

BES321971

# Robot Structural Analysis API Add-Ins as Benefits for Structural Design Modeling

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## Learning Objectives

- Discover how to transfer your structural design or modeling needs into Robot Structural Analysis add-in
- Get a firsthand impression of the Robot Structural Analysis API
- Get answers to Robot Structural Analysis API programming questions
- Meet Robot Structural Analysis Support Team members and provide feedback to them

## Description

Custom-tailored software has never been easier to achieve in Robot Structural Analysis software. If you're writing, or willing to write, add-ins for Robot Structural Analysis to expand its capabilities, this is the perfect place to get to know the subject and meet the people who use the Robot Structural Analysis API.

## Speaker

Rafal Gaweda - 1995-1997, Assistant Professor, Cracow University of Technology, Civil Engineering Department 1997-2001, Tech Support and Training Engineer, RoboBAT 2002-2007, CAD \ FEM software consultant 2007-2008, Tech Support and Training Engineer, RoboBAT 2008 - Product Support Specialist, Autodesk Inc. 2013 - Senior Product Support Specialist, Autodesk Inc.

## API - Application Programming Interface

Robot Structural Analysis, as most of the software, has its own programming interface. It allows to control Robot by external applications or add-ins.

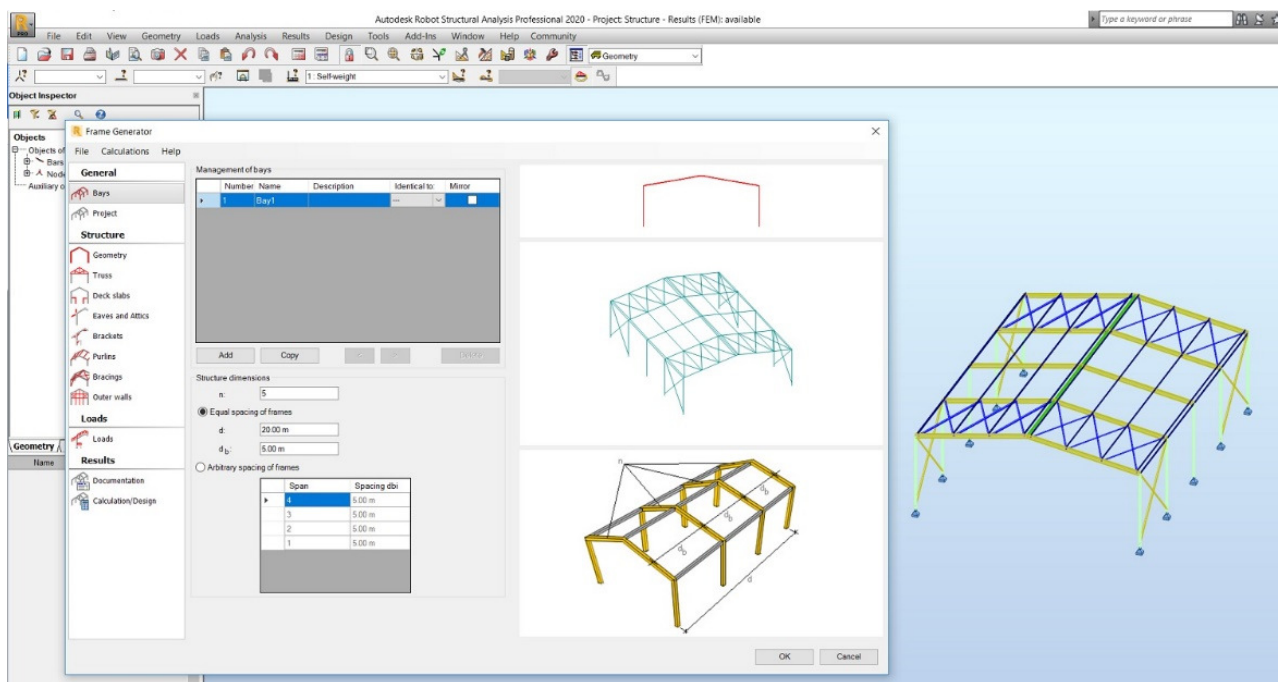
Level of access:

- Complete model data input \ modification
- Results exploration
- View management
- Printout creation
- Running Design

