

**APQP - Advanced Product Quality Planning**  
**A sophisticated way for Value Management to add Value**  
**to Products and to create Wealth for Companies**

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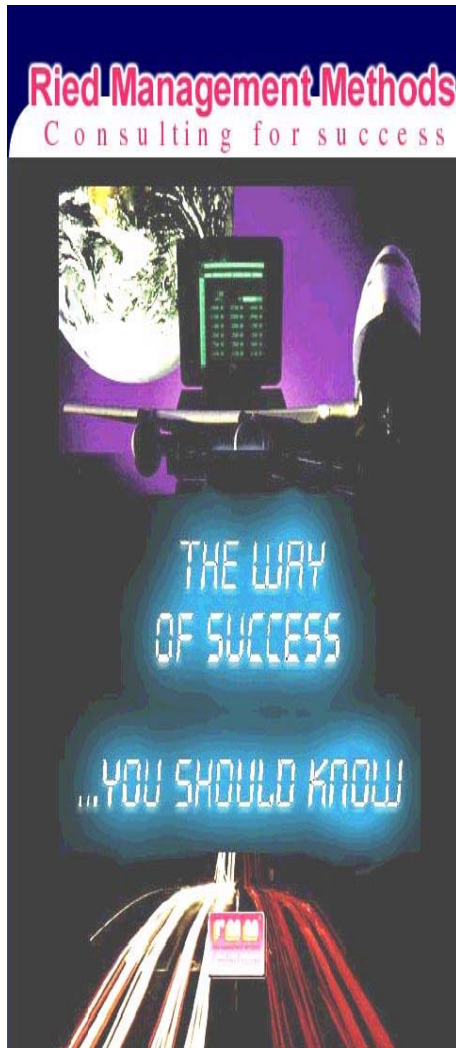
CEO of  Ried Management Methods International Technical Consultants

Headquarters Hamburg, Germany

presented at the

CSVA 2011 Conference Toronto, Ontario

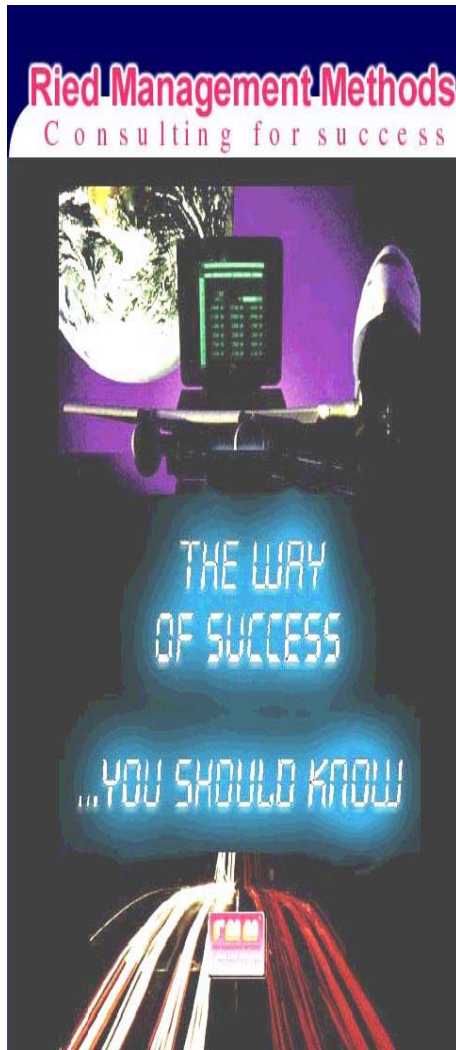
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## APQP - Advanced Product Quality Planning

an organized and well structured sophisticated process  
to define and develop products and services

- ↓ meeting all requirements
- ↓ and being presented to the Market exactly on time

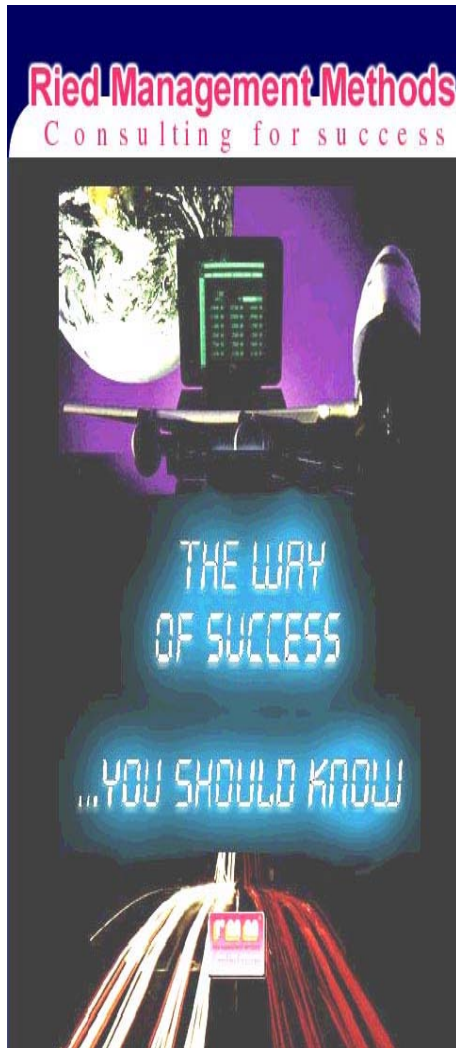


## Value Management and APQP

make it a great deal easier to

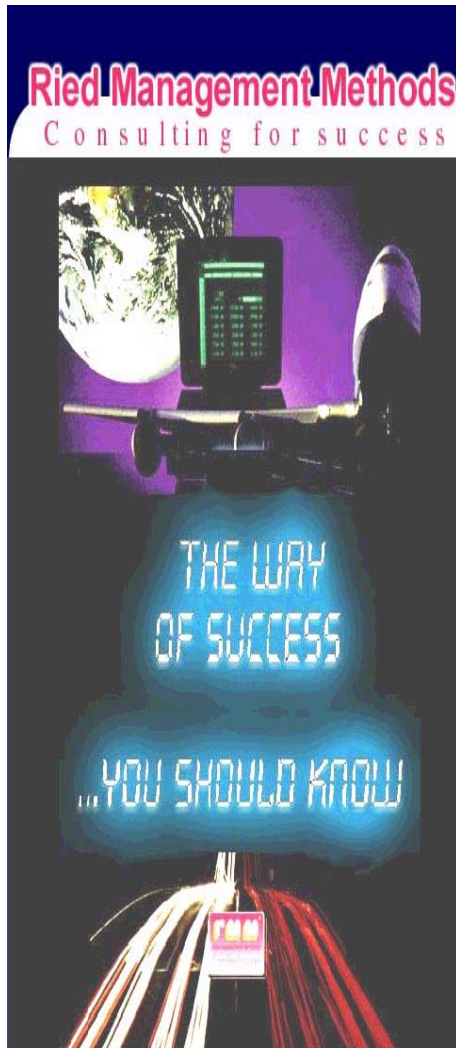
- ↓ plan
- ↓ monitor
- ↓ implement

very complex projects.



## APQP and QS 9000

all suppliers of systems, sub-systems and parts of the Automotive Industry must apply the APQP processes in conjunction with Value Management and Simultaneous Engineering.



## India's growing Automotive Industry

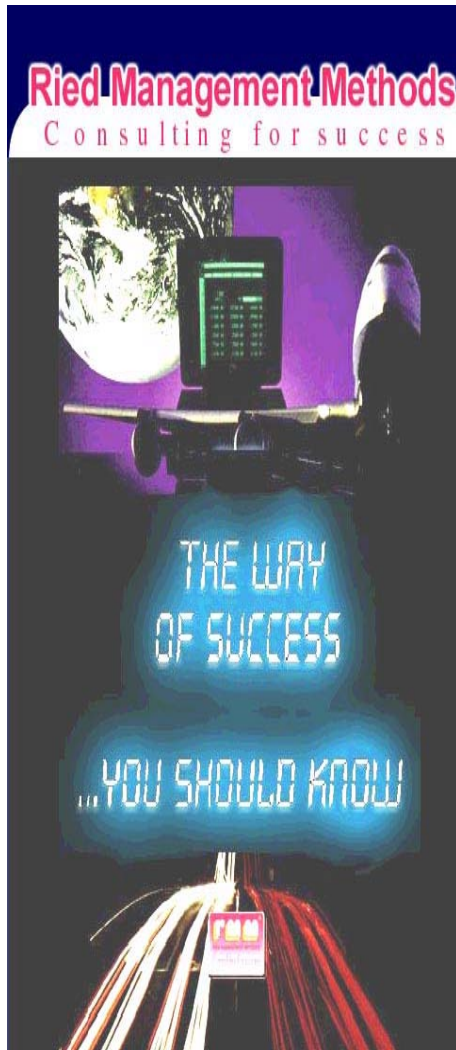
and all its national suppliers

will more and more be asked

to implement VM and APQP.

Well applied

this will guarantee the wealth of the Indian Industry.

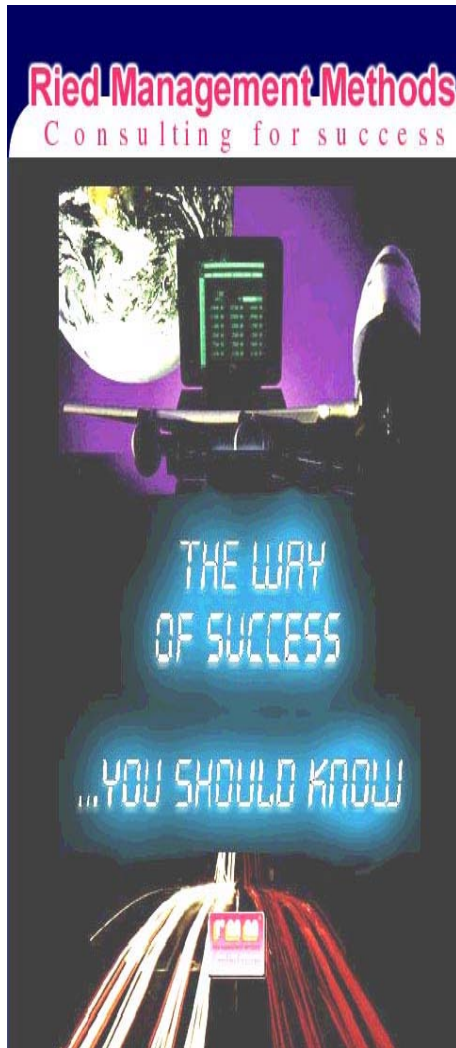


## Value Management and APQP are the Key Instruments of all important OEMs (Original Equipment Manufacturers)

- ↓ Daimler Chrysler
- ↓ Ford
- ↓ General Motors
- ↓ Volkswagen
- ↓ Audi
- ↓ BMW

All of them are Key Customers

of Ried Management Methods.

