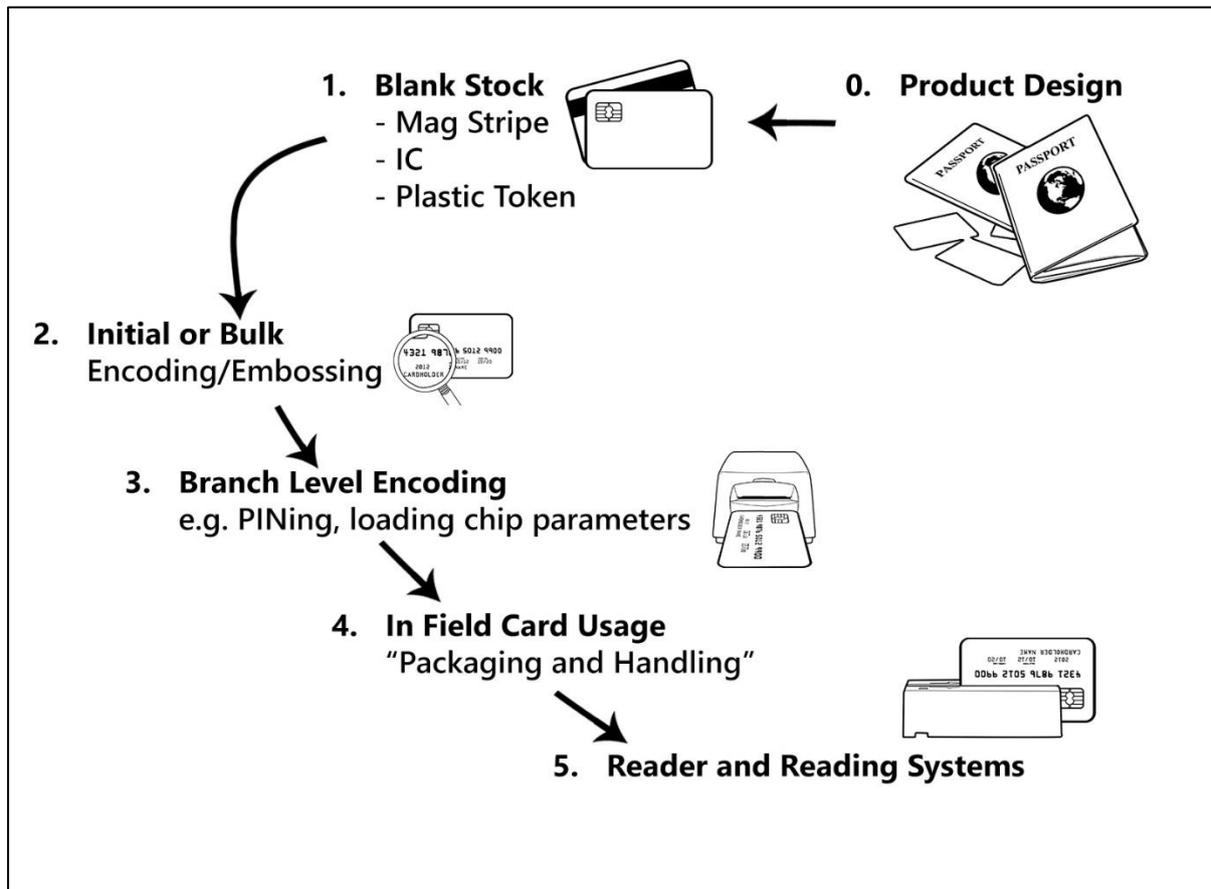


## Card failure, how does it occur?

Typical card production & use:





## 1. Card Stock

The initial card quality of the components which typically make up a magnetic stripe or IC card can in some cases have a significant effect on not only the quality of the data/information that is written/encoded on the magnetic stripe but additionally the durability parameter of the token itself. There are 2 fundamental groups to which new, un-encoded (blank) card characteristic can be categorised into:

**A. Electric characteristics**

i.e. Remanence, coercivity, resolution, static electricity (IC Cards)

**B. Physical characteristics**

i.e. lamination/bond strength, magnetic stripe surface profile and roughness, card dimensions, location of stripe, plastic durability

ISO, ANSI and MasterCard have specified an array of tests which dictate minimum standards for many of the un-encoded (blank) card characteristics above. If these specifications limits are breached, or in some cases merely approached, the subsequent quality of the data encoded (written) to the stripe and the useful lifetime of a token may suffer. CTI can provide analysis of the major ISO testing involved in this area.

## 2 & 3. Encoding Process

Another important aspect pertaining to the degree of card reliability is the overall performance of an encoder (which may or may not be operator influenced) in writing the data or information to the magnetic stripe. ISO has defined set parameter boundaries/limits for which a new card should not exceed. CTI can provide ISO testing and analysis how a particular encoder is performing in relationship to these ISO specifications. The majority of poor performances in this area are generally caused by:

- Poor encoder design
- Worn/old/damaged encoders
- Encoders which are incorrectly setup or monitored
- Operator induced errors
- Simple 'wear and tear'

We can relate a cards characteristics back to the ISO specifications and back to a 'real world' performance in a typical field reader.



#### 4. Card in field use

It is a common occurrence for cards which have previously functioned perfectly to either gradually or suddenly fail to read correctly. The two major or primary causes of this phenomenon are:

**A. Accidental magnetic erasure/static damage (IC card only)**

As the data held on the magnetic stripe is of a magnetic nature it can be erased/disrupted by an outside magnetic field, such as a fridge/clasp magnet or 'security' tag deactivator commonly found in clothing stores.

**B. Natural deterioration of the stripe and card quality**

A more subtle effect than magnetic erasure and static damage, natural deterioration is nonetheless another agent involved in card failure.

Dependant on the properties of the tape, plastic and amount of general 'wear and tear', the card quality will begin to deteriorate as the bit 'pattern' which represents the card data degrades. Once again ISO has set limits for Used/Returned cards. These limits are much more lenient than those for new cards, specifically allowing for 'natural deterioration'.

In summary the major factors contributing to card failure from use in the field are:

Plastic damage - cracks, bends etc.

Stripe damage- scratches, wear, and natural deterioration

Magnetic erasure, static damage (IC card only)

Owner abuse

#### 5. Readers and Reading Systems

As the last component in the card based transaction system, they certainly have the final influence on whether the card is read or is rejected. In general a reader's failure to perform can mainly be attributed to the commonly occurring deficiencies below.

Poor design

Worn readers

System/Application errors

Damaged/faulty readers

Normally we see the above deficiencies contributing too, or compounding the poor data quality results on a card.

**Note: 'Integrated Circuit/Smart Cards'** are also affected by many of the above factors mentioned. This paper has not addressed the additional factors which can have an effect on IC Cards (e.g. Static Electricity, chip location and adhesion, Electromagnetic Interference etc.). Additional information available.