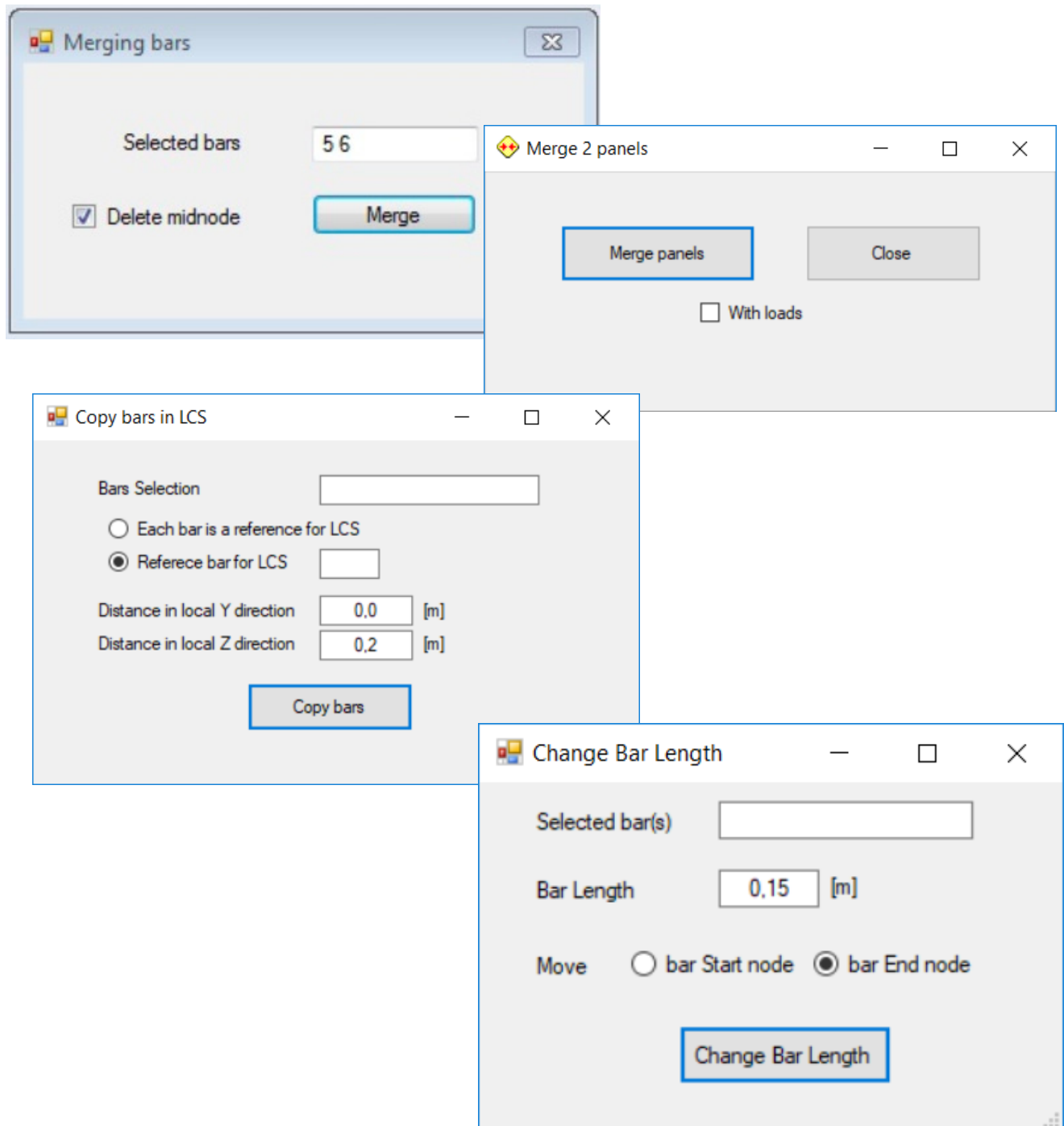
Programming can be made in VBA (for example in Excel or Word), VB, C#, C++.

During this class small macro will be developed to give You impression how easy and fast it can be to adjust software to Your needs.

