombStress_ Thread**_min**	MPa	Fastener Combined Stress in Thread **with min. Bolt Pretension**	(f_AxialStress_Thread_min**2 + 3*(k_tau * MomentShearStress_min)**2)**0.5, with k_tau=0.5	Combined (comparative or reduced) Stress in Thread with min. Bolt Pretension. Axial Stress and Torsional Shear Stress combined.	⊘	✓	✓
f_MaxAxialStress_SDIR	MPa	FastenerBeam: Max.AxialStress	read from Ansys	Nativ FastenerBeam: Max. Axial Stress in Ansys	⊘	⊘	⊘
f_MaxBendingStr_SB	MPa	FastenerBeam: Max.BendingStress	read from Ansys	Nativ FastenerBeam: Max. Bending Stress in Ansys	⊘	⊘	⊘
f_MaxCombStr_SDIR+SB	MPa	FastenerBeam: Max.CombinedStress Axial+Bending	read from Ansys	Nativ FastenerBeam: Max. Axial+Bending Combined Stress in Ansys	⊘	⊘	⊘
f_Pretension_FactorOfYield		Factor Of Yield Point defines max. Pretension Force	defined by user	This factor, together with the yield point of the bolt, defines the max. pretension force	⊘	✓	✓

f_TighteningFactor_alpha		TighteningFactor alpha	defined by user	This factor defines the difference between max. and min. pretension force	⊘	✓	✓
f_F_S_Head	N	Fastener Head Axial Force	for Screws with FEA-Pretension: - i_F_x of Head-Intersec., for Screws with Virtual-Pretension: F_M + F_SA, for Rivets: f_max_i_F_axial but only positive Values	Axial Force under the Fastener Head (>0 ... Tension, <0...Compression)	✓	✓	✓
f_F_S_Head**_max**	N	Fastener Head Axial Force **with max. Bolt Preload**	for Screws: F_M_max + F_SA, for Rivets: -f_min_i_F_x but only positive Values	Axial Force under the Fastener Head with max. Bolt Preload (>0 ... Tension, <0...Compression)	⊘	✓	✓
f_F_S_Head**_min**	N	Fastener Head Axial Force **with min. Bolt Preload**	for Screws: F_M_min + F_SA, for Rivets: -f_min_i_F_x but only positive Values	Axial Force under the Fastener Head with min. Bolt Preload (>0 ... Tension, <0...Compression)	⊘	✓	✓
f_F_M	N	used Bolt Preload	read from UI Input	Bolt Preload at assembly, **used in FEA** model (should stay between f_F_M_max and f_F_M_min)	✓	✓	✓
f_F_M**_max**	N	**max. Bolt Preload**	Bolt-Yield-Point * f_Pretension_FactorOfYield	**max. Bolt Preload** at assembly, within the achievable scatter of assembly bolt preload	⊘	✓	✓
f_F_M**_min**	N	**min. Bolt Preload**	f_F_M_max / f_TighteningFactor_alpha	**min. Bolt Preload** at assembly, within the achievable scatter of assembly bolt preload	⊘	✓	✓
i_F_SA	N	Intersec. Axial Additional Bolt Load	for Screws with FEA-Pretension: F_S - F_M,	Axial Additional Bolt Load (with Load Introduction Factor n from	✓	✓	✓

