

# NACELLE DAMAGE DESCRIPTION (NDD) GUIDE AND EXAMPLES

—  
23rd March 2017



# TABLE OF CONTENT

## 1. Reminder

## 2. Mandatory information

1. Why and which data are mandatory?
2. Relation with Repair Design Approval Sheet (RDAS)

## 3. Example of nacelle damage description illustrations

1. Cracks on composite structure
2. Impacts on metallic structure
3. Loose rivets on composite parts

## 4. Requested data

## 5. Damage description check list

SAFRAN		DAMAGE DESCRIPTION		Cust. Request Reference	
2477 Technical Call Center Phone : + (33) 164 149 033 Fax : (33) 164 149 037		CUSTOMER SUPPORT ENGINEERING		Date of Request	
				Page : 1 / 3	
<p><b>IMPORTANT NOTE:</b> All highlighted block <input type="text"/> must contain an entry in order to process a repair request. Inaccurate or missing information can result in delays, please ensure all details are addressed and all questions answered, or all request please contact <a href="mailto:atcelle.csc@necma.fr">atcelle.csc@necma.fr</a>. A response will be provided after receipt of the complete damage description.</p>					
<hr/>					
CUSTOMER INFORMATION			REQUEST TYPE AND PRIORITY		
Contact Name	<input type="text"/>	Resp. need date	<input type="text"/>		
Requester entity	<input type="text"/>	Priority	<input type="text"/>		
E-mail Address	<input type="text"/>				
Phone Number	<input type="text"/>				
-----					
AIRCRAFT INFORMATION					
Program	<input type="text"/>	Aircraft MSN	<input type="text"/>		
Airline	<input type="text"/>	A/C Flight Hours (FH)	<input type="text"/>		
Aircraft Tail Number	<input type="text"/>	A/C Flight Cycles (FC)	<input type="text"/>		
AFFECTED NACELLE COMPONENT INFORMATION			MAIN AFFECTED DETAILED COMPONENT INFO		
End item Designation	<input type="text"/>	Part Designation	<input type="text"/>		
End item Part Number	<input type="text"/>	Part Number	<input type="text"/>		
End item Serial Number	<input type="text"/>	Serial/Lot Number	<input type="text"/>		
End item Flight Hours	<input type="text"/>	Engine Position	<input type="text"/>		
End item Flight Cycles	<input type="text"/>	LH/RH on engine	<input type="text"/>		
ATA Subcomp Name	<input type="text"/>	ATA Subcomp Num	<input type="text"/>		
-----					
EVENT DESCRIPTION					
Root cause	<input type="text"/>				
Oper. consequences	<input type="text"/>				
Nacelle Situation	<input type="text"/>				
MAIN DAMAGE DESCRIPTION			MAX DAMAGE QUANTITY/DIMENS. ( mm )		
Main Damage Type	<input type="text"/>	Max diam. or length	<input type="text"/>		
Affected area	<input type="text"/>	Min remaining thick.	<input type="text"/>		
O'clock loc. of nacelle	<input type="text"/>	Max affected plies	<input type="text"/>		
Main Location	<input type="text"/>				
NON DESTRUCTIVE TEST					
NDT performed	<input type="text"/>	PREVIOUS REPAIR IN THE DAMAGED AREA (IF ANY)			
Findings	<input type="text"/>	Repair doc ref.	<input type="text"/>		
		Acoustic surface loss	<input type="text"/>	mm <sup>2</sup>	
OTHER DETAILS					
<input type="text"/>					



# 1

## REMINDER

## 1. Reminder (as stated in “User guide” of NDD worksheet)

### ▪ Basics

- ◆ Check that the repair of reported damage is not already addressed in the technical documentation (AMM, SRM, CMM, SB...)
- ◆ The **estimated cost of repair** is not near to, or does not exceed, the cost of the replacement part
- ◆ **All highlighted blocks entry fields in yellow** of “NDD” worksheet have been **completed** → Inaccurate or missing information can result in delays

