



## **PLATO SCIO™** - Overview

"We want to bring transparency and a systematic approach to your development process" is the stated mission of. Product development, product variants, and the planning of production and assembly are complex quality processes. Only an all-around approach and the acquisition and representation of networked data and structures can help to successfully achieve these tasks.

With PLATO SCIO<sup>™</sup>, products are developed and produced according to the customer's demands. PLATO SCIO<sup>™</sup> is a product family with practical modules that fulfill a wide range of requirements and perform numerous tasks in engineering. The success of PLATO SCIO<sup>™</sup> is especially due to the central database shared by all modules that makes knowledge management and the ability to reuse knowledge possible in the first place.

Require- ment	•	Develop- ment	•	Planning Production	•	Production & Testing	•	Maintenance & Service
SCIO™- Po	orta	al						
SCIO™- M	atr	ix						
		SCIO™-BI	ock	-Diagram				
		SCIO™-Ne	ət-E	Builder				
		SCIO™- F	ME	A				
		SCIO™- D	RВ	FM				
		SCIO™- Fa	auli	t-Tree				
				SCIO™- C	ont	rol-Plan		
				SCIO™-Pr	006	ess-Flow		

Fig.: PLATO SCIO<sup>™</sup> in the engineering process

## PLATO SCIO<sup>™</sup> Modules and Use

- SCIO<sup>™</sup>-Portal
- SCIO<sup>™</sup>-Matrix
- SCIO<sup>™</sup>-Block-Diagram
- SCIO<sup>™</sup>-FMEA
- SCIO<sup>™</sup>-DRBFM
- SCIO<sup>™</sup>-Fault-Tree
- SCIO<sup>™</sup>-Control-Plan
- SCIO<sup>™</sup>-Inspection-Plan
- SCIO<sup>™</sup>-Process-Flow
- SCIO<sup>™</sup>-Net-Builder
- SCIO<sup>™</sup>-Importer
- SCIO<sup>™</sup>-Methods
- SCIO<sup>™</sup>-Template-Manager

Easy and fast access to information via the Internet

System analysis with QFD, requirements analysis and variant management Project documents to represent the environment, conditions, and interfaces

- Failure mode and effects analysis
- Change management based on creative methods and FMEA
- Fault tree and system analysis
- Production control plans according to ISO/TS 16949
- Inspection plans for quality assurance measurements during production
- Planning and visualization of process flows
- Creating networks and analyzing relationships in networks
- Import data for FMEAs from Microsoft<sup>®</sup> Excel<sup>®</sup>
- Individual Forms for Engineering Methods
- Template management for system and risk analysis

## **Branches and Standards**

PLATO SCIO<sup>™</sup> is not designed for any specific industry. Primary applications include the automotive, aviation, medical technology, electronics, plant and mechanical engineering, services and the food, pharmaceuticals and chemical industries.

PLATO SCIO<sup>™</sup> fulfills the requirements for ISO/TS 16949, VDA, MPG, HACCP, GxP.





## **PLATO SCIO™ Database Concept**

The central PLATO SCIO<sup>™</sup> database collects and networks data, and then makes the data available to documents/forms as knowledge. In this manner, process steps in the process FMEA, the process flow chart, and the production control plan are used and the necessary "specialized" knowledge is then added – i.e. in the FMEA, failures are displayed for a process step, and in the production control plan machine data is added to this. The database ensures system relationships are known and derives the corresponding form.

Tasks of the database:

•	Global working	Access by all company locations to FMEAs and other SCIO <sup>™</sup> documents.
		Easy supply of data and analyses via the Internet.
•	Multi-user capability	An FMEA can be processed by more than one user at a time.
•	Efficient teamwork	Distributed and work across departments is supported, the unhindered flow of information is guaranteed.
•	Current data	Up-to-date data is guaranteed. Changes are always propagated automatically to all relevant occurrences. Revisions and the need to maintain copies of data are eliminated
•	Consistent data	Critical process and product features are consistently identified and updated $-$ in all PLATO SCIO <sup>TM</sup> modules.
•	Unlimited assessments	The database contains the entire know-how of the company is available for assessment purposes.