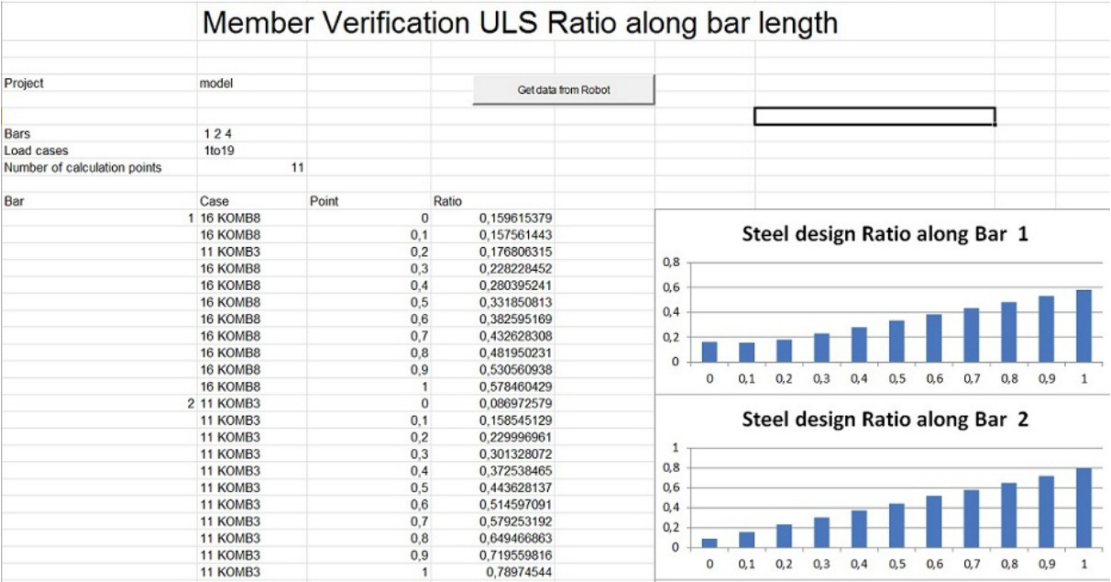
**A bit of programming knowledge let us to automatize design processes**



**Gives us possibility to develop features for Robot**



Presents results in different way



Internal Forces																
Project	st.rtd															
Bars	1															
Load cases	7 8															
Number of points along the bar	5															
Bar	Node	Case (/ Component)	FX [kN]	FY [kN]	FZ [kN]	MX [kNm]	MY [kNm]	MZ [kNm]	SQR	Value	Case (/ Component)	Bar	Node			
1	1	7	567.87264	-4.05	64.8	0	-513.6394313	-393.0444612	571.5578494	MaxSQR	571.5578494	7	1			
1	1	8	567.87264	-4.05	64.8	0	-513.6394313	-393.044612	571.5578494	MaxMy	4.08201E-11	7	1			
1	2 / 5	7	544.02948	-4.05	48.6	0	-330.4673987	-351.6599411	546.1959677	MaxMx	-513.6394313	7	1			
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1	3 / 5	7	520.18632	-4.05	32.4	0	-177.8116488	-260.5171945	521.1943064	MinMz	-393.044612	7	1			
1	3 / 5	8	520.18632	-4.05	32.4	0	-177.8116488	-260.5171945	521.1943064	MaxMx	0	7	1			
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1	4 / 5	8	496.34316	-4.05	16.2	0	-65.45397577	-136.733842	496.6074632	MaxFx	0	7	1			
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1	2	8	472.5	-4.05	1.4797E-10	0	4.08201E-11	7.35481E-11	472.5	MaxFy	-4.05	7	1			
										MaxFz	64.8	7	1			
										MinFz	1.47972E-10	7	1			

## Allow to run our own calculations or design based on imported results

1 Calculation of the End Plate Bolted Connection According to EC-1993-1-8

2

3 Design load Beam 2 HEB 600 Node 2 Get data from Robot

4

5

	N <sub>Ed</sub> [kN]	M <sub>y,Ed</sub> [kNm]	M <sub>z,Ed</sub> [kNm]	V <sub>z,Ed</sub> [kN]	V <sub>y,Ed</sub> [kN]	M <sub>x,Ed</sub> [kNm]	load coefficient	shear load coefficient r <sub>t</sub>
6								
7	-487.04	179.20	0.00	-3.65	0.00	0.00	0.28	0.00
8	-487.04	179.20	0.00	-3.65	0.00	0.00	0.28	0.00
9	-487.04	179.20	0.00	-3.65	0.00	0.00	0.28	0.00
10	-487.04	179.20	0.00	-3.65	0.00	0.00	0.28	0.00
11	-487.04	179.20	0.00	-3.65	0.00	0.00	0.28	0.00
12	-487.04	179.20	0.00	-3.65	0.00	0.00	0.28	0.00
13	-487.04	179.20	0.00	-3.65	0.00	0.00	0.28	0.00
14	-487.04	179.20	0.00	-3.65	0.00	0.00	0.28	0.00
15	-487.04	179.20	0.00	-3.65	0.00	0.00	0.28	0.00
16	-487.04	179.20	0.00	-3.65	0.00	0.00	0.28	0.00
17	-487.04	179.20	0.00	-3.65	0.00	0.00	0.28	0.00
18	-487.04	179.20	0.00	-3.65	0.00	0.00	0.28	0.00