## 1. Reminder (as stated in “User guide” of NDD worksheet)

### ▪ Damage information required

- ◆ The damage report only concerns one end item and its related damage(s). Be sure to return **one separate Damage Description form per each end item.**
- ◆ Digital **photos** have been provided showing the **damage close-up, and from afar**; (the damage location, relative to the main structure, can be clearly seen).
- ◆ Detailed sketch(s), and/or marked-up photograph(s) adequately describe the following:
  - Damage **size** (length, width and depth)
  - Location** (radial position (degrees or clock position), Power Plant Station (PPS) or proximity to adjacent landmark structure such as edge of part, local stiffeners, doublers, access panels, latches, hinges, ribs, fastener rows, etc.)
  - Clearly **identify damaged part**
  - Orientation** (view looking forward or aft)
  - CMM IPL/AMM/IPC references** should be included whenever possible.

# 2

## MANDATORY INFORMATION



## 2.1 Why and which data are needed?

- **The highlighted blocks entry field in yellow are necessary and/or mandatory for the following reasons:**
  - Some information (such as part number, serial number, ATA reference, FC/FH...) are **needed to raise the Repair Design Approval Sheet (RDAS)** that substantiates the repair. If data are missing, RDAS can not be issued
  - Some information are **needed to develop the repair procedure** (such as damages description and dimensions, non destructive tests performed and associated results...). If data are missing, the repair procedure can not be developed
  - Some information (such as Airline owner, operational consequences, nacelle situation...) are **needed to capitalize** in SAFRAN Nacelles databases the damage occurrences and consequences for customer. This will permit to **prioritize field actions and propose customized solutions** to our customers

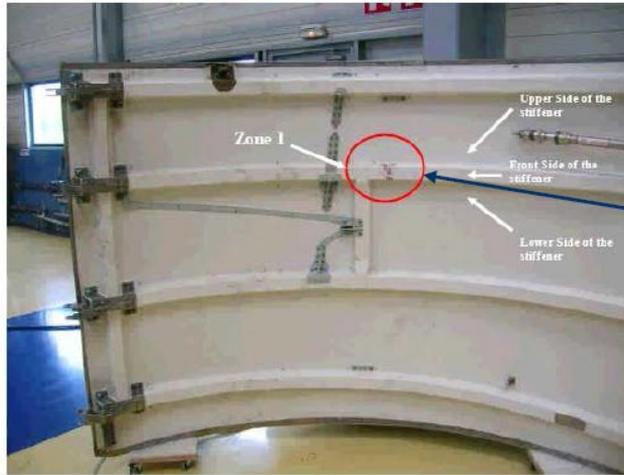




# 3

## EXAMPLE OF NACELLE DAMAGE DESCRIPTION ILLUSTRATIONS

### 3.1 Example 1: cracks on composite structure



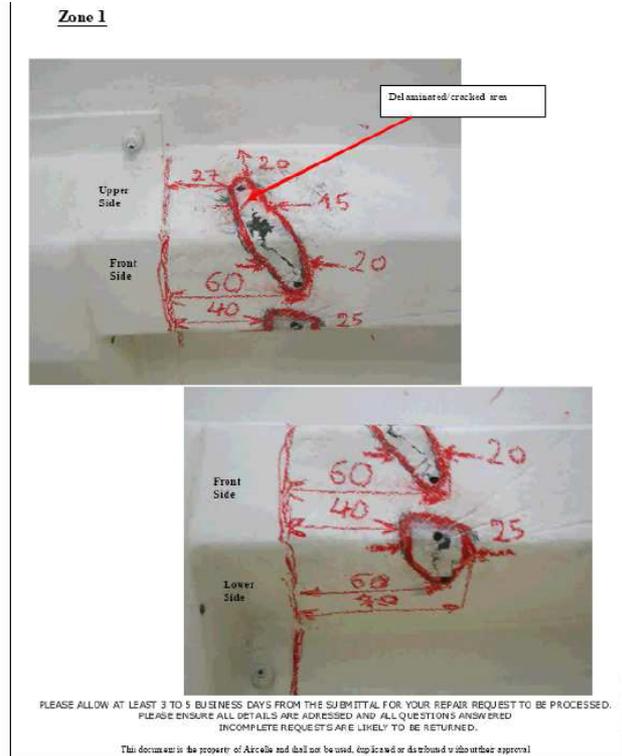
**THE STIFFENER N° 2 HAS BEEN FOUND CRACKED ON THE FAN COWL AFTER DVI (DETAILED VISUAL INSPECTION)**