## **Main Features and Functions**

Projects

- Assignment to projects and structured data storage.
- **Printing in folders** Project folders containing all SCIO<sup>™</sup> documents needed for a product or a customer are created at the press of a button.
- **Documentation** Archiving of any planning or processing status (sign off).
- Multiple languagesTranslations in foreign languages are supported in the display,<br/>when editing and in the printout.
- Operation
   Operated according to Microsoft standards; an additional Wizard helps you operate the modules and understand the methodology.
- VisualizationPhotos, images, drawings, and comments in SCIO™ documents<br/>support clear and unique descriptions.
- Interfaces
   Complaint and action management, CAQ systems, SAP® etc. (please request the interface information, if required).





## Detailed information on PLATO SCIO<sup>™</sup> - Moduls

## PLATO SCIO<sup>™</sup> -Portal

The PLATO SCIO<sup>™</sup>-Portal makes the compete set of knowledge in the PLATO SCIO<sup>™</sup> database available quickly, easily, and safely via the Internet. It displays the current information relating to the design, risks, and process planning in vivid graphical overviews and in the required forms. The responsible employees, project leaders, external suppliers, or even customers can obtain information here on the status of the development and risk management process. The comprehensive security concept of the PLATO SCIO<sup>™</sup> database ensures that each user is only able to see the data for which he or she has access rights to view.



No.	Function/Req.	Potential Failure Mode	Potential Effect(s) of Failure	Sev	Class	Potential Cause(s)/ Mechanism (s) of Failure	Occ	Current Design Controls	Det	RPN
60	Ensure resistance to corrosion	Corrosion detected	Complaint (8)	8	-	Blade material is not corrosion- resistant	2	P : Select material via data base	2	32
			Customer dissatisfaction (7)					D : Salt- spray test		

Fig.: The structure graph shows relationships; forms document analyses

## **PLATO SCIO™** -Matrix

PLATO SCIO<sup>™</sup> -Matrix is a customer-oriented product planning method. It combines the ideas and expectations of the customer with the necessary functions developed by the engineer. The result is a complete system analysis and a specification of the product to be developed together with the necessary manufacturing processes.

Hose pump	Ó,	Pump liquids	Continuous operation	Use for food	Programmable										
Hose		x	x	x											
							SpecificationFormsheet								
Motor		Х	Х			Inde	System Element	Object	Object ID	Function	Specification				
										Pump liquids	Pump capacity 100 l/h (+3 / -3 ) Pump pressure > 4 bar				
						0	Hose ourse	Pump	P 291 x	Continuous operation	Runtime 24 h/d				
Housing			х			0	11000 partip	- comp		Use for food	Conform to FDA Consistent to temperature = 180 °C				
										Programmable					
										Chemical resistance	PH-value < 6				
	1					1.	Hose	Hose	H 58	smell-neutrally	smell-neutrally according to FDA				
Control unit			Х		Х	_				taste-neutrally	taste-neutrally according to FDA				
						2.	Power	Motor	M 7	-	-				
	1					3.	Mousing	Mousing	M 33	1	*				

Fig.: System analysis supplies specifications for the specifications document.





## PLATO SCIO<sup>™</sup> -Block-Diagram

The PLATO SCIO<sup>™</sup> -Block-Diagram is a central project/FMEA document created in the early phases of the engineering process and that accompanies the entire engineering process. The acquisition and visualization of system relationships, interfaces and power/energy flow results in clear and concise documentation for all involved Block structure diagrams are recommended especially as a method to prepare for and initiate an FMEA (QS 9000).