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20 bolt M36 As= 8.2 cm<sup>2</sup> F<sub>t,Rd</sub>= 588.2 kN y<sub>M0</sub>= 1.00

21 class 10.9 f<sub>ub</sub>= 1000 kN/cm<sup>2</sup> F<sub>v,Rd</sub>= 488.6 kN y<sub>M1</sub>= 1.00

22 steel S355 f<sub>y</sub>= 490 kN/cm<sup>2</sup> F<sub>b,Rd</sub>= 732.1 kN y<sub>M2</sub>= 1.25

23 grade fy= 35.5 kN/cm<sup>2</sup> y<sub>M3</sub>= 1.25

24

25 [cm] BOLTS SCHEMA

26 tf= 3.00 YES stiffener col 1 NO

27 tw= 1.55

28 h= 60.0

29 b= 30.0

30 rc= 2.70

31

32 af= 1.5

33 aw= 0.8

34 o= 2.00

35 e= 4.40 ≥ 1.2d=4.32

36 w1= 28.24 ≤ 30

37 w= 12.40 ≥ 1.2

38 w2= 7.9 ≥ 2.2d=8

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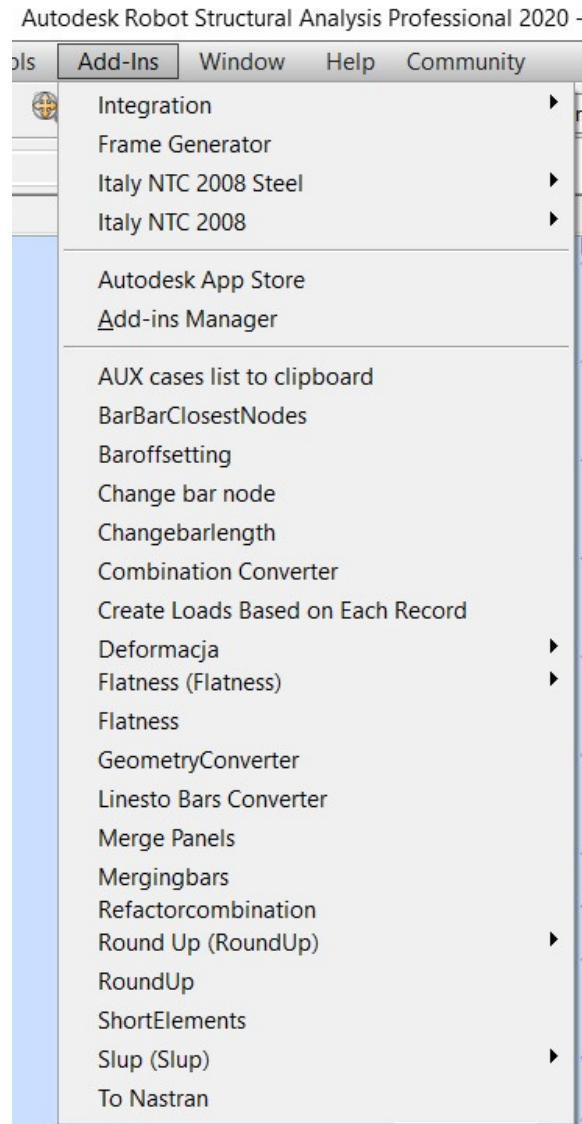
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## Developed addins can be attached to Robot Add-ins menu



## **Robot Structural Analysis**

### **Robot Forum**

<http://forums.autodesk.com/t5/Autodesk-Robot-Structural/bd-p/351>

### **API Examples on Forum**

<http://forums.autodesk.com/t5/Robot-Structural-Analysis/useful-addins-for-Robot-API/td-p/3899448>

### **SDK installation**

DVD\x86\Tools\RSASDK

### **SDK and Examples on computer after installation**

C:\Program Files\Autodesk\Autodesk Robot Structural Analysis Professional  
2020\SDK\ROBOTSDK.html