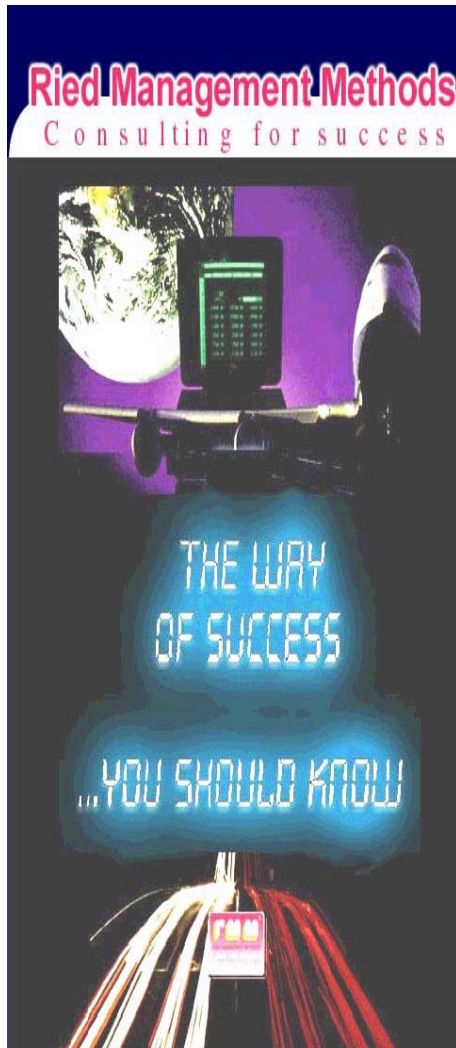


## Time to Market (TTM)

to reduce TTM for cars down from 5 to 3 years  
very sophisticated Management Tools had to be designed.

**VM and APQP** were identified to be the best tools to

- ↓ add value
- ↓ and create wealth.



## QS 9000 and VDA Strategy

VM and APQP are an integrated part of the

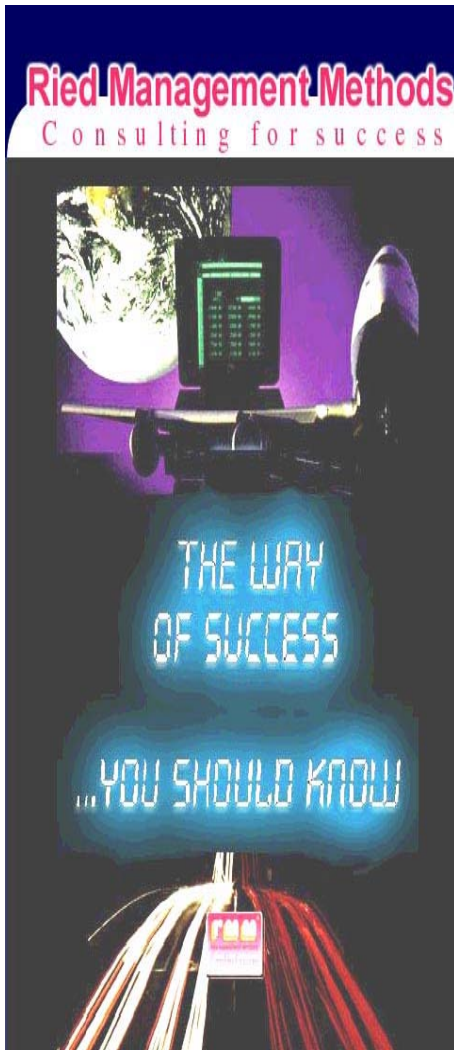
### QS 9000 and the VDA Strategy

and will be also systematically applied

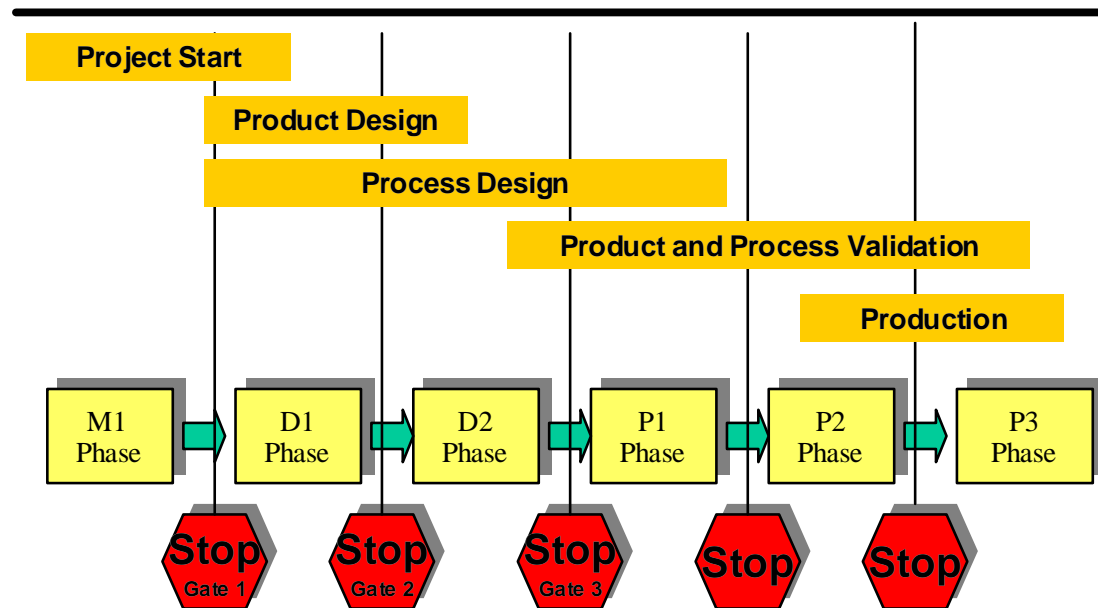
for all present and future suppliers out of India.

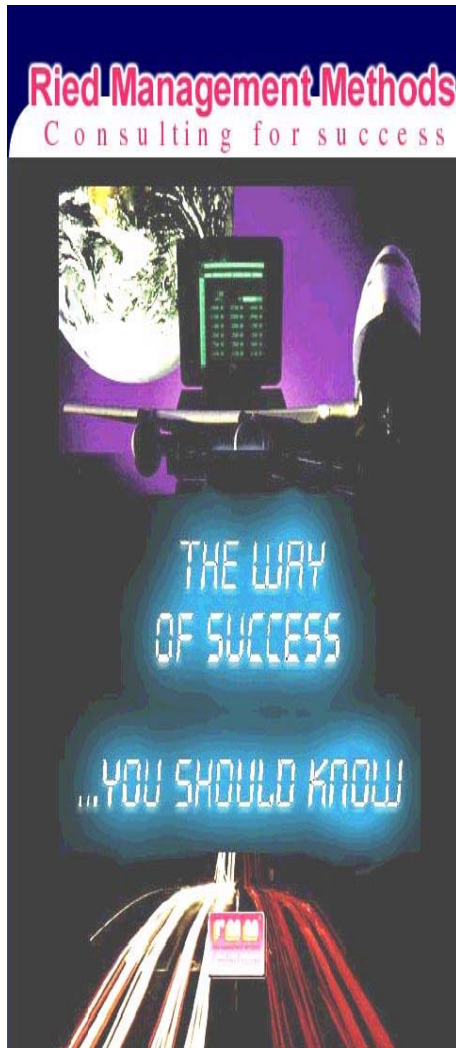
**Each supplier must be certified in these tools.**





## APQP - Advanced Product Quality Planning

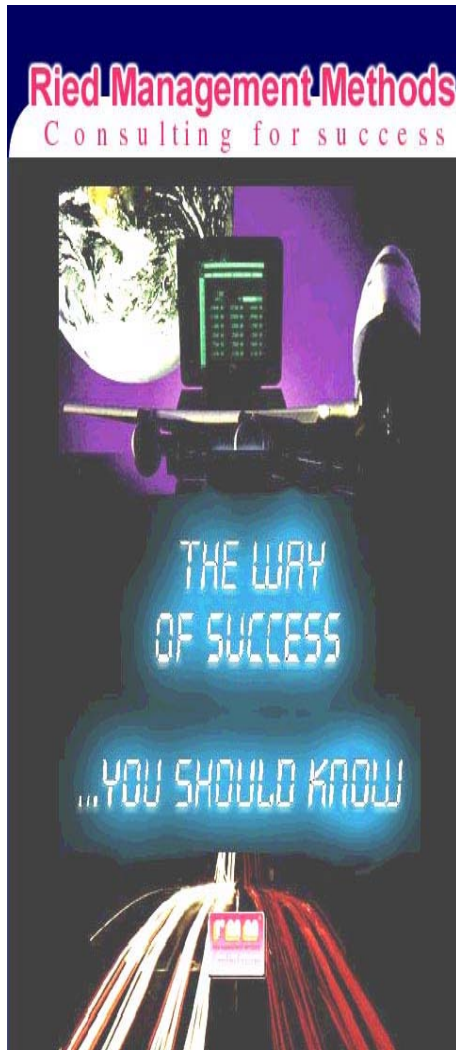




## Value Management and the APQP Process

Define the Development Phases for new products including the targets to

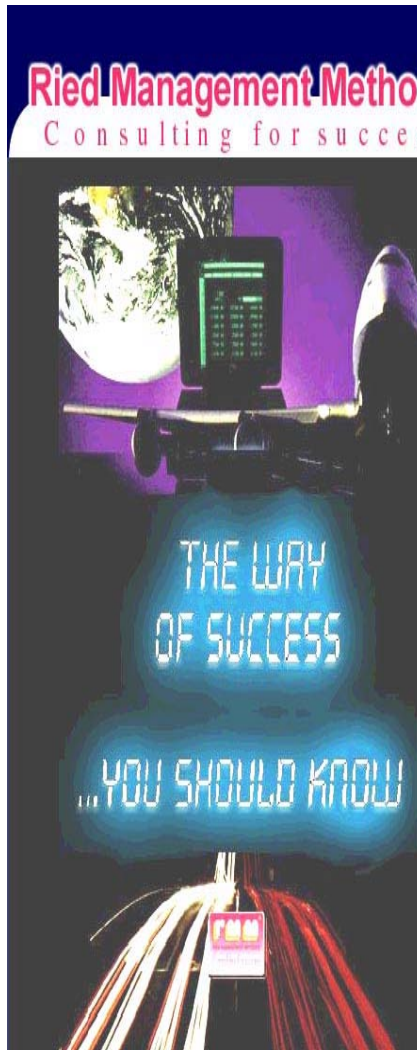
- ↓ simplify the choice of projects
- ↓ make sure, that sophisticated products will be implemented on time
- ↓ improve the communication of the company's departments
- ↓ guarantee a well controlled overall process structure by very disciplined activities
- ↓ identify and eliminate or reduce risks
- ↓ use the resources very target oriented and the best way possible.