NOTE : all dimensions are in millimeters.

## 3.1 Example 1: cracks on composite structure

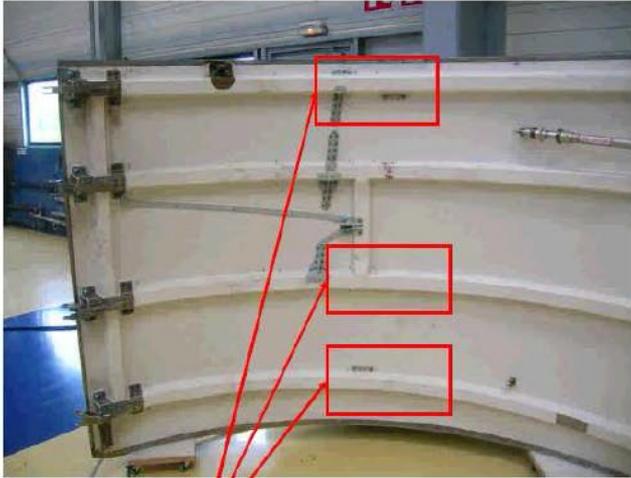
THE CRACKS ARE VISIBLE BUT THE ASSOCIATED DELAMINATION CAN ONLY BE DETECTED WITH NDT.

IN THIS CASE, THE INSPECTOR HAS PERFORMED AN ULTRASONIC TEST.



DAMAGES HAVE BEEN LOCATED USING THE CLOSEST LONGITUDINAL STIFFENER AS REFERENCE.

## 3.1 Example 1: cracks on composite structure



These areas on the three other stiffeners have been controlled by U-S inspection. They are free of any damage.

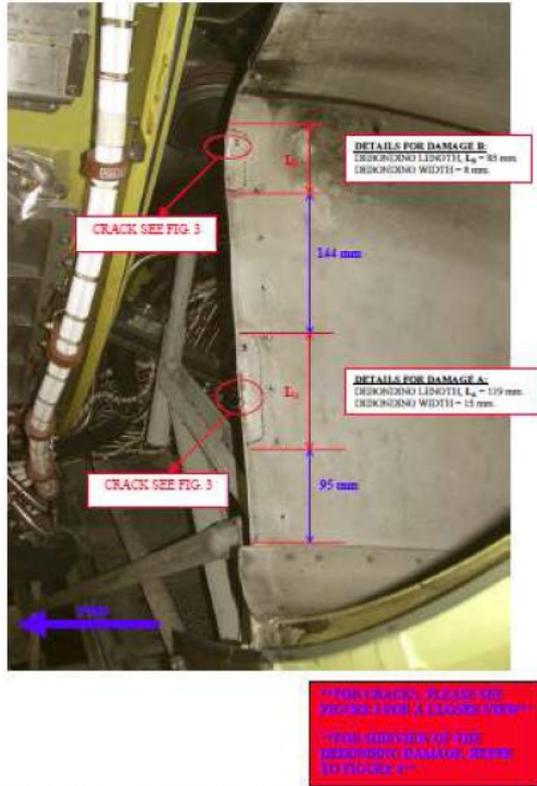
**THE OTHER STIFFENERS AND THE OUTER SKIN HAVE BEEN INSPECTED (ULTRASONIC), TO CONFIRM THE DVI : THEY ARE FREE OF DAMAGE.**