Fig.: Planning a process in process engineering

# PLATO SCIO<sup>™</sup> -FMEA

Failure mode and effect analysis (FMEA) is a preventative method used to prevent failures. Possible errors in products and processes are to be detected early and minimized or eliminated by taking suitable action. Complaint handling and development costs are reduced in this manner, and potential losses for the user of the product are avoided.

| Potential Failure<br>Mode (s)<br>Clamping angle<br>incorrect | Potential<br>Effect(s)<br>Blank needs to<br>be remachined                             | 5   | Class   | Potential<br>Cause(s)/<br>Mechanism(s) of<br>Failure   | 0  | P-Action(s)   
   | D-Action(s)  | D  
   
  | RPN  | P/D  | Recommended   | Responsibility   
   | Target<br>Completion   | PID  | Action Taken   | s  | 0  | DF   
   | PN  | Stat  |
|--|---|---|---|--|--
---|--
--
--
---	--	--	---	--	--
---					
Clamping angle incorrect	Illianii needii to be remachined	6	60	Camping angle	
   |  |  
   
  |  |  | Action (1)  | | |
   | Date   |  |  |  |  |  
   |   |   |
|  |   |   |   | setting incorrect  | 6  | SOP<br>Clamp device   
   | Working check<br>by foreman  | 7  
   
  | 252  | P  | Personnel<br>training   | Drand M.   
   | 24.11.2004   | P  | Personnel<br>training  | 6  | 2  | 7  
   | 04  | Cited   |
|  |   |   |   | Angle scale<br>displaced   | 5  | no action   
   | Check material<br>before start of<br>shift   | 6  
   
  | 180  |  |   | | |
   |  |  |  |  |  |  
   |   |   |
| Clamping force too<br>high                                   | Blank damaged<br>- reject   | 7   |   | Clamping force<br>not set correctly  | 3  | SOF<br>Clamp device   
   | Working check<br>by foreman  | 5  
   
  | 105  | Ρ  | Personnel<br>training   | Brand M.   
   | 24.11.2004   | P  | Personnel<br>training  | 7  | 2  | з  
   | 42  | Сю  |
|  |   |   |   | Clamping force<br>limiter detective or<br>incorrectly<br>calibrated  | 6  | Regular<br>checking of<br>clamp device  
   | Check material<br>before start of<br>shift   | 6  
   
  | 210  | P  | Shorter service<br>Intervalis   | Monroe G.  
   | 08.10.2006   | P  | Shorter<br>service<br>intervalis   | 7  | 2  | 6  
   | <b>194</b>  | 40  |
| Clamping force too   | Blank jumps<br>uncontrolisibly  | 9   |   | Camping force<br>not set correctly   | 6  | SOP   
   | Working check<br>by foreman  | 6  
   
  | 324  | P  | Personnel<br>training   | Brand M.   
   | 24.11.2004   | P  | Personnel<br>training  | 9  | 2  | 6  
   | 108   | 0   |
|  | out of the steel<br>saw when<br>sawing  |   |   | Clamping force<br>limber detective or<br>incorrectly   | 5  | Regular<br>checking of<br>clamp device  
   | Check material<br>before start of<br>sNft  | 6  
   
  | 270  | Ρ  | Shorter service<br>Intervalis   | Paulsen C.   
   | 08.10.2006   | P  | Shorter<br>service<br>intervalis   | 9  | 1  | 6  
   | -54   | 40  |
|  |   |   |   | callorated   |  |   
   |  |  
   
  |  | P  | Optimize SOP<br>for calibration   | Miller H.  
   | 11.04.2005   | P  | Optimize SOP<br>for calibration  |  |  |  
   |   | 80  |
| h Cutting length too<br>long                                 | Blank needs to<br>be remachined   | 6   | 00  | Outting length not<br>set correctly  | 2  | Personnel<br>training   
   | Working check<br>by foreman  | 6  
   