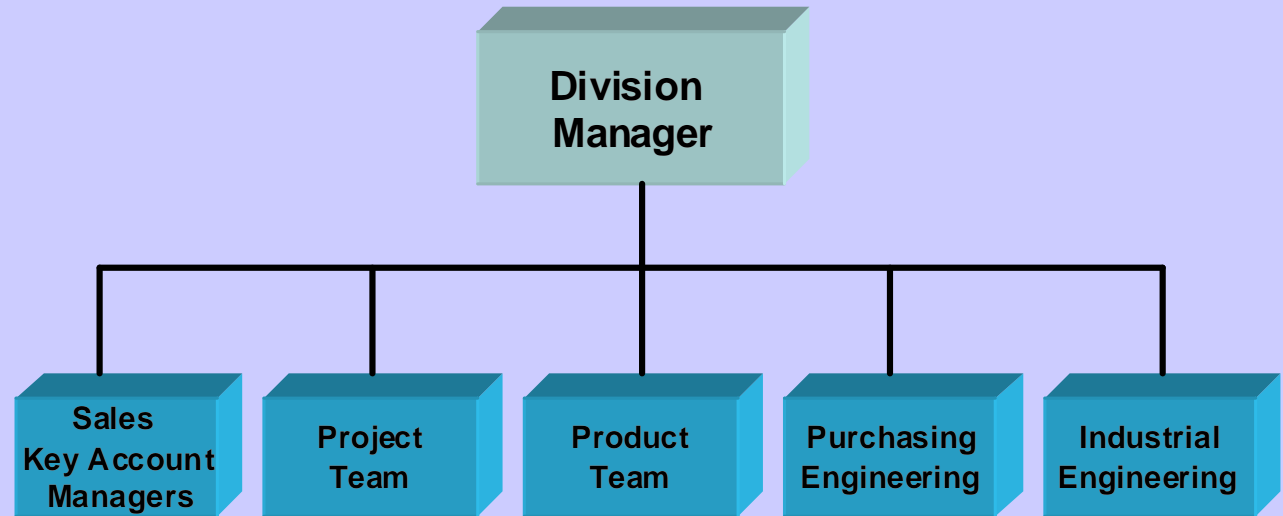
## Value Management and APQP

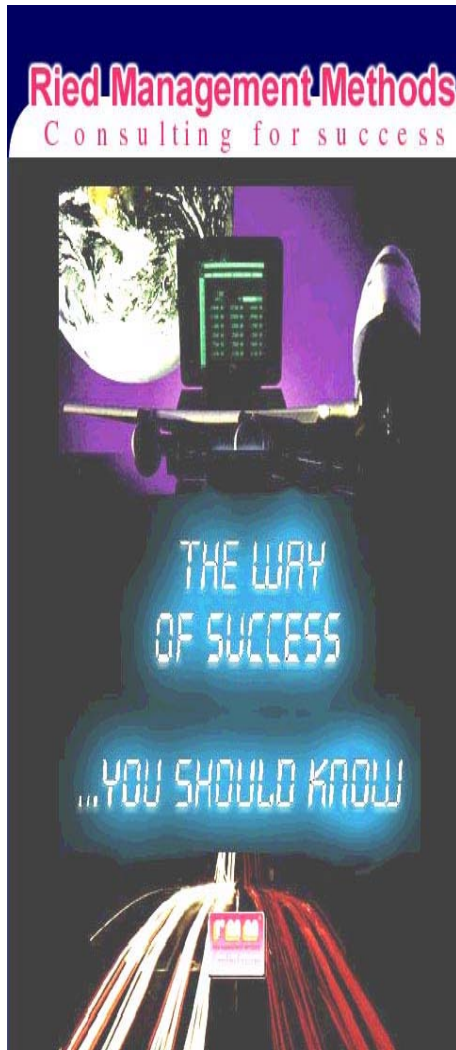
is being always applied in

- ↓ Project Teams
- ↓ and Product Teams.

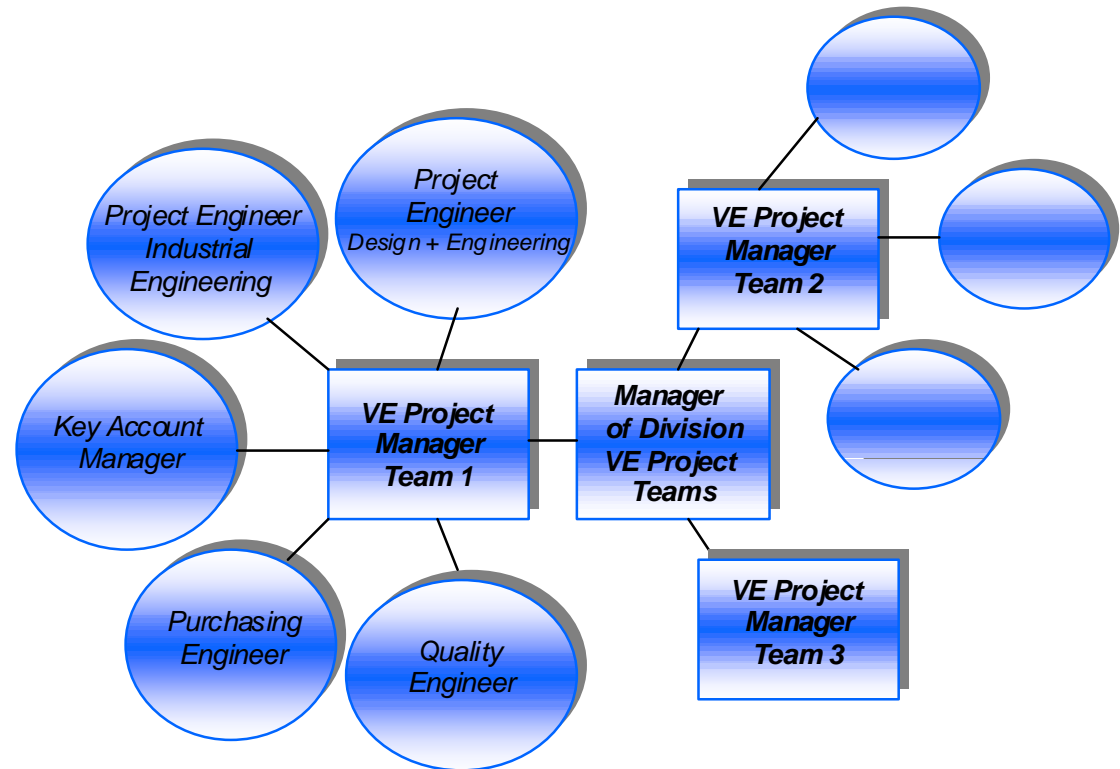


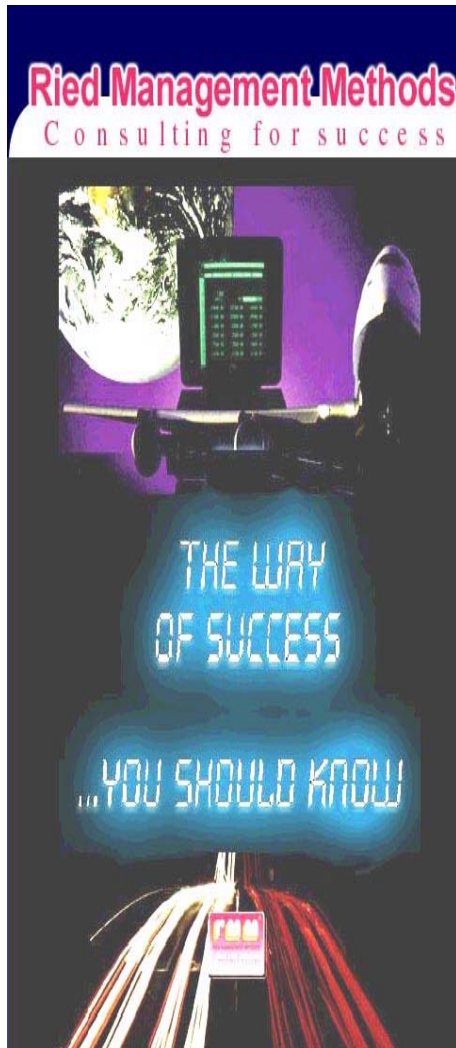
## APQP Division Organization





## APQP - Project Management Organization





## The VM - APQP Phases

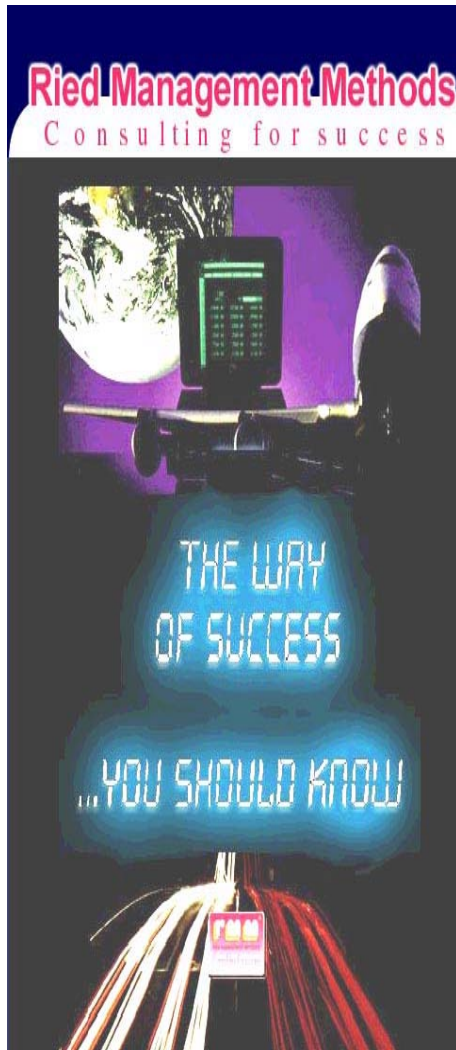
### Phase M1

This Phase checks

- ↓ the total market chance
- ↓ and if the project is in accordance

**It includes main activities like:**

- estimation and evaluation of the potentials on the basis of client's information, market analysis and other research studies
- evaluation of project chances