External skin : the external skin is free of damage (see following inspected areas)



## 3.2 Example 2: Impacts on metallic structure

FIGURE 2. ACTUAL PHOTO OF THE DAMAGES

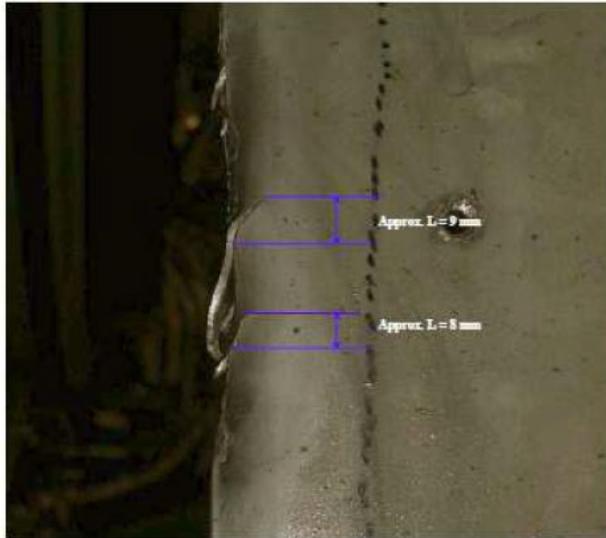


TAP TEST HAS BEEN PERFORMED AROUND THE 2 VISIBLE DAMAGES TO DETECT THE DISBONDED AREA.

THE DISBONDED AREA ARE LOCATED USING THE FLOW PATH FAIRING AS REFERENCE.