  | 72   |  |   | | |
   |  |  |  |  |  |  
   |   |   |
|  |   |   |   |  |  | SOP   
   |  |  
   
  |  |  |   | | | | | | | | | | | | | | | | | | |
   |  |  |  |  |  |  
   |   |   |
|  | Ownering force too<br>high<br>Ownering force too<br>the<br>Cutting length too<br>lang | Coupling from the Bank dongent<br>flags<br>Coupling from the Section of | Company functions Review Company<br>Review Company functions Review Company<br>Company functions Review Company<br>Review Company functions<br>Review Company | Carego toro to Res Annue 7<br>Page 1<br>Carego toro to Res Annue 7<br>Page 1<br>Carego toro to Res Annue 7<br>Page 1<br>Page | Compared from the Banel Amage and Am | Compared to to the investment of the investment | Implement         Provide state         Provide stat | Angle main         Part along         Design main         Part along         Design main         Part along         Design main         Design main <thdesign main<="" th=""> <thdesign main<="" th=""> <th< td=""><td>Image: Second Second</td><td>Angle nom         E nor schort         Ober schort</td><td>Image: Section 2016         Participation 2016         Constraint Constraint 2016         Participation 2016         Partipation 2016         Partipation 2016         Pa</td><td>Image: Image: Image:</td><td>Application         Application         Participation         Participatio</td><td>Image: Image: Image:</td><td>Angle norm         Program         Program</td><td>Image: Image: Image:</td><td>Angle one         Projection         Provide         Provide</td><td>Angle single         Angle single&lt;</td><td>Angle one         Preside         Preside</td><td>Angle norm         Angle norm         Chern start         Operation         Operation         Chern start         Chern start</td></th<></thdesign></thdesign> | Image: Second | Angle nom         E nor schort         Ober schort | Image: Section 2016         Participation 2016         Constraint Constraint 2016         Participation 2016         Partipation 2016         Partipation 2016         Pa | Image: | Application         Application         Participation         Participatio | Image: | Angle norm         Program         Program | Image: | Angle one         Projection         Provide         Provide | Angle single         Angle single< | Angle one         Preside         Preside | Angle norm         Angle norm         Chern start         Operation         Operation         Chern start         Chern start |



Fig.: Risk analysis determines characteristic values and displays them graphically





#### PLATO SCIO<sup>™</sup> -DRBFM

PLATO SCIO<sup>™</sup> -DRBFM (Design Review Based On Failure Mode) is a new method designed to accompany the development process that is being used more and more in industry. The goal of DRBFM is to make change management an integral part of the development process. Product changes, new customer requirements, changes to the specification, and changes to the application have led to massive problems and product recalls in the past. DRBFM provides a systematic examination of changes to products and a creative discussion method so that change processes can be successfully brought under control using teamwork.

Change	Function	Concer	ms		Ca	Effects on customer		
		Loss of function and unmarketability [D]	Any other concems?[R]	0	Causes [D] (Design Engineer)	Cause [R] (Reviewteam)		s
	Surface coating	Coating has a raw surface				53	-	
Ensure resistance to corrosion	Surace coauly	Coating is too thick			8	8	10	
	Stay within geometry specifications	-	P		•	×	•	

Fig.: DRBFM form

## PLATO SCIO<sup>™</sup> -Fault-Tree

The fast analysis of weak spots and the finding of creative solutions is the job of PLATO SCIO<sup>™</sup> -Fault-Tree. Fault tree and system analyses are performed with PLATO SCIO<sup>™</sup> -Fault-Tree. Cause and effects chains are displayed graphically and selectively processed.



Fig.: Creative problem analysis





## PLATO SCIO<sup>™</sup> -Control-Plan

PLATO SCIO<sup>™</sup> -Control-Plan is an instrument used to check and control production processes. In the production control plan, actions and inspection methods used to monitor product and process features are documented. The goal is to achieve stable and controllable processes, and therefore to guarantee the quality of the product.

				Characteri	stics				<u>_</u>	Methods			
D	Duesees	Machine Device				Special				S	Sample		]
Number	Name/Operation	for Mfg.	No.	product	process	Char. Class	Specification, Tolerances	Measurement Technique		Size	Freq.	Control Method	Reaction Plan
		<u>.</u>	r	•									
145	Cure blades in nitrogen atmosphere	Oven 011	12	Resistance to scratching (ISO)		© sc	> 50 % Haze	Test RRT 2	10	Parts	per part	Record sheet	Remove charge
	anospiere	9 Oven 011	13	Surface hardness		© sc	> 200 HB	Test KDT 3	10	Parts	per part	Check form	Remove charge
		Joven 011	P 45		• Duration	© sc	= 60 min (+1 <i>I</i> -1)	Visual inspection	(	100 %	each charge	Cecklist	System reset
		<u>.</u>			•			2					
150	Cool blade in air flow	Fan F66	P 46		Air temperature	<b>∇</b> cc	= 5 °C	Sensor		100 %	each charge	Record sheet	Adjust Fan

Fig.: Control Plan

## **PLATO SCIO<sup>™</sup>** -Inspection-Plan

An operator inspection plan is the foundation for any measurements taken for quality control purposes in production. The inspection plan documents the features to be checked, test procedures used and persons responsible, among other things. It is the final result of the quality planning process. Data from the control plan (PLATO SCIO<sup>™</sup> -Control-Plan) is used as the basis when creating an operator inspection plan.