### Evaluation of Project Chances – M 1 Phase

Client:  
Project:  
Application:  
Date:

<b>Evaluation Result</b>	< 150 points – no further activities ≥ 150 points – possibly interesting > 180 points - recommendable > 210 points – very recommendable			
The project is very recommendable.				
<b>Evaluation Criteria</b>	<b>Weighing Factor</b>	<b>Ranking</b>		<b>Total Value</b>
Client Bonus Implementation Probability  <b>A-Project</b> Product Sales Period (years) Units per year Sales/year after SOP Competition Situation				
<b>Target achievement and chances (T)</b>				
Sales know how Engineering know how Manufacturing know how Engineering Invest, of which client pays for % Manufacturing and QC-Invest Availability of Resources				
<b>Advantages and Risks (A)</b>				
<b>Total T + A</b>				

Specify reasons,  
if project will be denied

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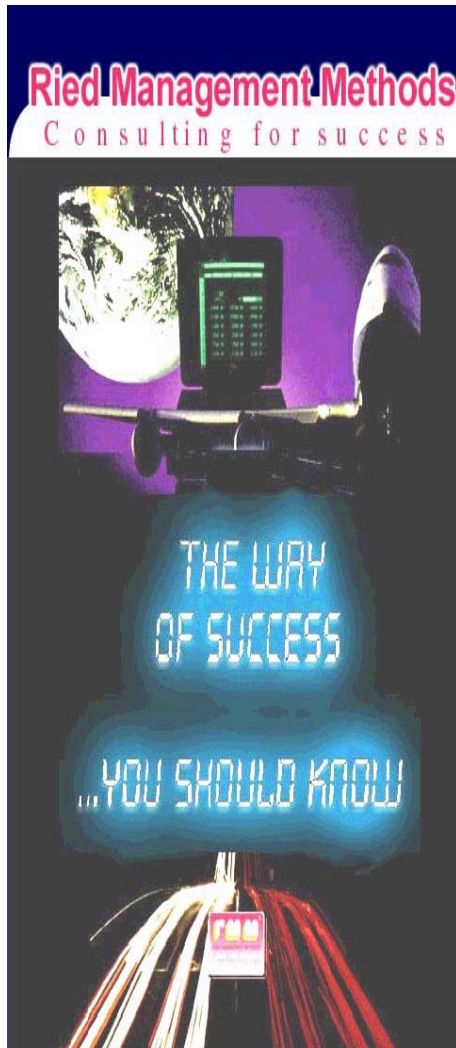
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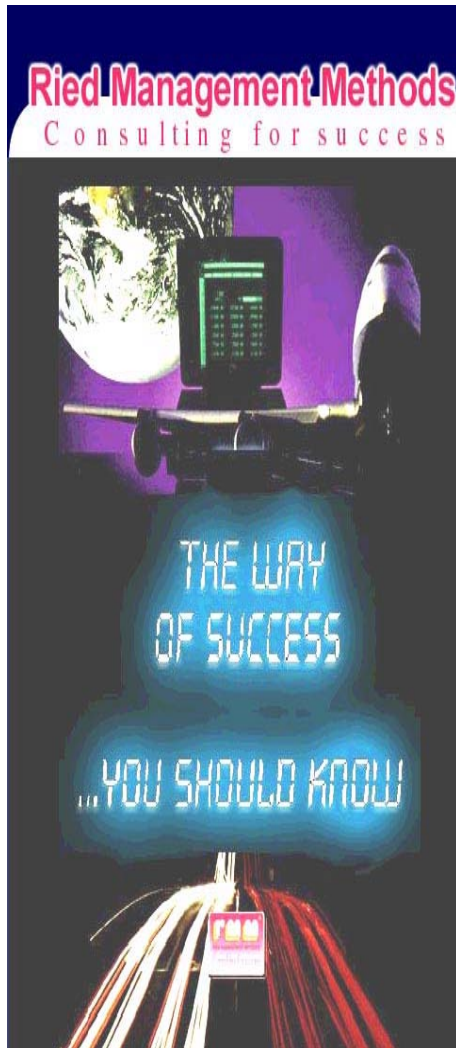
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## Phase D 1 Feasibility Study

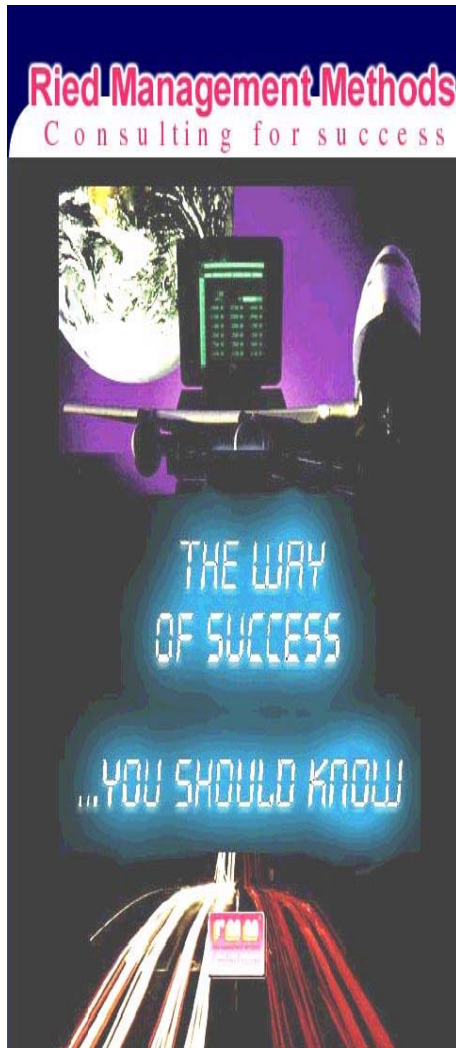
- ↓ to check the implementation chances to meet all targets (functions, quality, cost, profit etc.)
- ↓ to identify and eliminate risks
- ↓ to intensively check the customer 's Duty Book requirements
- ↓ to fully understand the client's application ideas
- ↓ to finally determine the Duty Book in close cooperation with the client





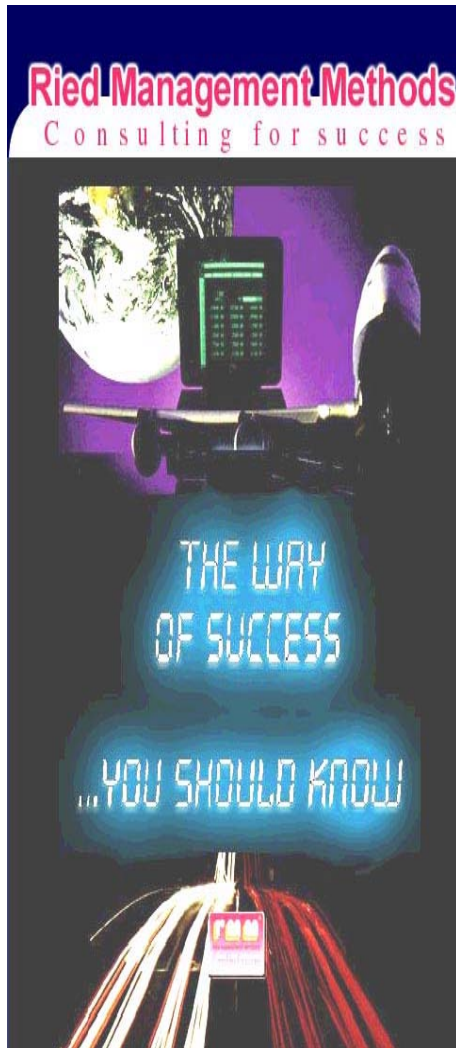
## The Duty Book describes

- ◆ cost targets
- ◆ technical functions and requirements
- ◆ schedule requirements
- ◆ quality requirements



## Documentation

- ↓ first application of FMEA (Failure Mode Effect Analysis)
- ↓ application of QFD - Quality Function Deployment
- ↓ first definition of possible suppliers
- ↓ benchmarking with competitor products

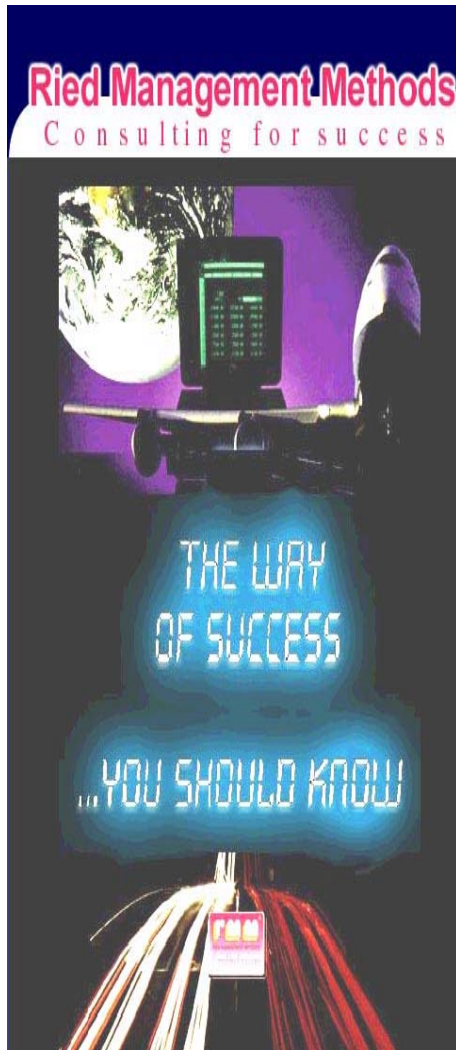


## Design Verification

The Design Verification makes sure that the Design performs the requirements and functions of the Duty Book.