## 3.2 Example 2: Impacts on metallic structure

DAMAGE A

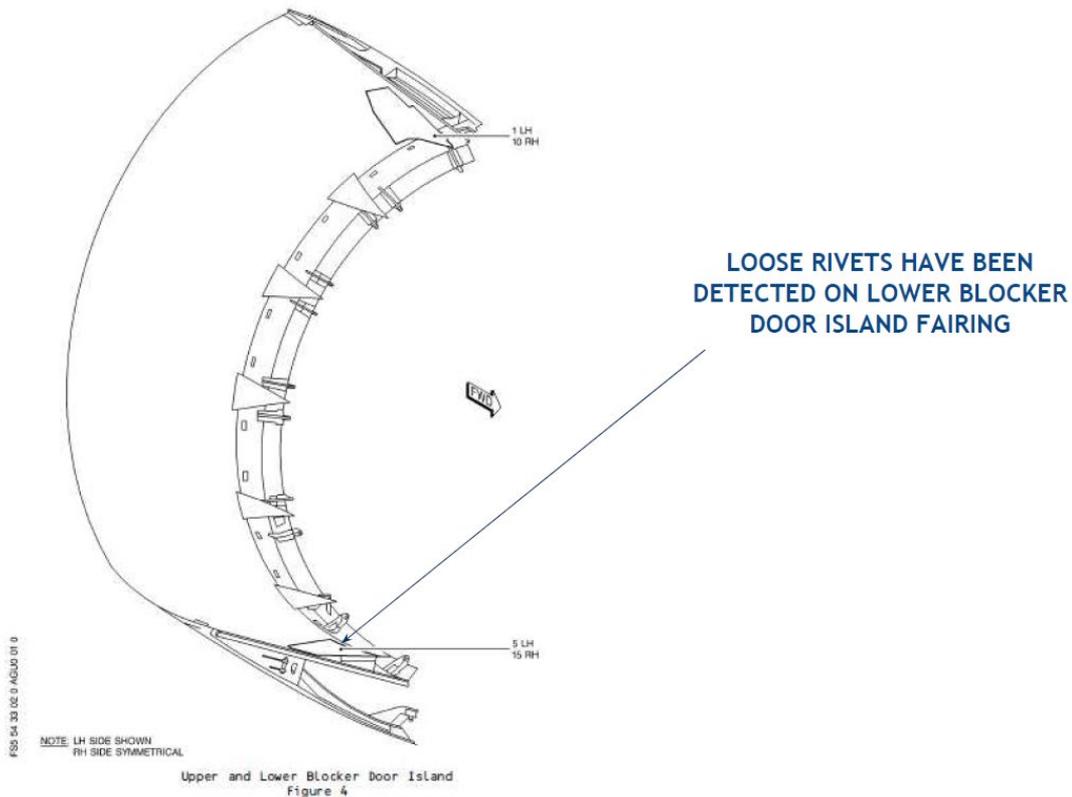


FLUORESCENT PENETRANT  
HAS BEEN PERFORMED ON  
BOTH DAMAGE FOR CRACK  
DETECTION

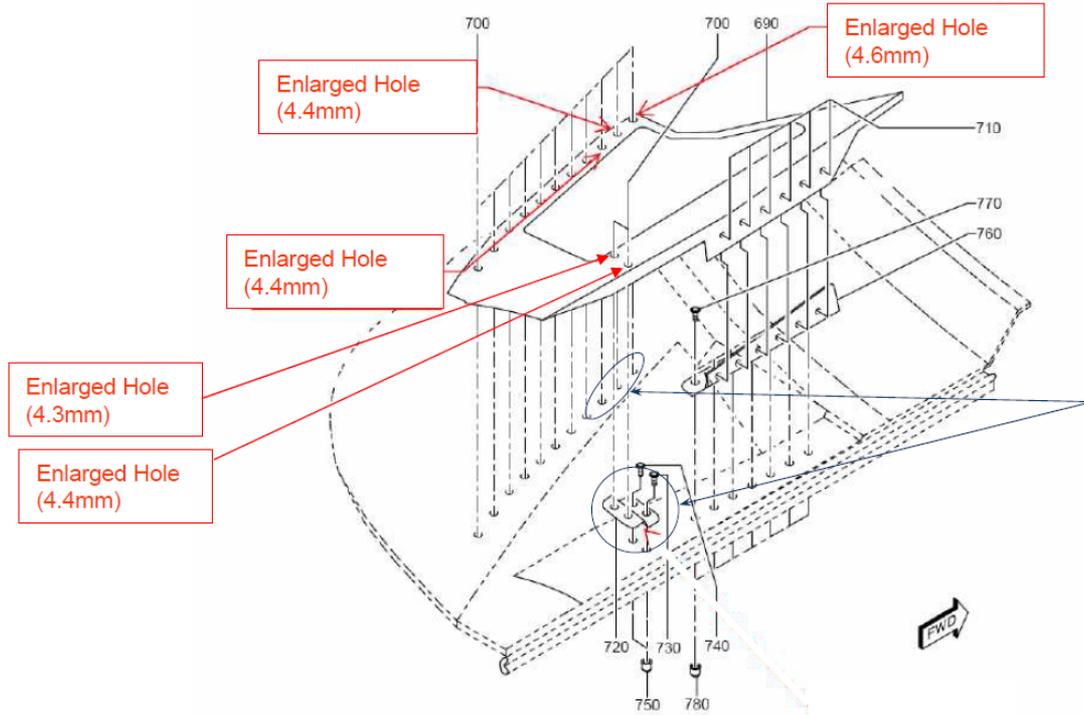
DAMAGE B



### 3.3 Example 3: Loose rivets on composite parts



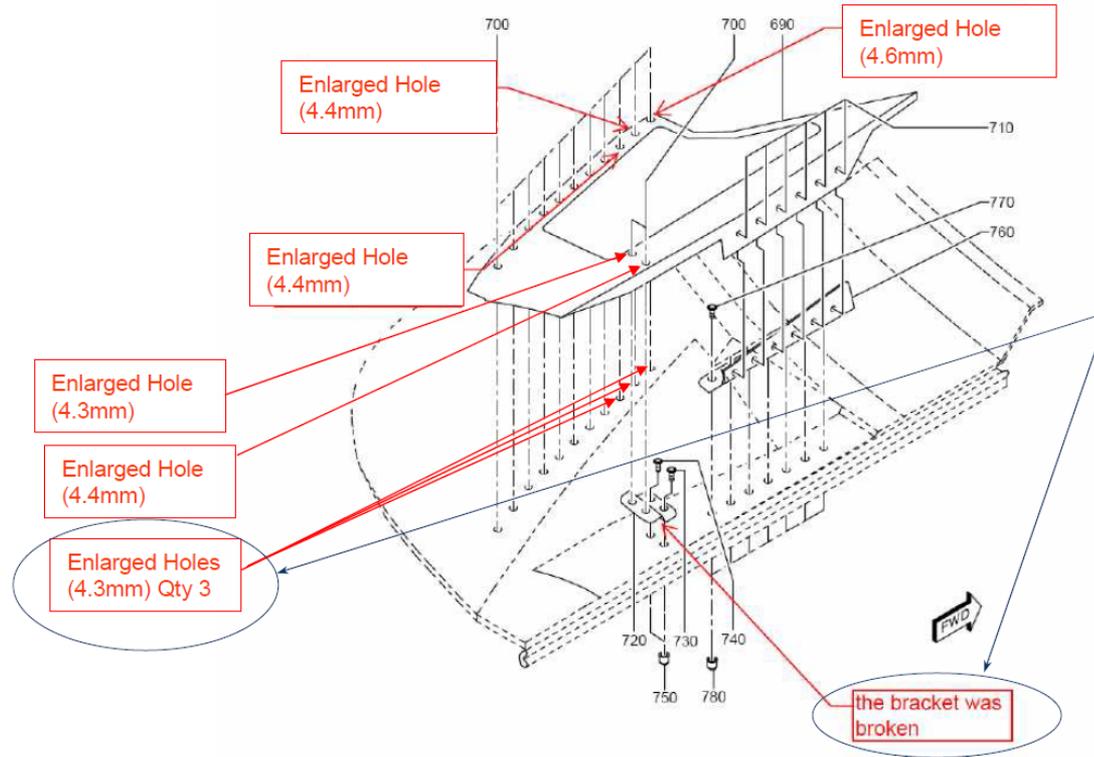
### 3.3 Example 3: Loose rivets on composite parts



**LOOSE RIVETS GENERALLY HAVE CONSEQUENCES ON LOWER PARTS OF THE ASSEMBLY**

**IN THIS CASE : METALLIC BRACKET AND ACOUSTIC PANEL MUST BE INSPECTED (MEASUREMENT OF HOLES + NDT)**

### 3.3 Example 3: Loose rivets on composite parts



**METALLIC BRACKET WAS FOUND BROKEN, AND HOLES IN ACOUSTIC PANEL WERE ALSO ENLARGED.**

**COMPOSITE PARTS WERE FREE OF DELAMINATION.**



# 4

## REQUESTED DATA

## 4. Technical data requested pending damage type

- **Location:**
  - > Distance between the edge of the damage and the center of fasteners
  - > Distance between edge of the damage and edge of the panels (leading edge, trailing edge, 12OC edge, 6OC edge)
  - > Distance between 2 fasteners is given from center of fasteners
  - > Distance between 2 damages is given from edges of damages
  - > Relative position of damages on each skin (sandwich area, through damage)
  
- **Inspection (list is not exhaustive, you must refer to the Non Destructive test manual for more details):**
  - > Metallic skins:
    - ◆ Fluorescent Penetrant Inspection for cracks
    - ◆ Detailed visual inspection
    - ◆ Electrical conductivity... (pending of the damage)
    - ◆ Eddy Current test
  - > Composite area:
    - ◆ Tap test for disbond in sandwich area (between skin and honeycomb core)
    - ◆ Ultrasonic inspection (monolithic and sandwich) for delamination
    - ◆ Detailed visual inspection