ΡΙ ΔΤ	OAG	Operator	Inspection Plan	Customer:				Drawi	ng:		
1 671	0 70	No.:	454	Partdescription:	Blades					1. 2 1	~
		Testlocation:	CNC-Milling cutter F11	Part-No.:	OEM				5	ain-4	
Version:	1	Revision:	1.0	Drawing No./Index:	12887 V				4 L		
Created:	20.09.2005	by:	Parker	Release:	-	by:	QC				2 3
Edited:	10.10.2005	by:	Black	Signature:		<i>.</i>					
Comment:				Distributor:	Supplier			1			
				This Operator Ins	pection Pl	an is only	to use in	connect	ion with a draft!		
						,					
	r			I	1	Minmum	Maximum	r			
Vho	How / V	ith what	Vh	at	Basic size	size	size	Unit	When	How often	Additional doc.
	Gauge		Length		150	2	2	mm	per part	5 Parts	
	Gauge		Thickness		1,5	0,05	0,05	mm	per part	5 Parts	
	laser-optical		Phase angle		70	0,05	0,05		continously	100%	
	laser-optical	-	Crosshead length		1,1	0,05	0,05	mm	continously	100%	
	laser-optical		Crosshead thickness		8	0,1	0,1	mm	continously	100%	
	laser-optical	-	slotted head thickness		1	0,05	0,05	mm	continously	100%	
	laser-optical		slotted head width		8	0,5	0,5	mm	continously	100%	
· · · · · · · · · · · · · · · · · · ·	lager optical		Phage apple		70	0.2	0.2		contineuclu	10.0%	

Fig. : Operator inspection plan





#### **PLATO SCIO™-Flow-Chart**

PLATO SCIO<sup>™</sup>-Process-Flow forms and visualizes process flows. The logical sequence of production, inspection, and assembly steps and all other movements of a product (transport, storage, etc.) is analyzed and documented. The representation of the entire flow, including concurrent processes and their interactions, helps to detect the possible causes of a fault.



Fig.: Process flows are planned and visualized

## PLATO SCIO<sup>™</sup>-Net-Builder

PLATO SCIO<sup>™</sup>-Net-Builder was developed especially for the analysis of problems and failures. PLATO SCIO<sup>™</sup>-Net-Builder places the problem at the center of attention and also shows the user of the product the surrounding environment, i.e. possible causes from all subsystems and possible effects in the higher-level systems. The users can navigate easily in the visual representations and create cause and effect chains, even in complex systems. PLATO SCIO<sup>™</sup>-Net-Builder always displays the current failure network as well as well as the corresponding function network. Of course, the FMEA forms are filled in automatically based on the resulting failure network



Fig.: The Failure Editor displays the current failure and function networks.





#### **PLATO SCIO™-Importer**

The SCIO<sup>™</sup>-Importer is an optional module for the PLATO SCIO<sup>™</sup> product family. The PLATO SCIO<sup>™</sup>-Importer can import existing FMEA analyses in a company in the PLATO SCIO<sup>™</sup> database with little effort. FMEAs are then processed further, archived, or used to build a knowledge base with PLATO SCIO<sup>™</sup>.