The following activities have to be completed:

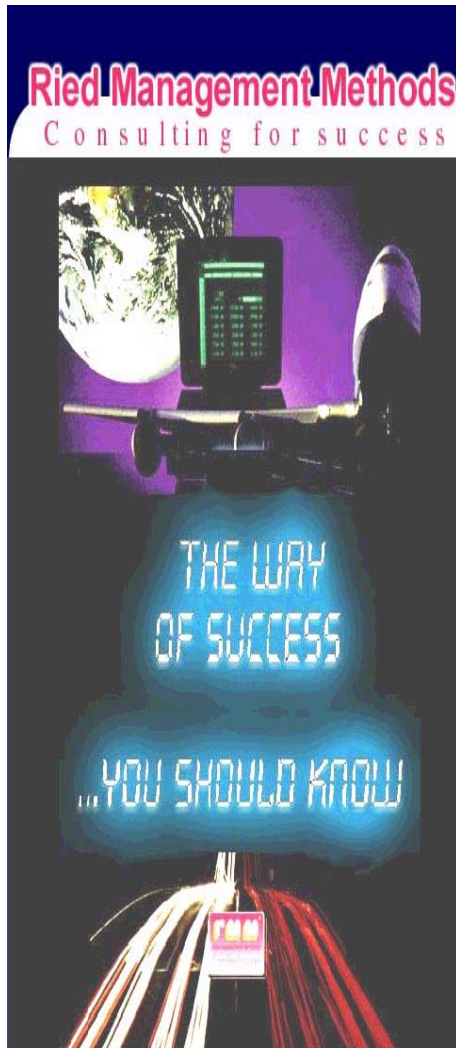
- comparison of the new design with similar already existing Design (if available) to assure that all lessons learned are applied the right way.
- check of alternative solutions
- preparation of alternative calculations
- check of Design Documents



## D1 Feasibility Check

The VE-Project Team must come to a consensus that the chosen Design Concept will definitely meet the customer's requirements:

- ◆ functions
- ◆ quality
- ◆ cost
- ◆ technical aspects
- ◆ Mile Stone Plan and its key dates

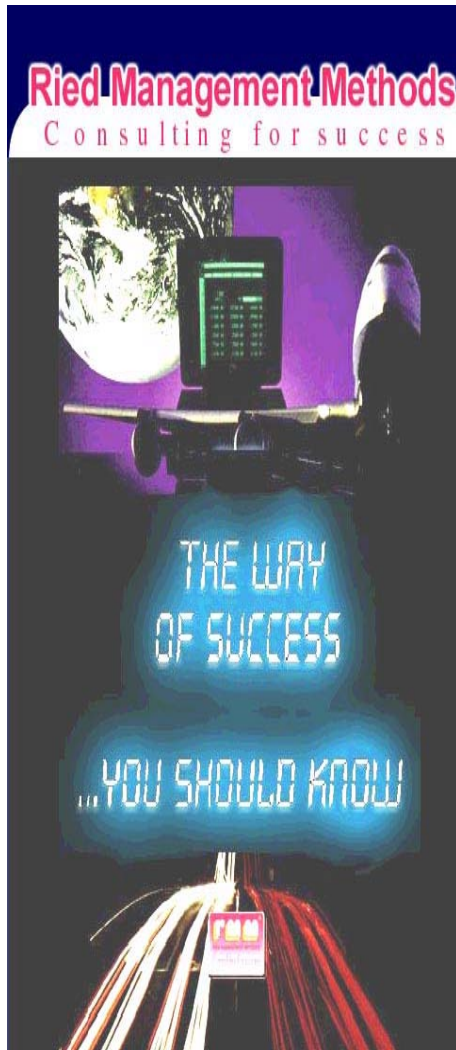


## D1 - Review

At the end of the APQP - D1 – Phase

the Team will prepare a D1-Review

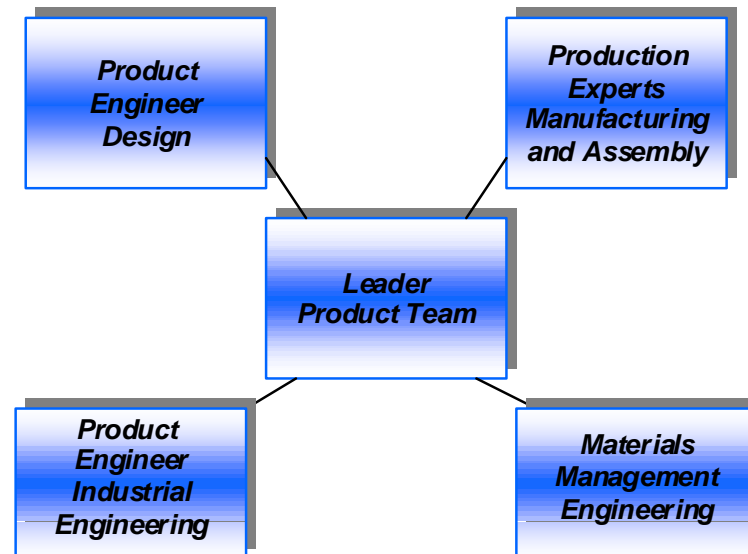
to finally confirm that the next APQP Phase can be started.

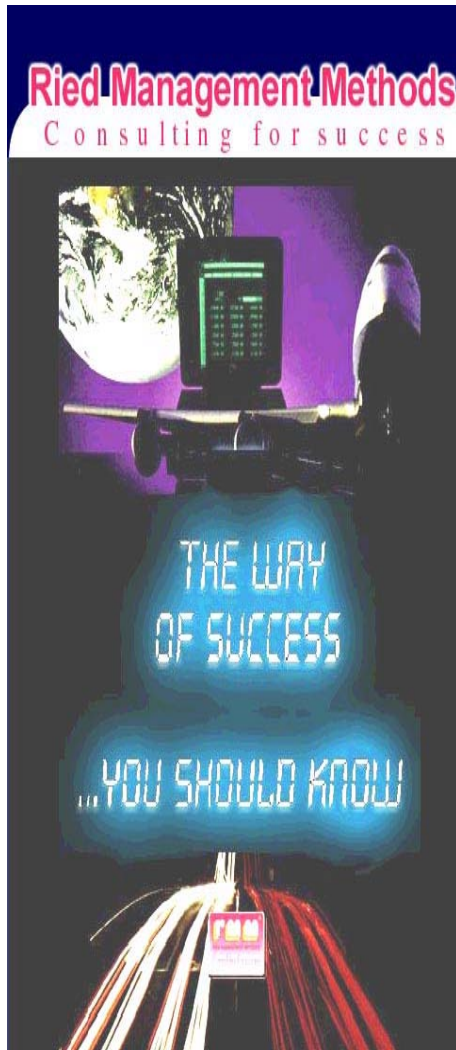


## Phase D2-Product Development

During this phase all Engineering Activities for the new product will be completed:

## APQP - Product Team Organization





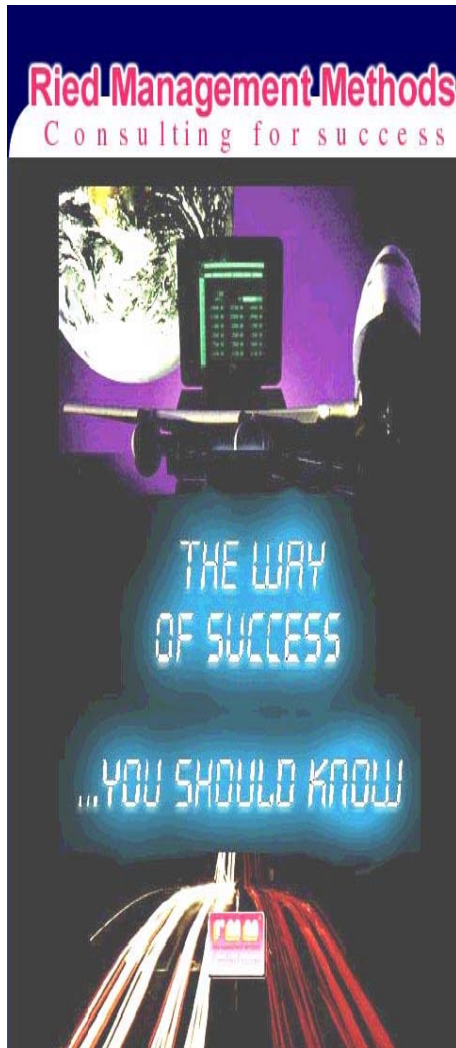
## Manufacturing and Assembly Processes

will be designed in a way that these guarantee a

- ↓ permanent high quality level  
within the SPC and PPM Targets

Well structured test programs

are a most important part of the Design Validation.



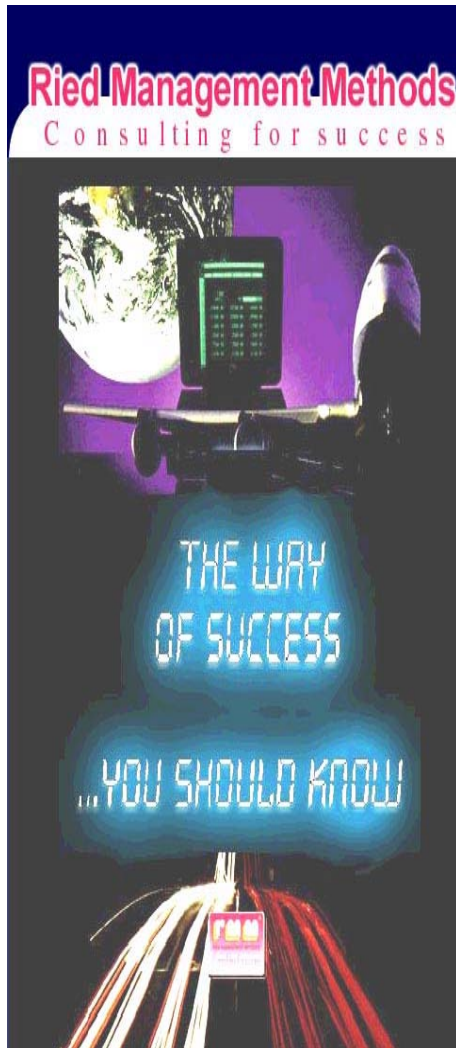
## Client Confirmation and Design Freeze

The successful Design Validation is the basis of the

- ↓ Design Confirmation by the client
- ↓ and the Design Freeze

From now on any changes will definitely cause  
heavy consequences (schedule, cost etc.).