## 4. Technical data requested pending damage type

- **Impacts on composite sandwich / monolithic area:**
  - > Location of the damage, distance with other damages and fasteners
  - > Depth of the damage or number of missing/damaged plies
  - > Impacts on honeycomb core,
  - > Delamination / disbond / dents
  
- **Delamination:**
  - > Location of the damage, distance with other damages and fasteners
  - > Length and width
  - > Depth of the damage or number of missing/damaged plies
  
- **Disbond:**
  - > Location of the damage, distance with other damages and fasteners
  - > Length and width

## 4. Technical data requested pending damage type

- **Dent, wear, gouge, scratch, hole:**
  - > Location of the damage, distance with other damages and fasteners
  - > Length and width
  - > Depth of the damage or number of damaged plies
  
- **Cracks:**
  - > Location of the damage, distance with other damages and fasteners
  - > Length
  
- **Corrosion - after corrosion removal:**
  - > Location of the damage, distance with other damages and fasteners
  - > Length and width
  - > Depth of the damage
  
- **Elongated holes:**
  - > Location of the damage, distance with other damages and fasteners
  - > Delamination
  - > Broken / cracked metallic parts linked to the fasteners

# 5

## DAMAGE DESCRIPTION CHECK LIST



# 5. Damage description check list – refer to NDD “User Guide” sheet

## BASICS

- Check that the repair of reported damage is not already addressed in the technical documentation (AMM, SRM, CMM, SB...)
- The estimated cost of repair is not near to, or does not exceed, the cost of the replacement part.
- All highlighted blocks entry fields in yellow of “NDD” worksheet have been completed. Inaccurate or missing information can result in delays. If AOG be sure to provide aircraft location and next scheduled flight.

## DAMAGE INFORMATION REQUIRED

- The damage report only concerns one end item and its related damage(s). Be sure to return one separate Damage Description form per each end item.
- Digital photos have been provided showing the damage close-up, and from afar; (the damage location, relative to the main structure, can be clearly seen).
- Detailed sketch(es), and/or marked-up photograph(s) adequately describe the following:
  1. Damage size (length, width and depth)
  2. Location (radial position (degrees or clock position), Power Plant Station (PPS) or proximity to adjacent landmark structure such as edge of part, local stiffeners, doublers, access panels, latches, hinges, ribs, fastener rows, etc.)
  3. Clearly identify damaged part.
  4. Orientation (view looking forward or aft)
  5. CMM IPL/AMM/IPC references should be included whenever possible. For guidance, refer to the structural identification section of the Structural Repair Manual (SRM).
- The cause of damage has been given. If cause is unknown, please state “Unknown”.
- The damage has been classified, and described according to the table below:

<b>Cracks in metallic components</b>	Specify NDT method used to determine crack length and crack ends.
<b>Nicks, scratches and gouges in metallic structure</b>	Provide minimum remaining material thickness at location of defect after blending per SRM Chapter 51. Alternatively, if minimum remaining thickness is not possible, determine the material loss (depth).
<b>Corrosion</b>	Provide minimum remaining thickness after corrosion removal has been accomplished using methods available in applicable SRM
<b>Oversized / elongated holes and loose rivets</b>	Determine maximum diameter of hole required to remove elongation damage and confirm if underlying structure is affected. Maximum hole diameter and countersink diameter and depth along with edge distances need to be provided
<b>Composite surface damage</b>	Damage area and adjacent areas must be tap tested to detect any disbond from the core or ply delamination's are present. Determine how many plies are damaged. Provide a detailed mapping.
<b>Composite edge erosion damage</b>	Determine the number of structural (carbon) plies damaged (light sanding may be required to identify actual damage depth).

**Before submitting a Damage Description form, review this checklist line-by-line to ensure ALL boxes are checked. If any boxes cannot be checked, please contact your Field Service Representative for guidance.**