			for Screws with Virtual-Pretension: n * (delta_P / (delta_P * delta_S)) * F_A, for Rivets: 0	User Input for Fasteners with Virtual-Pretension)			
f_max_i_F_SA	N	Intersec. Axial Additional Bolt Load	Maximum of i_F_SA of all Intersections of a Fastener	Find max. of i_F_SA of ALL Intersections of a Fastener (--> max. F_S_Head on a Screw), especially relevant if more than two bodies are connected	✓	✓	✓
i_F_KR	N	Intersec. Residual Clamp Load	for Screws with FEA-Pretension: -i_F_axial, for Screws with Virtual-Pretension: F_M + F_SA - F_A, for Rivets: 0	residual clamp load at the interface during relief or loading by F_PA	✓	✓	✓
i_F_KR_**max**	N	Intersec. Residual Clamp Load, **with max. Bolt Pretension**	for Screws: F_M_max + F_SA - F_A, for Rivets: 0	max. residual clamp load at the interface during relief or loading by F_PA	⊘	✓	✓
i_F_KR_**min**	N	Intersec. Residual Clamp Load, **with min. Bolt Pretension**	for Screws: F_M_min + F_SA - F_A, for Rivets: 0	min. residual clamp load at the interface during relief or loading by F_PA	⊘	✓	✓
i_F_A	N	Intersec. Axial Load	for Screws with FEA-Pretension: F_S - F_KR, for Screws with Virtual-Pretension: -i_F_axial, for Rivets:	a component, directed in the bolt axis and proportionally related to the bolt of a working load FB in any direction	✓	✓	✓

			0				
i_F_S	N	Bolt Load	<u>for Screws with FEA-Pretension:</u> f_F_S_Head, <u>for Screws with Virtual-Pretension:</u> F_M + F_SA, <u>for Rivets:</u> 0	Bolt Load	✓	✓	✓
i_F_S**_max**	N	Bolt Load, **with max. Bolt Pretension**	<u>for Screws:</u> F_M_max + F_SA, <u>for Rivets:</u> 0	Bolt Load, with max. Bolt Pretension	⊘	✓	✓
i_F_S**_min**	N	Bolt Load, **with min. Bolt Pretension**	<u>for Screws:</u> F_M_min + F_SA, <u>for Rivets:</u> 0	Bolt Load, with min. Bolt Pretension	⊘	✓	✓
i_F_StickFric	N	Intersec. StickFriction Force	i_F_KR * FrictionCoeffiction	Shear Force that can be transmitted by Friction at an Intersection with the Bolt Pretension used in the FEA model	✓	✓	✓
i_F_StickFric**_max**	N	Intersec. StickFriction Force **with max. Bolt Pretension**	i_F_KR_max * FrictionCoeffiction	Shear Force that can be transmitted by Friction at an Intersection with max. Bolt Pretension	⊘	✓	✓
i_F_StickFric**_min**	N	Intersec. StickFriction Force **with min. Bolt Pretension**	i_F_KR_min * FrictionCoeffiction	Shear Force that can be transmitted by Friction at an Intersection with min. Bolt Pretension	⊘	✓	✓
i_F_shear	N	Intersec. Shear Force	(i_F_y**2+i_F_z**2)**0.5	Acting Shear Force at an Intersection	✓	✓	✓
i_F_axial	N	Intersec. Axial Force	+i_F_x	Acting Axial Force at an Intersection (>0...Tension -	✓	✓	✓

				opening gap, <0...Compression - closing gap)			
f_max_i_F_axial	N	Intersec. Axial Force	Maximum of i_F_axial of all Intersections of a Fastener	Find max. of F_axial of ALL Intersections of a Fastener, especially relevant if more than two bodies are connected (conservative assumption: =max Tension on a Rivet)	✓	✓	✓
i_M_bend	N mm	Intersec. Bending Moment	(i_M_y**2+i_M_z**2)**0.5	Acting Bending Moment lateral to Fastener Axis at an Intersection	⊘	⊘	✓
i_M_axial	N m	Intersec. Moment around Fastener Axis	-i_M_x	Acting Moment (Torque) around Fastener Axis at an Intersection	⊘	⊘	✓
i_F_x	N	Intersection: x-Force	read from Ansys	Intersection: Force in local x-Direction (in Fastener-Axis direction)	✓	✓	✓
i_F_y	N	Intersection: y-Force	read from Ansys	Intersection: Force in local y-Direction (perpendicular to Fastener-Axis)	✓	✓	✓
i_F_z	N	Intersection: z-Force	read from Ansys	Intersection: Force in local z-Direction (perpendicular to Fastener-Axis)	✓	✓	✓
i_M_x	N m	Intersection: x-Moment	read from Ansys	Intersection: Moment around local x-Axis (Fastener-Axis)	✓	✓	✓
i_M_y	N m	Intersection: y-Moment	read from Ansys	Intersection: Moment around local y-Axis (perpendicular to Fastener-Axis)	✓	✓	✓
i_M_z	N m	Intersection: z-Moment	read from Ansys	Intersection: Moment around local z-Axis (perpendicular to Fastener-Axis)	✓	✓	✓
i_u_shear	mm	Intersec. Shear Slip Distance	(i_u_y**2+i_u_z**2)**0.5	Shear Slip Distance at an Intersection	✓	✓	✓
i_u_axial	mm	Intersec. Axial Displacement	i_u_x	Axial Displacement at an Intersection (>0...Tension, opening gap, <0...Compression, closing gap)	✓	✓	✓