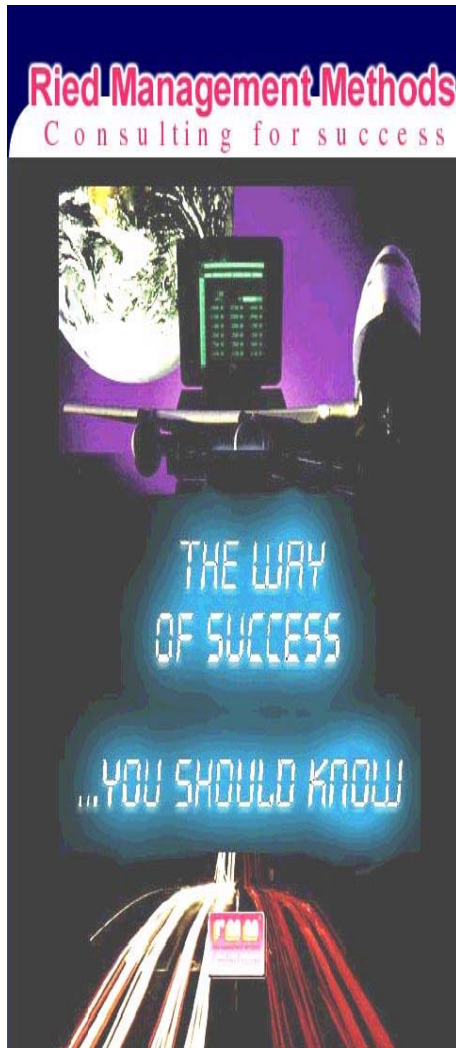




## Duty Book and Specification Review

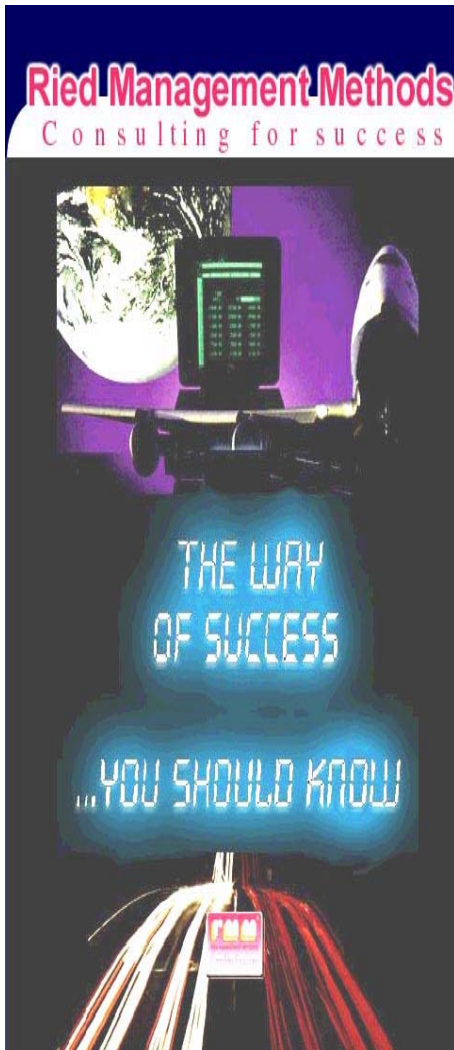
Supplier and client will review the Duty Book and the specification which will be binding from now on - and will have to be performed completely.

$$\text{Quality} = \frac{\text{Client Requirements}}{\text{Product Performance}} = \frac{1}{1}$$



## Design Review

- ↓ **Step 1** **Planning, definition of the Review Team and preparation of a Review Plan**
- ↓ **Step 2** **Development of Review Check-Lists**
- ↓ **Step 3** **Preparation of necessary documents and procedures**
- ↓ **Step 4** **Implementation, i.e. identification of problems, development of solutions and documentation**

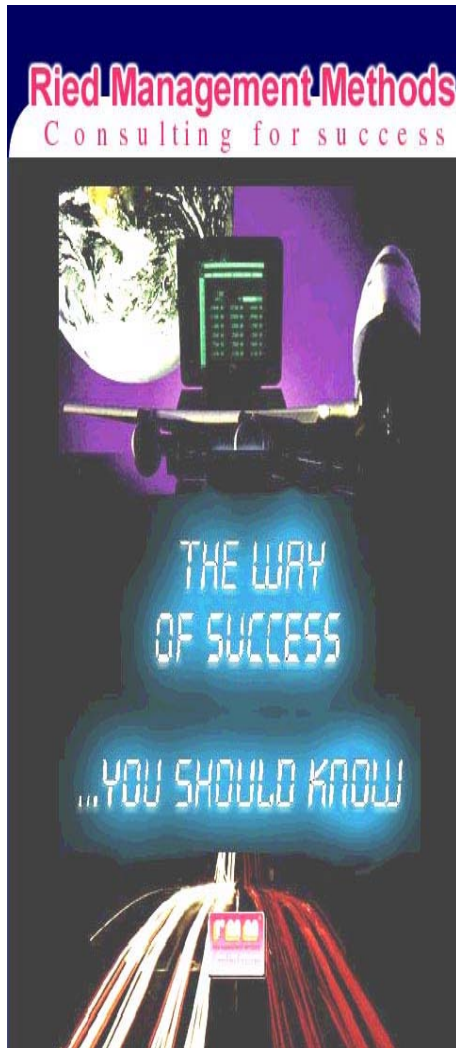


## Project Mile Stone Plan

describes all activities for the different Project Phases.

An excellent tool is the MS-Project software.

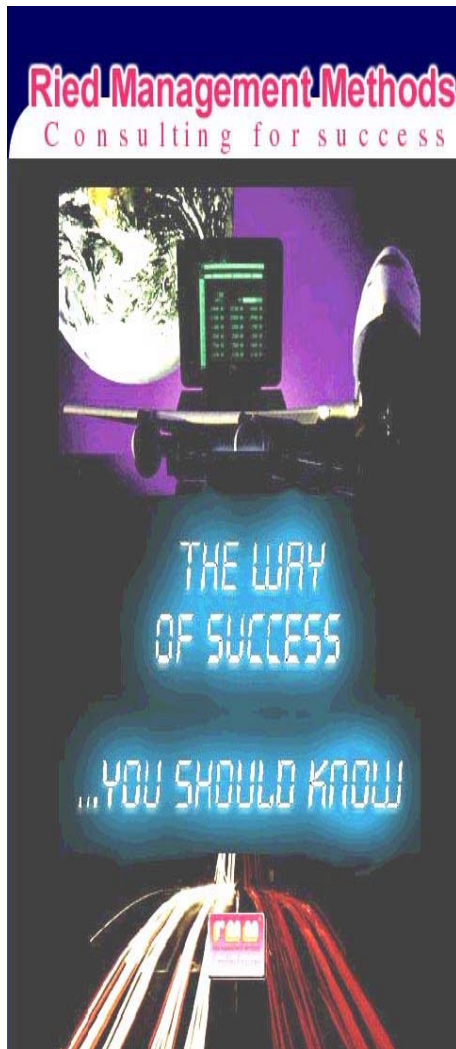
No. of Activity	Activity	No. of Days	Month/ Year							
			Jan		Feb			March		
			01	02	03	04	05	06	07	08



## Special Product and Process Criteria

Each product developed by a VE-Team must meet all specific client criteria, such as for example:

- ↓ safety relevant items
- ↓ delicate manufacturing processes
- ↓ which may cause safety, cost, function and schedule consequences

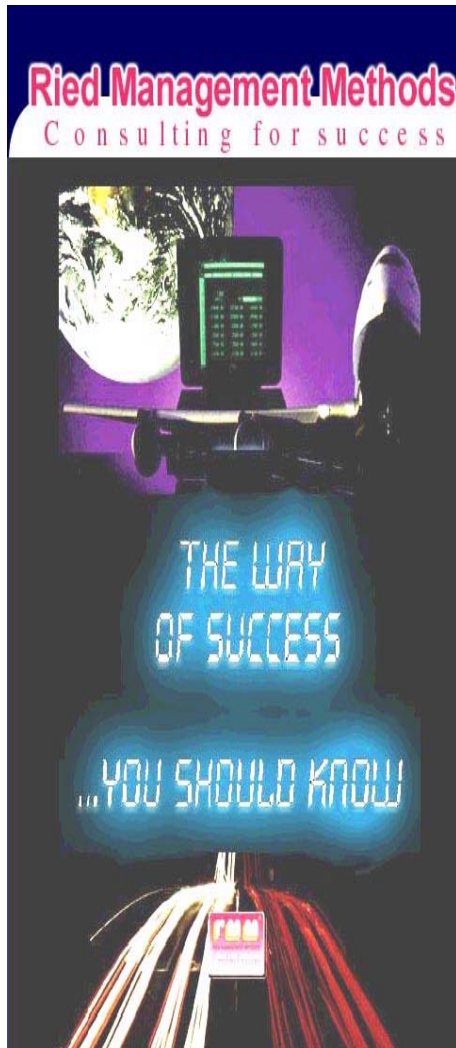


## Control Plan

The Control Plan makes sure that

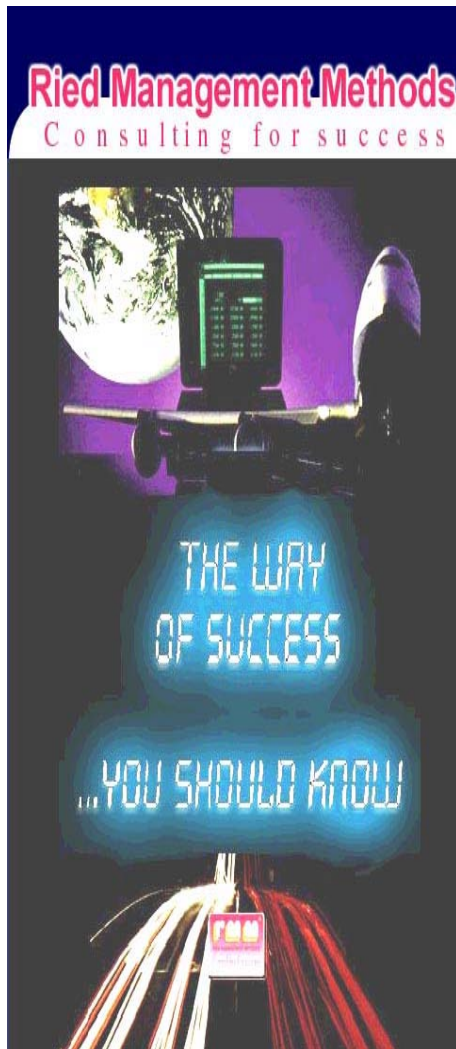
- ◆ prototypes
- ◆ first samples
- ◆ pre series-
- ◆ and series products

will be checked systematically and consequently.