C	ombination blade	e manufactur	ring proces	\$\$																		
Pro Re	sject: Examples FMEA for sponsible Nenager: Peuls	n (FMEA) Jen C.																				
No.	Process Function Req.	Potential Falure Mode (1)	Potential Effect(s)	s	Class	Potential Cause(s)/ Mechanism(s) of Failure	0	P-Action(s)	D-Action(s)	D	RP	n PID	Recommended Action (1)	Responsibility	Terget Completion Date	P.C	Action Taken	s	0	D	RPN	Status
10	Camp new material in steel saw Specifications: Camping angle = 90 * (20 20 20	Clamping angle incorrect	Blank needs to be remachined	6	ec.	Clamping angle setting incorrect	6	SOP Clamp device	Morking check by foreman	7	28	9 22	Personnel training	Brand M.	24.11.2004	P	Personnel training	6	2	7	84	Closed
	(te) Camping force = 90 N (+2/-2) (cc)					Angle scale displaced	5	no ection	Check material before start of shift	6	18	80										
		Clemping force too high	Blank damaged - reject	7		Clamping force not set correctly	3	SOP Clamp device	Morking check by foreman	5	10	78 P	Personnel training	Brand M.	24.11.2004	P	Personnel training	7	2	3	42	Closed
						Clamping force limiter defective or incorrectly calibrated	6	Regular checking of clamp device	Check material before start of shift	6	21	na P	Shorter service intervals	Monroe G.	08.10.2006	P	Shorler service intervalis	7	2	6	104	40
		Clamping force foo Blank	Blenk jumps uncontrolisibly	•		Clemping force not set correctly	6	SOP	Monking check by foreman	6	33	a P	Personnel training	Brand M.	24.11.2004	P	Personnel training	9	2	6	108	Closed
			out of the steel sew when sewing			Clamping force limber detective or incorrectly	5	Regular checking of clamp device	Check material before start of shift	6	21	P 67	Shorter service Intervalis	Paulsen C.	08.10.2006	٢	Shorter service intervalis	9	1	6	-54	40
						callorated						P	Optimize SOP for cellsration	Miler H.	11.04.2005	p	Optimize SOP for calibration					80
20	Cut new material to length Specifications: Outing length	Cutting length too long	Blank needs to be remachined	6	ec.	Cutting length not set correctly	2	Personnel training	Morking check by foreman	6	,	72										
	* 200 mm (+1)-1) (t0) Feed rate = 60 mmb (+2i-2) (c0)					Length scale incorrect	2	Regular calibration	Check material before start of proces	7		54										

Fig.: FMEA form after importing in to the PLATO SCIO<sup>™</sup> database

## **PLATO SCIO™-Methods**

PLATO SCIO<sup>™</sup>-Methods provides individual forms for companies for the implementation of engineering methods and analyses in a web application.

Use individual forms and network data from different analysis methods and various sources. SCIO<sup>™</sup> base data (e.g. FMEA, specifications, structures), method-specific data, values for calculations, and corporate data from PLM, MES, etc., are used.

When defining the engineering method, the user specifies which layout the form should have, which relationships exist between data, and from which applications data should be used.

All administration and master data as well as system elements and their data that have already been created in other SCIO<sup>™</sup> modules are used. PLATO SCIO<sup>™</sup>-Methods focuses primarily on: adding supplemental information, implementing methods, and performing calculations.



Fig.: The form and the data relationships are defined.





#### PLATO SCIO<sup>™</sup>-Template-Manager

#### Template management for system and risk analysis

It makes sense to quickly use an existing example as a template when performing a similar task. This way, you don't have to start "from scratch" and only need to adapt the existing example to the current task at hand. The problem is: Where is the right template? And if found, it the template still valid and up-to-date? Have any changes been made in the meantime and have they been integrated into the template?

Studies have shown that the amount of work time spent searching for documents is not insignificant. PLATO SCIO<sup>™</sup> solves this problem and uses its own professional template management system, the PLATO SCIO<sup>™</sup>-Template-Manager. It creates templates that are adapted to meet the requirements of system analyses and risk management, released the templates according to a defined procedure, and publishes them specifically for the group of users.



Fig.: The PLATO SCIO<sup>™</sup>-Template-Manager controls the release and publishing of templates.

## Methodology, Projects, Consulting

- Internationally-oriented training organization for methods and applications
- Experienced specialists to guide projects and for pilot projects
- Workshops, FMEA presentations and individual subjects of emphasis