i_u_x	mm	Intersection: rel. x-Displacement	read from Ansys	Intersection: relative axial Displacement in local x-Direction	✓	✓	✓
i_u_y	mm	Intersection: rel. y-Displacement	read from Ansys	Intersection Slip: relative Displacement in local y-Direction	✓	✓	✓
i_u_z	mm	Intersection: rel. z-Displacement	read from Ansys	Intersection Slip: relative Displacement in local z-Direction	✓	✓	✓
i_r_x	deg	Intersection: rel. x-RotationAngle	read from Ansys	Intersection: relative RotationAngle around local x-Axis	✓	✓	✓
i_r_y	deg	Intersection: rel. y-RotationAngle	read from Ansys	Intersection: relative RotationAngle around local y-Axis	✓	✓	✓
i_r_z	deg	Intersection: rel. z-RotationAngle	read from Ansys	Intersection: relative RotationAngle around local z-Axis	✓	✓	✓

How to read the „Unique Names“ of the values:

i_ DoU_ ShearStress_Thread
f_ DoU_ AxialCombStress_Shaft
i_ SF_ ShearStress_Shaft
i_ F_ stickFric
f_ F_S_ Head
f_ F_S_ Head _max
f_ F_S_ Head _min
i_ F_ x

Value calculated with **max. or min Bolt Preload**. Without this ending, the value uses the Bolt-Pretension from the FEA-model.

additional description

DoU_ … Degree of Utilization
SF_ … Safety Factor
Stress_… Stress Component
F_ … Force
M_ … Moment / Torque
u_ … relative Displacement
r_ … relative Rotation Angle

i_ … Value belongs to a specific **Interface**
f_ … Value belongs to a specific **Fastener** (only one value for a Fastener, independent of the number of Interfaces)

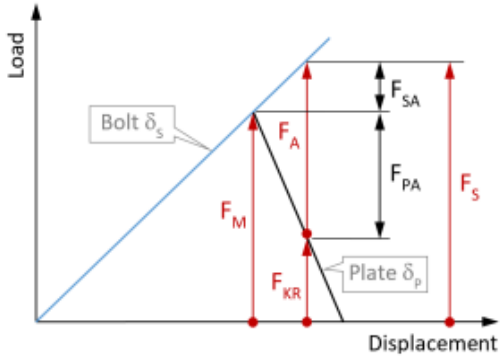
Special Case:
f_min_ i_F_x

Value from which the Minimum was taken

Minimum Value of all Interfaces of a **Fastener**

the following Force-Names are related to the Joint Diagramm:

i_F_M
i_F_A
i_F_KR
i_F_SA
i_F_PA
i_F_S



Bolt Pretension at assembly is always subjected to a certain degree of scatter. This scatter is taken into account by the tightening factor α_A and leads to the difference between max. and min. Preload … $F_{M\,max}$ and $F_{M\,min}$.

- Max. preload $F_{M\,max}$ is needed for the assessment of the bolt strength and
- Min. preload $F_{M\,min}$ is needed for the assessment of the slipping safety factor.

Both conditions ($F_{M\,min}$ and $F_{M\,max}$) are calculated by FAST+MORE automatically → compare values listed above.

- $F_{M\,max}$ = Bolt-Yield-Point * Factor-of-Yield-Point
- $F_{M\,min}$ = $F_{M\,max}$ / tightening factor α_A