## The Control Plan describes

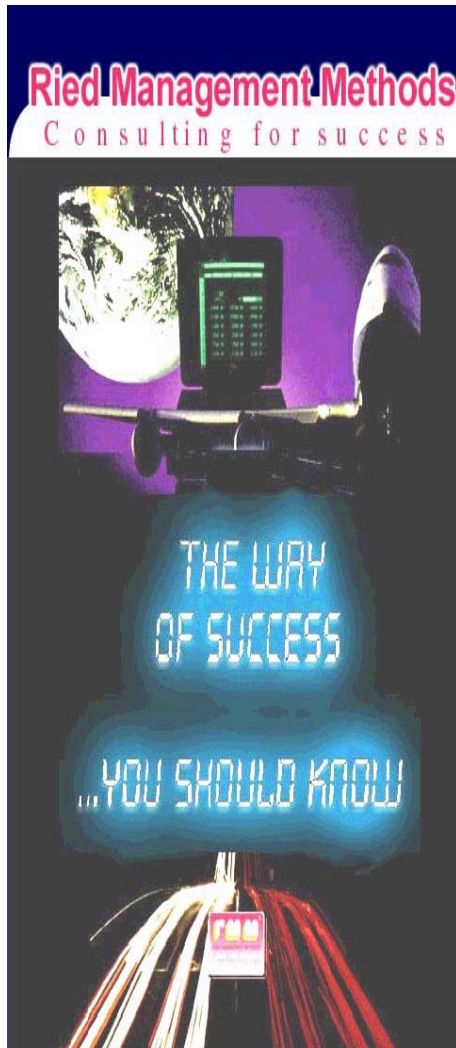
- what to check
- how to check
- how much to check
- by whom to check
- where to check
- by which mean to check
- the checking criteria
- and which measures have to be taken in case of variances



## DFMA - Design for Manufacturability and Assembly

Target = to optimize the product in regard to function and quality performance

- sensitivity of design, concept and function to manufacturing variances
- production and assembly processes
- requirements of specification parameters and drawing tolerances
- number of parts and components
- process control possibilities
- material-flow and -handling

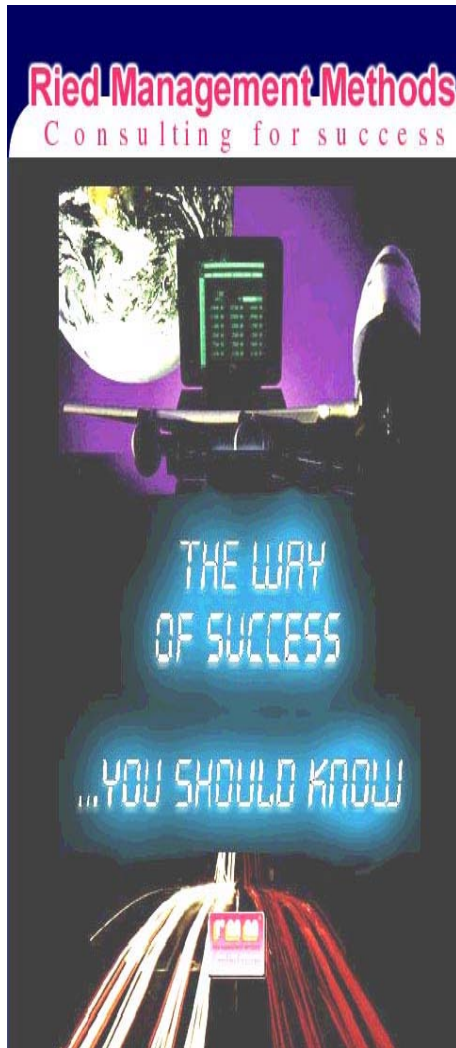


## Design Validation

The Design Validation must be performed to guarantee that the product really performs all requirements of the client.

The final validation will be done for the final product.



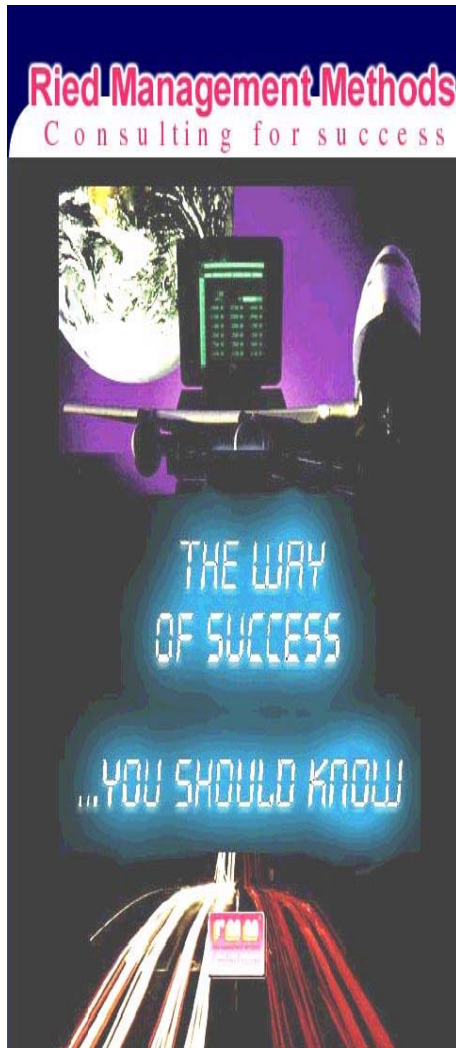


## FMEA – Failure Mode Effect Analysis

**FMEA will be applied systematically during the  
D2 – Product Development Phase  
to avoid any defects in the future.**

**FMEA asks three main questions about:**

- 1. Probability that the defect happens**
- 2. Effects for the client and the product application**
- 3. Probability of the detection before the product will be shipped to the client**



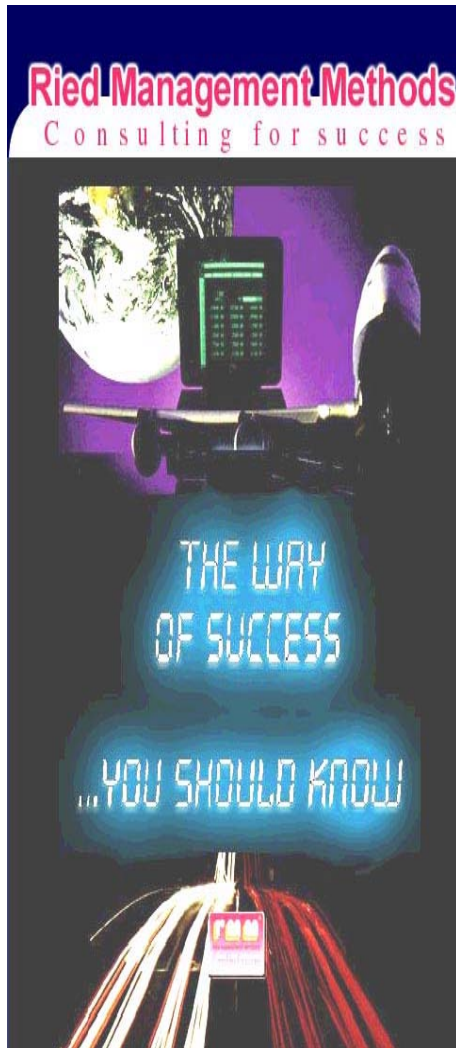
## D2-Review

At the end of the

### D2-Phase Product Development

a final review will be prepared

to guarantee that all D2-Phase activities  
were fully achieved.



## P1-Phase - Process Design

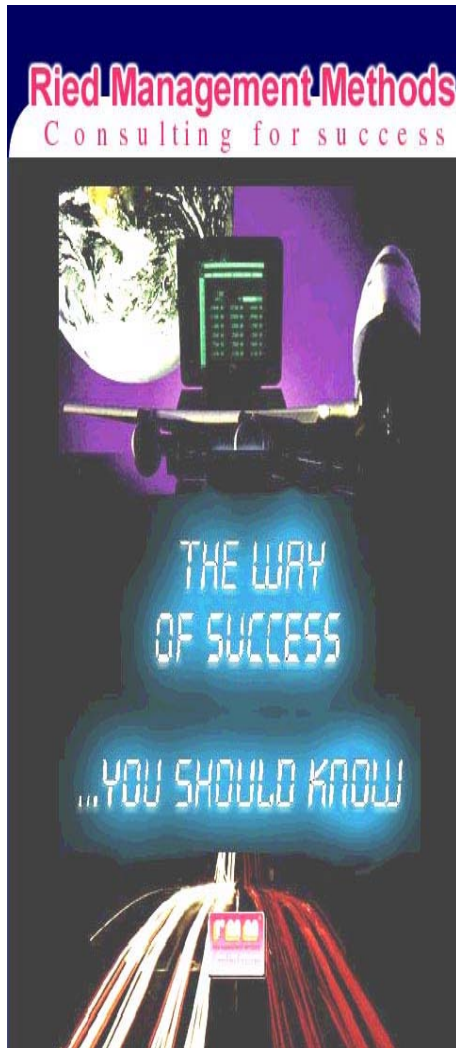
During this Phase the VE Project Teams complete the Product and Process Design.

On this basis a final calculation of:

- ◆ parts
- ◆ manufacturing cost
- ◆ manufacturing tools/machines and processes
- ◆ control equipment

will be prepared.

Also all drawings of parts and componen will be finally checked and confirmed.

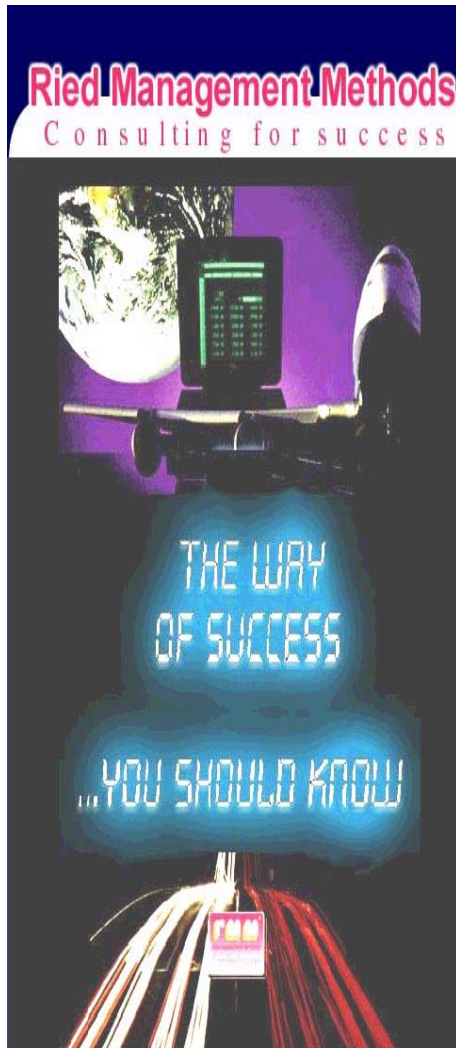


## P1 - Feasibility Check

The members of the Team must also reach a **consensus** that all criteria of the developed product will be achieved:

- Quality
- Cost
- Technique
- Schedule

On this basis the product production will be finally confirmed and started.

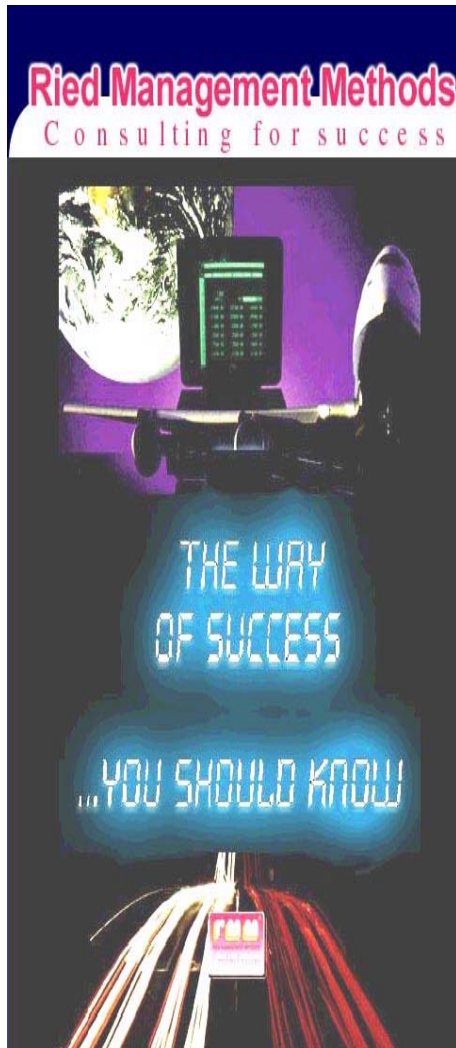


## P1 - Review

The results of the P1 - Phase

will be checked and confirmed

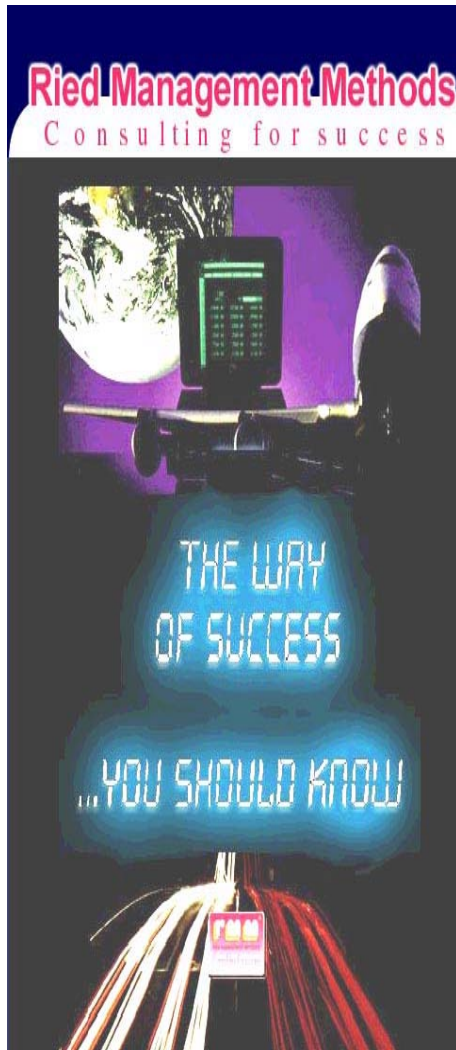
by a P1 - Review by the VE Project Team.



## P2 - Phase - Product and Process Validation

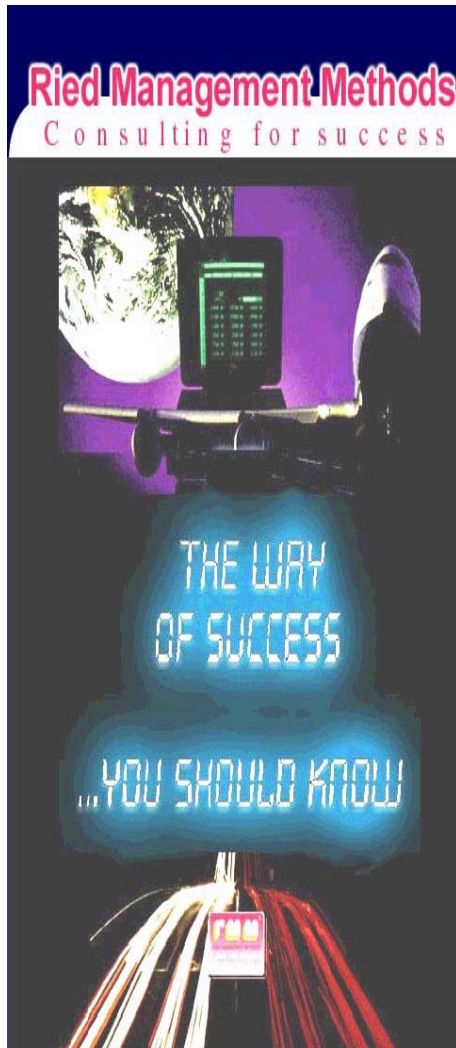
The P2 - Phase makes sure  
that all conditions are completed to manufacture the new product:

- in the required number of units
- in the required quality
- at the lowest possible cost
- at the right time to meet the delivery time schedule



## P2 - Review and Start of Pre-Series Production

In order to start the Pre-Series Production,  
the P3 - Phase Review must be completed.



## P3 - Phase - Series Production

On the basis of the confirmed results

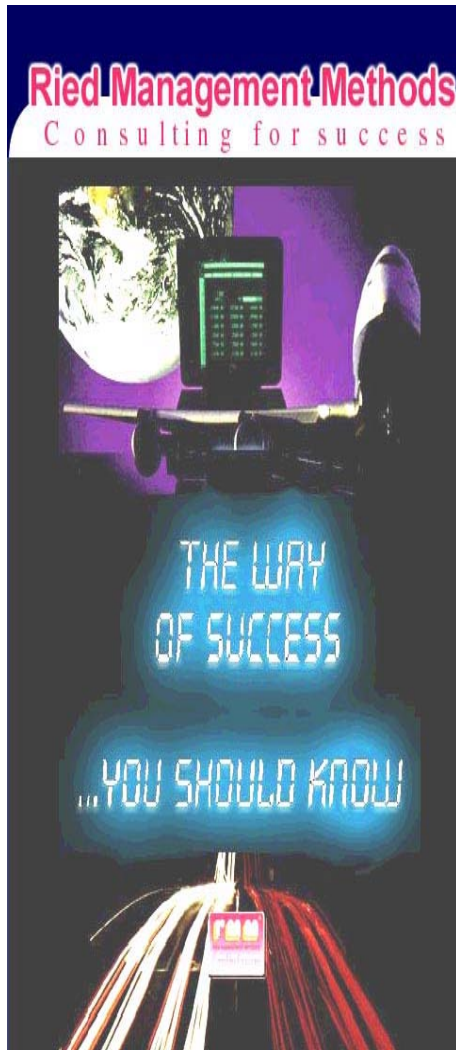
of the Pre-Series Production and the client's confirmation  
the Series Production P3 will be started.

A specific check-list

„Confirmation of Series Production“

will be completed to document that all processes are fully in operating function and that the products being manufactured and assembled are achieving all requirements and targets.



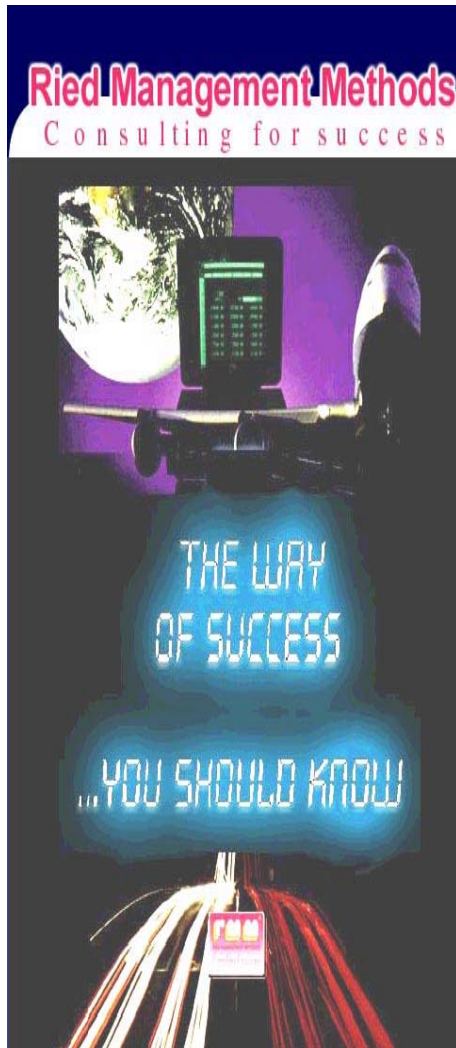


**Customer full satisfaction**

**The customer now is fully satisfied**

**as he gets his products in the desired quality**

**and always on time.**

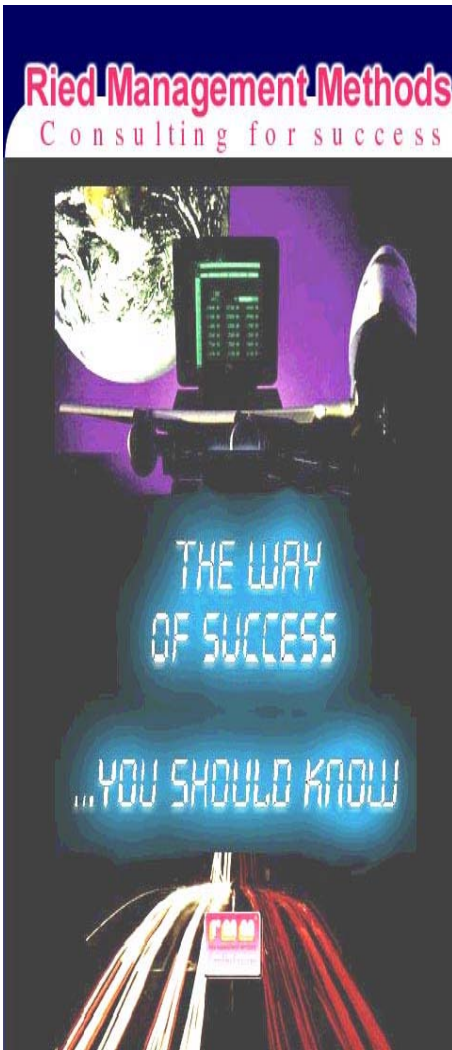


## Special Product and Process Criteria

The consequent application of the APQP procedures in Value Management and VE-Teams guarantees

- ↓ value added products
- ↓ and the basis to create wealth for companies.

because companies applying the APQP procedures are becoming and staying a remarkable and calculable partner for customers from around the world.



Good Luck!

